Public Interest Comment\(^1\) on

The Pipeline and Hazardous Materials Safety Administration’s Proposed Rule:
Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains

Docket ID No. PHMSA-2012-0082 (HM-251)
RIN: 2137-AE91

September 30, 2014

Sofie E. Miller, Senior Policy Analyst\(^2\)

The George Washington University Regulatory Studies Center

Retrospective Review Comment Project

The George Washington University Regulatory Studies Center works to improve regulatory policy through research, education, and outreach. As part of its mission, the Center conducts careful and independent analyses to assess rulemaking proposals from the perspective of the public interest. This comment on the Pipeline and Hazardous Materials Safety Administration’s proposed rule intended to reduce the consequences of accidents involving trains that ship crude oil and ethanol does not represent the views of any particular affected party or special interest, but is designed to evaluate whether the agency’s proposal incorporates plans for retrospective review, pursuant to Executive Order 13563.

---

\(^1\) This comment reflects the views of the author, and does not represent an official position of the GW Regulatory Studies Center or the George Washington University. The Center’s policy on research integrity is available at [http://regulatorystudies.columbian.gwu.edu/policy-research-integrity](http://regulatorystudies.columbian.gwu.edu/policy-research-integrity).

\(^2\) Sofie Miller is a Senior Policy Analyst at the George Washington University Regulatory Studies Center, 805 21st St. NW, Suite 609, Washington, DC. She can be reached at sofemiller@gwu.edu or (202) 994-2974.
Introduction

In this rulemaking, the Pipeline and Hazardous Materials Safety Administration (PHMSA) proposes to revise its existing Hazardous Materials Regulations (HMR) establishing requirements for high-hazard flammable trains (HHFTs). PHMSA argues that this revision is necessary because growth in crude oil and ethanol production has presented challenges for the domestic transportation system.

The increase in shipments of large quantities of flammable liquids by rail has led to an increase in the number of train accidents, posing a significant safety and environmental concern.³

The volume of flammable liquids shipped by rail and in HHFTs has been increasing rapidly since 2006, representing a growing risk. Therefore, we are reevaluating the structure of the HMR as they pertain to rail transportation.⁴

More and more crude oil and ethanol is shipped to its destination via rail, which has increased the number (and severity) of train accidents because ethanol and crude oil are flammable materials that also pose environmental harms when released. The intent of updating the HMR is “to lessen the frequency and consequences of train accidents/incidents (train accidents) involving certain trains transporting a large volume of flammable liquids.”⁵

Currently, the Department of Transportation (DOT) has set specifications for the design of tank cars that carry certain flammable liquids, “DOT Specification 111” tank cars. This proposal would require DOT Specification 111 tank cars to undergo extensive retrofitting to ship crude oil and ethanol, and would require new tank cars to meet either updated specifications for HHFTs (“DOT Specification 117”) or performance criteria in order to ship these flammable liquids.

In this NPRM, we propose to require a tank car that is constructed after October 1, 2015 and used to transport ethanol or crude oil or used in a HHFT, to either meet the proposed DOT Specification 117 design requirements or the performance criteria. Under this proposal, a car manufactured to the performance standard must be approved in accordance with §179.13(a) and must incorporate several enhancements to increase puncture resistance; provide thermal protection to survive a 100-minute pool fire; and protect top fitting and bottom outlets during a train accident. The proposed performance standard is intended to encourage innovation in tank car designs, including materials of construction and tank car

³ 79 FR 45017
⁴ 79 FR 45019
⁵ 79 FR 45016
protection features, while providing an equivalent level of safety as the DOT Specification 117. Tank car manufacturers would be allowed to develop alternative designs provided they comply with the performance requirements.⁶

PHMSA also proposes classification and characterization standards for crude oil, reduced operating speeds for non-compliant tank cars shipping crude oil and ethanol, and enhanced braking requirements for all HHFTs.

As a part of its ongoing Retrospective Review Comment Project, the Regulatory Studies Center examines significant proposed regulations to assess whether agencies propose retrospective review as a part of their regulations, and submits comments to provide suggestions on how best to incorporate plans for retrospective review into their proposals. To facilitate meaningful retrospective review after the promulgation of a final rule, multiple government guidelines instruct agencies to incorporate retrospective review plans into their proposals during the rulemaking process.

