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RE: Comments of the Railway Supply Institute, Committee on Tank Cars regarding the Pipeline and Hazardous Materials Safety Administration Notice of Proposed Rulemaking for Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, Docket No. PHMSA-2012-0082 (HM-251)

Dear Sir or Madam:

The Railway Supply Institute (“RSI”) is the international trade association of the railway supply industry. Its members provide all types of goods and services to freight and passenger railroads, rail shippers and freight car manufacturers and lessors. The members of the RSI Committee on Tank Cars (“RSI-CTC”) collectively build more than ninety-five percent (95%) of all new railroad tank cars and own and provide for lease over seventy percent (70%) of railroad tank cars operating in North America. These comments are submitted on behalf of the following RSI-CTC members: American Railcar Industries; American Railcar Leasing; CIT Rail; GATX Corporation; General Electric Railcar Services Corporation; Trinity Rail Group, LLC; and Union Tank Car Company. The RSI-CTC has a demonstrated commitment to safe rail transportation by tank car. This includes its long-standing participation in the Railroad Tank Car Safety Research and Test Project (“Tank Car Safety Project”) with the North American Class I Railroads (through the Association of American Railroads (“AAR”)) and regulators from both the United States and Canada whereby the RSI-CTC contributes funding, technical resources and thought leadership to the detection, prevention and mitigation of equipment-related factors in train accidents.

The RSI-CTC commends the U.S. Department of Transportation (“DOT”), Pipeline and Hazardous Materials Safety Administration’s (“PHMSA”) efforts to improve the safe transportation of hazardous materials as outlined in its Notice of Proposed Rulemaking for Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, Docket No. PHMSA-2012-0082 (HM-251) (“Proposed Regulations” or “NPRM”) and appreciates the opportunity to submit its comments on the

Proposed Regulations. The RSI-CTC shares PHMSA's commitment to a safe and efficient rail transportation system and to ensuring the continued growth and vitality of an integrated North American energy market. As set forth below, the RSI-CTC endorses various aspects of the Proposed Regulations as the most effective means for addressing the complex issues presented. In other areas, the RSI-CTC believes that the Proposed Regulations could be better tailored to optimize risk reduction more effectively without unnecessary economic disruptions and unintended consequences that could implicate other safety concerns. In those instances, the RSI-CTC has accepted PHMSA's invitation to suggest alternative solutions for the agency's consideration.

Finally, we ask PHMSA to bear in mind that the Proposed Regulations do not exist in a vacuum. Concurrently, Transport Canada is undertaking its own rulemaking (the "TC Proposed Regulations") that is intended to address the same issues covered by the PHMSA Proposed Regulations. At present, there are fundamental differences between the PHMSA Proposed Regulations and the TC Proposed Regulations that require harmonization, given the integrated nature of the North American rail system and the economies and industries that it supports. Specifically, both sets of regulations will have significant impacts on the transportation of flammable liquids, including crude oil and ethanol, throughout North America. Absent harmonization, the producers of these commodities will face severe, certain, and unintended economic consequences caused by transportation service interruptions.

I. Executive Summary

The RSI-CTC shares PHMSA's commitment to a safe and efficient rail transportation system and to ensuring the continued growth and vitality of an integrated North American energy market.

In the sections below, we will discuss the following key comment areas:

- The RSI-CTC supports PHMSA's holistic approach to improving the safety of hazardous materials transportation by rail by focusing on derailment prevention in addition to post-derailment mitigation.
- Harmonization of the U.S. and Canadian requirements is essential to ensure the viability of key segments of the North American economy.
- A rule governing tank car specification that is predicated upon train makeup and railroad operations provides neither the necessary advance notice nor the certainty to determine packaging requirements. Accordingly, "High-hazard flammable trains" is not a workable concept for determining tank car specifications. Tank car specifications should instead be determined by the commodity transported.
- PHMSA's final rule should include only feasible, cost-justified, prescriptive standards, clear definitions, and achievable timelines.
- Newly built tank cars transporting crude oil and ethanol (in all Packing Groups) should be built with a 9/16 inch tank shell, jacket, full-height half inch head shields, top fittings protection, a reconfigured bottom outlet valve handle ("BOV"),

a reclosing pressure relief valve (“PRV”), TC128 Grade B normalized steel, and a thermal protection system. This is consistent with Option 2.