**Incorporating Retrospective Review into NPRMs**

Through a series of Executive Orders, President Obama has encouraged federal regulatory agencies to review existing regulations “that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned.” On January 18, 2011, President Obama signed Executive Order 13563, Improving Regulation and Regulatory Review, which reaffirmed the regulatory principles and structures outlined in EO 12866. In addition to the regulatory philosophy laid out in EO 12866, EO 13563 instructs agencies to

consider how best to promote retrospective analysis of rules that may be outmoded, ineffective, insufficient, or excessively burdensome, and to modify, streamline, expand, or repeal them in accordance with what has been learned. Such retrospective analyses, including supporting data, should be released online whenever possible.⁷

This ex-post review makes it possible for the government and the public to measure whether a particular rule has had its intended effect. In his implementing memo on retrospective review, former Administrator of the Office of Information and Regulatory Affairs, Cass Sunstein, stated that “future regulations should be designed and written in ways that facilitate evaluation of their

---

⁶ 79 FR 45057
consequences and thus promote retrospective analyses and measurement of ‘actual results.’”

This emphasis is repeated in Sunstein’s June 14, 2011 memo, “Final Plans for Retrospective Analysis of Existing Rules.”

In its Draft 2014 Report to Congress on the Benefits and Costs of Federal Regulations, the Office of Management and Budget (OMB) states that such retrospective analysis can serve as an important corrective mechanism to the flaws of ex ante analyses. According to that report, the result of systematic retrospective review of regulations:

should be a greatly improved understanding of the accuracy of prospective analyses, as well as corrections to rules as a result of ex post evaluations. A large priority is the development of methods (perhaps including not merely before-and-after accounts but also randomized trials, to the extent feasible and consistent with law) to obtain a clear sense of the effects of rules. In addition, and importantly, rules should be written and designed, in advance, so as to facilitate retrospective analysis of their effects.

The proposed rule is listed in the Department’s plan for retrospective review, which describes the action as a response “to petitions for rulemaking submitted by the regulated community and NTSB recommendations that are associated with the petitions.” However, in the proposed preamble itself, PHMSA does not describe the action as being a result of E.O. 13563’s requirements for retrospective review. PHMSA does cite the importance of retrospective review in the rulemaking process and invites public participation, indicating that the agency may be receptive to recommendations on how to incorporate plans for retrospective review at the final rulemaking stage. In line with the requirements of EO 13563, OMB’s implementation memo, and OMB’s Draft 2014 Report to Congress, it is clear that PHMSA should incorporate specific plans for retrospective review and ex post evaluation into the text of its final rule.

**Retrospective Review Requirements**

To evaluate whether PHMSA’s proposal was “designed and written in ways that facilitate evaluation of [its] consequences,” we measure it against five criteria:

---


9 The Department’s semi-annual plans for retrospective regulatory reviews are available here: [http://www.dot.gov/regulations/dotretrospective-reviews-rules](http://www.dot.gov/regulations/dotretrospective-reviews-rules).


11 79 FR 45063

The George Washington University Regulatory Studies Center
• Did PHMSA clearly identify the problem that its proposed rule is intended to solve, and do the policies that PHMSA proposes address this problem?
• Did PHMSA provide clear, measurable metrics that reviewers can use to evaluate whether the regulation achieves its policy goals?
• Did PHMSA write its proposal to allow measurement of both outputs and outcomes to enable review of whether the standards directly result in the outcomes that the agency intends?
• Did PHMSA commit to collecting information to assess whether its measurable metrics are being reached?
• Did PHMSA provide a clear timeframe for the accomplishment of its stated metrics and the collection of information to support its findings?

Identifying the Problem

The first of the “Principles of Regulation” outlined by President Clinton in EO 12866 makes it clear that, as a first step, agencies must be able to identify the problem that justifies government action through regulation:

Each agency shall identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action) as well as assess the significance of that problem.