- Newly built tank cars transporting the balance of other Class 3, flammable liquids in Packing Group (“PG”) I, II, or III, should be built with a 7/16 inch tank shell, jacket, full-height half inch head shields, top fittings protection, a reconfigured BOV, a reclosing PRV, TC128 Grade B normalized steel, and a thermal protection system. This is consistent with Option 3.
- Existing tank cars serving all Class 3, PG I and II commodities including crude oil and ethanol should remain in service with the existing head and shell as a base and undergo modification that would include jackets (if not already present), full-height half inch head shields, a reconfigured BOV, a reclosing and appropriately sized PRV, and a thermal protection system in accordance with 49 C.F.R. § 179.18.¹ This is consistent with Option 3. The RSI-CTC agrees with PHMSA that top fittings protection is not a cost justified modification for existing tank cars.
- Modifications to existing tank cars transporting Class 3, PG III commodities should be limited to the application of a reconfigured BOV and a reclosing PRV.
- The compliance deadlines for the modification program must account for the complexity of the modifications and the constraints of the maintenance and repair facility network to provide sufficient time to avoid the substantial unintended consequences of an unrealistic modification timeline.
- We support rigorous benefit cost analysis to inform the final rule, and suggest elements of such an analysis.
- PHMSA’s final rule should be free of legal uncertainties that could hinder effective implementation, public safety protections, or commerce.

II. The RSI-CTC Supports PHMSA’s Holistic Approach to Improving the Safety of Hazardous Materials Transportation by Rail

At the outset, the RSI-CTC applauds PHMSA for working with the Federal Railroad Administration (“FRA”) to create Proposed Regulations that not only address tank car requirements, but also address aspects of railroad operations and shipper classification. We completely agree that safe transportation of hazardous materials by rail requires simultaneous focus on the entire integrated system: railway infrastructure, track maintenance, railway operations, product classification, equipment standards and human factors. Tank car requirements cannot be examined in isolation, as they are only one aspect of rail transportation. Although enhanced tank car features may mitigate the effects of certain post-derailment consequences, implementing changes to tank car requirements will not prevent derailments from occurring in the first place.

¹ 49 C.F.R. § 179.18 requires that a tank car have sufficient thermal resistance “so that there will be no release of any lading within the tank car, except release through the pressure release device, when subjected to (1) a pool fire for 100 minutes; and (2) a torch fire for 30 minutes.”

The RSI-CTC shares PHMSA's commitment to improving the safe transportation of hazardous materials by rail. RSI and its predecessors have been working with the AAR since 1970 to fund the Tank Car Safety Project. The data collected by the Tank Car Safety Project describing damage to tank cars in train accidents is available to industry researchers to support studies of potential enhancements to tank car construction, design, and material standards.

We also would support future regulatory actions by PHMSA and the FRA that would address derailment prevention and not just post-derailment mitigation. As PHMSA Administrator Cynthia Quarterman stated before Congress in testimony earlier this year, "[f]irst we need to prevent derailments. Getting a new tank car is not a silver bullet."² We agree with Administrator Quarterman's conclusions that no tank car, no matter how it is designed or constructed, could reasonably be expected to withstand the derailment forces of an event comparable to Lac Mégantic. PHMSA's own data reinforces these statements and underscores the importance of derailment prevention.

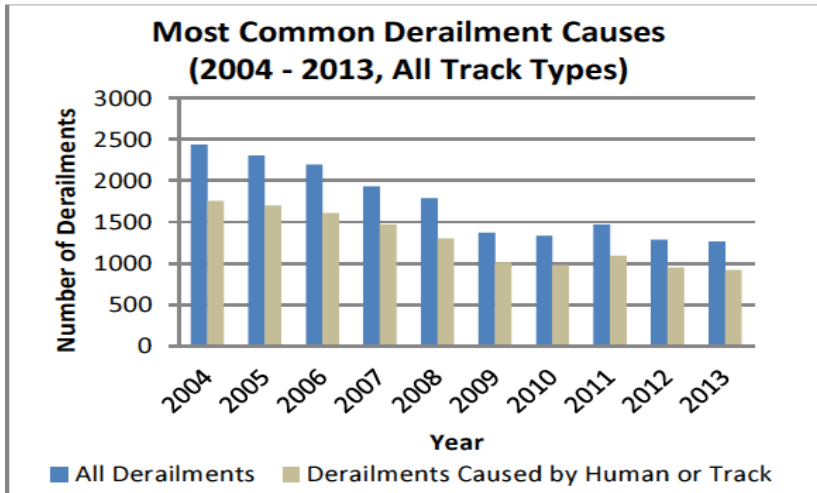
Of the major crude oil and ethanol incidents referenced in the NPRM where a root cause has been determined, nearly all of these incidents were caused by track integrity issues such as rail defects and washouts or by human error.³ This is consistent with PHMSA's finding that "broken rails or welds, track geometry, and human factors...are the leading causes of derailments."⁴ Exhibit A1 below illustrates that human error and track problems are the most common causes of all derailments between 2004 and 2013. The proportion of derailments resulting from human error or track related causes has also remained relatively constant with an average proportion of 74%, a minimum proportion of 72%, and a maximum proportion of 76% during this period. The consistently high proportions of mainline derailments due to track or human causes suggest that there is more that the industry and regulators can do to enhance accident prevention.

² Hearing on "Oversight of Passenger and Freight Rail Safety," Before the H. Comm. Transportation and Infrastructure (Feb. 26, 2014) (statement of Cynthia L. Quarterman, PHMSA Administrator), transcript available at <http://www.gpo.gov/fdsys/pkg/CHRG-113hhrg86845/pdf/CHRG-113hhrg86845.pdf>.

³ Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains, Docket No. PHMSA-2012-0082 (HM-251), 79 Fed. Reg. 45018, at 45020, Table 3 (proposed Aug. 1, 2014) (hereafter "NPRM").

⁴ NPRM, 79 Fed Reg. at 45026.

Exhibit A1⁵



For example, while many aspects of the Proposed Regulations are designed to mitigate post-derailment consequences (such as reduced operating speeds and additional tank car requirements), there are several outstanding items which, if addressed in conjunction with this rulemaking, would yield even greater overall safety benefits, because they are related to derailment prevention efforts. These include:⁶

- Finalizing rules for Railroad Safety Risk Reduction Programs
- Finalizing rules for Training Standards for Railroad Employees
- Finalizing rules for Controlled Substance Testing

The Proposed Regulations reflect appropriate and welcome safety enhancements. In order to realize their full potential, however, we urge PHMSA and FRA simultaneously to address the above items. The RSI-CTC looks forward to engaging with the agencies in these endeavors.

III. Harmonization is Essential to Ensure the Viability of Key Segments of the North American Economy

Currently, the PHMSA Proposed Regulations and the TC Proposed Regulations contain different requirements for new tank car specifications and existing car modifications, different timelines for compliance with the modification requirements and different criteria for determining the applicability of the proposed regulations. It is critical that the U.S. and Canada work closely together to create a single harmonized standard for tank cars in order to ensure the viability of transporting flammable liquids by rail throughout North America. The specific inconsistencies between the two countries' proposals include:

⁵ Federal Railroad Administration ("FRA"), Office of Safety Analysis, derailment database.

⁶ These items were identified by the FRA as significant actions it intended to undertake in 2014 in a presentation to the Railroad Safety Advisory Committee ("RSAC"). See FRA Regulatory Activity Update to the 51st RSAC Committee Meeting (March 6, 2014), available at <https://rsac.fra.dot.gov/meetings/20140306.php>.

- Compliance timelines
- New tank car shell and head thickness requirements
- Modification requirements
- Scope of the rule (crude oil and ethanol versus all flammable liquids)

A comparison table outlining the specific differences between the three PHMSA options and the TC proposal can be found in Appendix A.

During a recent summit of North American Business, Civil Society, and Education Leaders in February of 2014, U.S. President Barack Obama remarked that,

So much of the cross-border trade that exists is part of an integrated supply chain that allows us, [the U.S. and Canada], to successfully sell our products and services all around the world. And so we have every incentive to make this work. And so a lot of our conversation has focused on how do we reduce any continuing trade frictions; how do we make sure that our borders are more efficient...⁷

Canadian Prime Minister Stephen Harper echoed these sentiments stating that, “Today, Canadian [and] American...companies do much more than sell things to each other. [They] increasingly make things together through integrated supply chains...[which] is why we want to tighten our relationships and increase the competitiveness in the region.”⁸