This step is crucial to the formulation of any policy. Without knowledge of the problem that the agency is trying to address, the public cannot assess whether the policy or regulation at hand has had the intended effect, which is key in retrospectively evaluating regulation.

In this rulemaking, PHMSA proposes a number of different standards to address different types of problems stemming from one source: the hazards of shipping crude oil and ethanol via rail. For simplicity, Table 1 identifies the key problems that this proposal is intended to address, where applicable, and the solution that the agency identifies to address that problem.

Table 1

<table>
<thead>
<tr>
<th>Problem</th>
<th>Goal/Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper classification and characterization can have serious ramifications that could impact transportation safety. (79 FR 45024)</td>
<td>PHMSA proposes changes to the HMR that clarify and enhance the current classification requirements for mined gases and liquids… Proposed § 173.41 would explicitly require a sampling and testing program for mined gases and liquids, including crude oil. (79 FR 45044)</td>
</tr>
<tr>
<td>Incorrect classification and characterization of hazardous material may lead to failures throughout the transportation system. (79 FR 45043)</td>
<td></td>
</tr>
</tbody>
</table>
The projected continued growth of domestic crude oil production, and the growing number of train accidents involving crude oil, PHMSA concludes that the potential for future severe train accidents involving crude oil in HHFTs has increased substantially. Such an increase raises the likelihood of higher-consequence train accidents. (79 FR 45019)

The primary intent of this rulemaking is to propose revisions to the HMR that update and clarify the regulations to prevent and mitigate the consequences of a train accident involving flammable liquids, should one occur. (79 FR 45017)

The transportation of any hazardous materials is inherently dangerous, and transporting crude oil can be dangerous if the crude oil is released into the environment because of its flammability. This risk of ignition is compounded in the context of rail transportation of crude oil... With the rising demand for rail carriage of crude oil throughout the U.S., the risk of rail accidents and incidents increases with the increase in the volume and the length of haul of the crude oil shipped. (79 FR 45041)

These accidents have demonstrated the need for action in the form of additional communication between railroads and emergency responders to ensure that the emergency responders are aware of train movements carrying large quantities of crude oil through their communities. (79 FR 45041)

Speed is a factor that may contribute to derailments. Speed can influence the probability of an accident, as it may allow for a brake application to stop the train before a collision. Speed also increases the kinetic energy of a train resulting in a greater possibility of the tank cars being punctured in the event of a derailment. (79 FR 45046)

We are proposing three Options for a 40-mph speed restriction for any HHFT unless all tank cars containing flammable liquids meet or exceed the proposed standards for the DOT Specification 117 tank car. (79 FR 45047)

N/A

In this NPRM we are proposing to require each HHFT to be equipped with an enhanced brake signal propagation system. (79 FR 45051)

Shell and head punctures are the failure modes that result in rapid and often complete loss of tank contents. A HFFT poses a greater increase risk resulting from puncture due to the volatility of the lading. (79 FR 45053)

A number of strategies exist to improve puncture resistance of a tank car, including using higher strength and tougher steel and increasing the thickness of the shell and head of the tank...DOT is considering both of these strategies. (79 FR 45053)

Approximately 10 percent of tank car breaches were attributed to exposure to fire conditions. (79 FR 45054)

All DOT Specification 117 options in this NPRM require a thermal protection system sufficient to meet the performance standard of §179.18, and which must include a reclosing pressure release valve. (79 FR 45055)

It has been demonstrated that the DOT Specification 111 tank car provides insufficient puncture resistance, is vulnerable to fire and roll-over accidents, and the current bottom outlet valves are easily severable in HHFT accidents. These risks have been demonstrated

For the purposes of crude oil and ethanol that are classed as flammable liquids, the DOT Specification 111 tank car would no longer be authorized for use in HHFT. (79 FR 45059)
In table 3 of its proposed rule, PHMSA lists 13 major crude oil and ethanol train accidents in the U.S. since 2006, providing examples of the problems that the agency seeks to address in its rulemaking.\(^\text{12}\) Ostensibly the environmental damages and loss of life associated with those train accidents represent an externality, a market failure which could be addressed by the proposed standards.

However, PHMSA should consider the possibility that the risks and environmental externalities that motivate this rule might be better addressed by changes in other government policies. PHMSA justifies the revisions largely on increased risks resulting from an increase in the volume of crude oil and ethanol shipped by rail. First, PHMSA notes that “the volume of crude oil carried by rail increased 423 percent between 2011 and 2012,” observing that “with a growing domestic supply, rail transportation, in particular, has emerged as a flexible alternative to transportation by pipeline or vessel.”\(^\text{13}\) The agency does not examine in this proposal why the capacity of pipelines, which have been the traditional mode of transporting crude oil, have not kept up with demand. Second, PHMSA observes “U.S. ethanol production has also increased considerably during the last 10 years and has generated similar growth in the transportation of ethanol by rail [leading to] an increase in the number of train accidents, posing a significant safety and environmental concern.”\(^\text{14}\) The increased domestic production of ethanol is a result of government standards, most notably the Environmental Protection Agency’s Renewable Fuel Standard,\(^\text{15}\) which mandates the use of ethanol as a transportation fuel.

Understanding the underlying problems (“failures of private markets or public institutions”) contributing to the increased potential for accidents is essential for developing cost-effective solutions and evaluating their success retrospectively. While responding to the potential risks these other government policies pose may be beyond the scope of this rulemaking, President Obama’s E.O. 13563 and 13610 explicitly contemplate that retrospective review should harmonize regulations and take into account their cumulative effects.\(^\text{16}\)

**Measurement Criteria**

In order to measure the success of this rule following implementation, it is necessary for PHMSA to define what constitutes a “success.” Any stated metrics of success should be linked to the

\(^\text{12}\) 79 FR 45020

\(^\text{13}\) 79 FR 45017

\(^\text{14}\) Ibid.

\(^\text{15}\) http://www.epa.gov/otaq/fuels/renewablefuels/


The George Washington University Regulatory Studies Center
problems identified, and demonstrate that the standards that PHMSA is proposing actually reduce the severity of HHFT derailments and crashes.

While PHMSA didn’t list specific outcomes that it intends to measure ex post, the agency did identify a number of intended outputs and outcomes that could be assessed retrospectively. Below are some potential metrics that PHMSA identifies in its proposed rule which may enable measurement both of the rule’s success and the accuracy of the agency’s ex ante analysis. In addition, these metrics should be measured against a well-defined baseline, which PHMSA articulated throughout the rule.

**Baseline**

According to the preamble,

- Absent this proposed rule, we predict about 15 mainline derailments for 2015, falling to a prediction of about 5 mainline derailments annually by 2034. The high end of the range of estimated benefits includes the same estimate of 5 to 15 annual mainline derailments predicted, based on the U.S. safety record, plus an estimate that the U.S. would experience an additional 10 safety events of higher consequence—nine of which would have environmental damages and monetized injury and fatality costs exceeding $1.15 billion per event and one of which would have environmental damages and monetized injury and fatality costs exceeding $5.75 billion—over the next 20 years. (79 FR 45022)

- [Option 3] is the car configuration PHMSA believes will be built for HHFT service in absence of regulation, based on commitments from one of the largest rail car manufacturers/leasers—Greenbrier, Inc. and the Railway Supply Institute. This car is a substantial safety improvement over the current DOT Specification 111 but does not achieve the same level of safety as the [DOT Specification 117 tank cars]. (79 FR 45052)

- Please note that current regulations do not require a jacket. This rule requires an 11-gauge steel jacket. PHMSA expects all new tank cars to have jackets in the absence of this rule, so we do not expect any benefits or costs from this change. (79 FR 45054)

- PHMSA expects that all new tank cars put into in crude oil and ethanol service would, in the absence of this rule, have jacket, thermal protection, TC-128 Grade B normalized steel, full height head shield, enhanced top fittings protection, and bottom outlet valve reconfigurations. (79 FR 45057)

These statements make clear that a number of the proposed standards for tank cars would already be met without this rule. PHMSA’s table 21, reproduced below, shows the differing efficacy of three tank car options. Option 1 and Option 2 are specification designs proposed by PHMSA, and Option 3 is the tank car that will be built in the absence of regulation. Efficacy is measured relative to the DOT Specification 111 tank car.
However, since PHMSA states that the Option 3 tank car will replace the DOT Specification 111 tank car absent this rule, Option 3 should be the baseline against which efficacy is measured, rather that DOT Specification 111. The marginal increases in efficacy over Option 3 are negligible in all categories except for shell puncture. While shell puncture is the most common train accident damage that results in loss of lading, it should be noted that jackets can be used to prevent shell puncture, and PHMSA expects all tank cars to include jackets absent its regulation.