These remarks demonstrate the priority that both countries have placed on ensuring the economic viability of the North American markets, which can only be achieved through harmonized policies and regulations. Regulatory alignment, especially on important “upstream” issues like this, is also the stated goal of the ongoing Canada-U.S. Regulatory Cooperation Council, unveiled personally by President Obama and Prime Minister Harper in early 2011. As we emphasized in our comments to Transport Canada on September 1, 2014, it is wholly unrealistic to assume that there is or could be a discrete set of tank cars available to operate in the U.S. while another would operate in Canada. Most of the tank cars carrying the commodities covered by the Proposed Regulations operate in cross-border service. It is infeasible to segregate cars by those loaded or offered for transportation in the U.S. only versus those loaded or offered for transportation in Canada only. Tank car stakeholders cannot reasonably be expected to adhere to one set of regulations in Canada and another set of regulations in the U.S.

Following the derailment in Lac Mégantic, Canada, the two countries have continued their tireless work to address the safe transportation of flammable liquids by rail. Both the U.S. and Canadian transportation agencies are confronting—at the same time—the same issues, across the same integrated rail network, involving the same tank cars,

⁷ Remarks by President Obama, President Peña Nieto, and Prime Minister Harper to North American Business, Civil Society, and Education Leaders (February 19, 2014), available at <http://www.whitehouse.gov/the-press-office/2014/02/19/remarks-president-obama-president-pe-nieto-and-prime-minister-harper-nor>.

⁸ *Id.*

which are used to transport the same flammable liquids across the border. As our economies are intrinsically linked, it is imperative that these regulatory proposals are consistent and harmonized. Transport Canada has explicitly stated its commitment to “a North American solution for tank car standards,”⁹ and we respectfully urge the DOT to make the same commitment and to continue to work as closely as possible with Transport Canada to create a final, harmonized regulation. Otherwise, and without corresponding safety benefits, stakeholders will incur unintended costs and inefficiencies attempting to meet inconsistent standards contained in each final rule.

IV. Scope of the Proposed Regulations: the HHFT Definition is Unworkable; Commodity Focus is Better Alternative

The RSI-CTC appreciates the intent behind the use of the High-Hazard Flammable Train (“HHFT”) concept in the Proposed Regulations. Through the HHFT definition—a train comprised of 20 or more carloads of a Class 3 flammable liquid¹⁰—PHMSA appears to be seeking to limit the applicability of the rule to a discrete group of commodities operating in a specified train service. Although the rule pertains to all Class 3 flammable liquids on its face, and to trains with as few as twenty carloads of those commodities, PHMSA assumes that the practical impact of the Proposed Regulations will be limited to unit train shipments of crude oil and ethanol only. Indeed, its cost-benefit analysis is structured based upon this assumption. As set forth in detail below, this assumption is flawed.

Any final rule must provide car owners and shippers with sufficient advance notice of and certainty as to which tank cars are covered. Otherwise, these stakeholders will be forced to guess which cars are within the scope of the rule. As a result, they either risk non-compliance if they are wrong or will have to modify all cars potentially within the scope of the rule and likely waste time and other resources. A rule predicated upon railroad operating practices provides neither the necessary advance notice nor certainty.¹¹ Both the HHFT concept and unit train concept, which others in the industry have proposed as an alternative, improperly base coverage upon railroad operating practices.

A. HHFTs¹²

Under the HHFT definition, the applicability of the Proposed Regulations to a given shipment is predicated upon how the associated tank car moves from origin to

⁹ Transport Canada, “Explanatory Note - Consultations on Proposed Amendments to the Transportation of Dangerous Goods Regulations (New Class TC140 Tank Cars for the Transport of Dangerous Goods)” at p. 6, available at <http://www.tc.gc.ca/eng/tdg/clear-modifications-menu-1193.html> (stating that “it is important that in the longer-term, Canada be harmonized with North American requirements to the greatest extent possible.”).

¹⁰ NPRM, 79 Fed. Reg. 45017.

¹¹ The “20 or more carloads” requirement derives from existing Circular OT-55-N, establishing “Recommended Railroad Operating Practices for Transportation of Hazardous Material.” See NPRM, 79 Fed. Reg. 45024.

¹² This section is responsive to Q1 - HHFTs, 79 Fed. Reg. 45040.

destination. In other words, it requires all shippers to know in advance the type of train(s) in which their cars will move and to know the types of commodities and number of tank cars introduced by other shippers that will make up the train during shipment. Tank cars carrying specified commodities in HHFTs would fall under the Proposed Regulations, yet the same tank cars carrying the same commodities that do not move in HHFTs would not be covered by the Proposed Regulations. The fundamental flaw underlying this approach, however, is the notion that a shipper has advance notice of or control over the type of train in which its tank car moves or that the type of train in which it moves remains static from origin to destination.