While PHMSA does a good job of explaining what the world would look like without its proposed rule, the agency should incorporate its forecasts into its baseline for a more accurate comparison of efficacy across tank cars.

**Metrics**

According to the preamble,

- The laws of physics indicate that if an accident occurred at 40 mph instead of 50 we should expect a reduction of kinetic energy of 36... this would translate to the severity of an accident being reduced by 36%. (79 FR 45046)
- PHMSA anticipates the reductions in the speed of trains that employ less safe tank cars will prevent fatalities and other injuries, and limit the amount of property damage done in an accident. PHMSA expects fewer safety benefits would be realized from a reduction in speed as the tank car fleet is enhanced as proposed in this NPRM. (79 FR 45047)
- DOT calculated that a derailment involving a train made up of Option 1 tank cars (equipped with ECP brakes) will result in 36 percent fewer cars puncturing than the same train with conventional brakes. As such DOT estimates that ECP brakes would reduce the severity of a HHFT accident by an estimated 36 percent, compared to conventional brakes. (79 FR 45050)
- DOT estimates that two-way EOT or DP would reduce the severity of a HHFT accident by 18 percent (half of the 36% estimated for ECP brakes), compared to conventional brakes. (79 FR 45050)

---

17 79 FR 45053

The George Washington University Regulatory Studies Center
PHMSA expects that all railroads already have two-way EOT devices, have DP, or operate at speeds lower than 30-mph, so PHMSA estimates no benefits or costs for the 30-mph limit in the absence of advanced braking systems. (79 FR 45051)

The proposed performance standard is intended to encourage innovation in the design of tank car, use of new materials, and incorporation of new appurtenances. (79 FR 45051)

The proposed materials, minimum thickness of 9/16 inch, and jacket provide a 68 percent improvement in the puncture force for Options 1 and 2 relative to the current specification requirements for a DOT Specification 111 tank car. This translates to a 17 percent effectiveness rate. A tank car constructed to the proposed requirements of Option 3, would have a 35 percent improvement in puncture force relative to the current DOT Specification 111 tank car. This translates into a 9 percent effectiveness rate. (79 FR 45054)

As a result of use of the proposed DOT Specification 117 tank cars, we expect the volume of flammable liquid released into the environment and the consequences of a train accident to be reduced. (79 FR 45060)

Many of PHMSA’s stated metrics can be collected and measured, the most important of which is the number and severity of HHFT accidents. PHMSA seems to already keep records of the relevant incidents, as well as some estimates of the monetary damages from environmental harm, property loss, and loss of life. PHMSA should commit to using these metrics as a measure for its rule after implementation to be sure that the benefits anticipated by the agency are realized by society.

**Measure Linkages**

As PHMSA commits to measuring the effects of its rule, it should also be aware of mediating factors that may have accomplished or undermined the stated metrics absent the rule. Determining linkages between the rule and the measured outcomes is necessary to ensure that the policy itself resulted in the desired outcomes, rather than other factors beyond the agency’s control.

For example, PHMSA did not include in its baseline its expectation that, due to market forces, Option 3 tank cars will become widely used for the transport of flammable liquids in the future. Therefore, measuring increases in efficacy against DOT Specification 111 tank cars, rather than Option 3 tank cars, will overstate the efficacy of PHMSA’s rule. In addition, PHMSA notes that documented derailment speeds exceed the puncture velocity of all three of the tank car options in its proposal,\(^\text{18}\) indicating that the proposed standards may not offer enough puncture resistance to be meaningful.

\(^\text{18}\) 79 FR 45060
Additionally, the safety and environmental risks PHMSA expects this rule to avoid are highly correlated with the volume of crude oil and ethanol transported by rail. Thus, the effectiveness of the rule will depend on both the supply of crude oil and ethanol in commerce, and the availability of alternative modes of transportation, particularly pipeline and vessel.

**Information Collection**

In the proposed rule, PHMSA clearly acknowledges the importance of information collection to the retrospective review, and seeks comment on “potential data and information gathering activities that could be useful in designing an evaluation and/or retrospective review of this rulemaking.”

OMB’s Paperwork Reduction Act regulations require agencies to “ensure that each collection of information … informs and provides reasonable notice to the potential persons to whom the collection of information is addressed of … an estimate, to the extent practicable, of the average burden of the collection (together with a request that the public direct to the agency any comments concerning the accuracy of this burden estimate and any suggestions for reducing this burden).”

Consistent with the requirements of the Paperwork Reduction Act, and with the text of its proposal, PHMSA should commit to collecting the information needed to measure the rule’s success.

**Timeframe**

In the text of its rule, PHMSA does not commit to a timeframe in which to measure the outcomes of its rule. In the final rule, the agency should identify a timeframe for review, indicating how soon after implementation PHMSA will begin to measure the progress of its stated metrics. PHMSA should structure its timeline around the phase-out of its DOT Specification 111 cars, which begins in October, 2015 for shipment of flammable liquids that pose the highest danger (Class 3 Packing Group I).

**Recommendations**

PHMSA justifies its proposal largely on reducing the risks resulting from an increase in the volume of crude oil and ethanol shipped by rail and the associated externalities. However, PHMSA should consider the possibility that the risks and environmental externalities that motivate this rule might be better addressed by changes in other government policies, including

---

19 79 FR 45063  
20 5 CFR Part 1320.8(b)(3)(iii)
policies that constrain pipeline capacity and the Environmental Protection Agency’s Renewable Fuel Standard, which mandates the use of specified amounts of ethanol as a transportation fuel. It is possible that, without mandated production of ethanol, the risks posed by rail transport would be significantly reduced.

Further, while PHMSA does a good job of explaining what the world would look like without its proposed rule, the agency should incorporate its forecasts into its baseline for a more accurate comparison of efficacy across tank cars. For example, although PHMSA expects Option 3 tank cars to become standard in the near future absent this regulatory action, the agency doesn’t incorporate the accompanying safety improvements into its baseline. Measuring increases in efficacy against DOT Specification 111 tank cars, rather than Option 3 tank cars, will overstate the efficacy of PHMSA’s rule.

In the proposed rule, PHMSA clearly acknowledges the importance of information collection to the retrospective review, and seeks comment on “potential data and information gathering activities that could be useful in designing an evaluation and/or retrospective review of this rulemaking.” Consistent with the requirements of the Paperwork Reduction Act, and with the text of its proposal, PHMSA should commit to collecting the information needed to measure the rule’s success.

Many of PHMSA’s stated metrics can be collected and measured, the most important of which is the number and severity of HHFT accidents. PHMSA seems to already keep records of the relevant incidents, as well as some estimates of the monetary damages from environmental harm, property loss, and loss of life. PHMSA should commit to using these metrics as a measure for its rule after implementation to be sure that the benefits anticipated by the agency are realized by society.

In addition to the above, PHMSA may want to consider using the initiation of the Option 3 tank cars as a quasi-experiment,\(^\text{21}\) where data can be gathered regarding the effectiveness of different design standards with some controls still in place. If the Option 3 tank cars do not yield sufficient increases in safety over a specified amount of time, then PHMSA can incorporate these lessons into an improved safety standard that more directly addresses the problems at hand.

\(^{21}\) For an example of how to use experiments in formulating regulatory policy, see Lacko, James M. and Janis K. Pappalardo. 2010. The Failure and Promise of Mandated Consumer Mortgage Disclosures: Evidence from Qualitative Interviews and a Controlled Experiment with Mortgage Borrowers. American Economic Review 100(2): 516-521