Neither of these assumptions is true. At any point during transit, an ordinary manifest train carrying less than 20 car loads of a covered commodity could become a HHFT if the handling railroad decided to accept the requisite number of additional carloads of such commodity from another shipper. None of the parties offering shipments to the railroad would have control over this. As a result, a tank car shipper would never know if its compliance obligations would be triggered until it was too late. The only way to remove this uncertainty would be to resort to deploying HHFT-compliant tank cars only, whether or not they ultimately would be transported in a HHFT. This would unduly deprive the shipper of flexibility and likely impose unnecessary costs. Such costs are not taken into account by PHMSA.

B. Unit Trains

The RSI-CTC agrees with PHMSA that the recent expansion in U.S. energy production “has led to significant challenges in the transportation system” related to the rising volumes of shipments of crude oil and ethanol.¹³ As the agency notes, the volume of crude oil carried by rail increased 423% between 2011 and 2012, and U.S. ethanol production has experienced similar growth over the last decade. To accommodate these rising shipment volumes, rail carriers began using trains dedicated entirely to the transportation of a single commodity such as crude oil or ethanol. These “unit trains” typically range from 50-120 cars, with each tank car carrying the same commodity. Unit trains are more efficient, because the switching of rail cars in intermediate yards is eliminated, making the overall duration of a given trip shorter. However, we recognize the increased risk associated with transportation of crude oil and ethanol in unit trains, and we agree that the Proposed Regulations should reflect this unique risk.

Unfortunately, a rule that defines scope by reference to unit trains is largely saddled with the same notice and uncertainty problems as one that refers to HHFTs. Stakeholders still would unfairly be subject to the vagaries of railroad operating practices. To date, the rules surrounding operation of unit trains and trains subject to OT-55-N (the basis for the HHFT definition) have worked, because the same entity—a railroad—is governed by and is in control of the activities associated with those rules. That is not the case with the Proposed Regulations. The RSI-CTC respectfully submits that tank car packaging requirements should not be dictated by activities outside of the car owner or shipper’s control, and that the unit train risk is better addressed through prioritization of modifications to the existing fleet.

¹³ NPRM, 79 Fed. Reg. 45017.

C. Scope should be determined by commodity transported

Rather than using railroad operating practices to dictate packaging requirements, the RSI-CTC recommends using the commodity transported to determine whether a given tank car falls within the scope of the Proposed Regulations. This is consistent with the approach taken by Transport Canada in the TC Proposed Regulations. We support this methodology because it establishes a clearer and more efficient means of ensuring compliance with the regulation. Since a tank car shipper knows well in advance the commodity it intends to transport, a commodity-based approach removes uncertainty and promotes flexibility. Unlike the HHFT or unit train approach, this scenario provides a tank car shipper with fair notice of any compliance obligations and the opportunity to select the tank car that suits its needs.

D. Scope should Include Crude Oil, Ethanol, and all Class 3, PG I, II and III Flammable Liquids

The RSI-CTC fully supports PHMSA's inclusion of crude oil, ethanol and other Class 3, Packing Group ("PG") I, II and III commodities within the Proposed Regulations. Despite PHMSA's emphasis on crude oil and ethanol shipments in the Proposed Regulations, it nonetheless is important to keep other Class 3 flammable liquids, in PG I, II and III, within the scope of the rule. Having these other commodities covered by the Proposed Regulations optimizes the safety impact of the final rule by improving the safety of the overall fleet.

The importance of regulatory certainty to the health of our energy markets cannot be underestimated. It is the experience of the RSI-CTC that the ongoing uncertainty surrounding final tank car requirements has served as a disincentive for investment. Accordingly, we suggest that it would be prudent to include all Class 3 flammable liquids within the scope of the rule at this time, rather than wait for another potentially protracted rulemaking to address commodities other than crude oil and ethanol. For new cars, this means new builds for any Class 3, PG I, II, or III commodity would be impacted by the final rule. For existing cars, this means the entire fleet would eventually be modified but different modifications would be required for different subsets of the fleet. As discussed in Section VIII and IX, we support modification of tank cars in other flammable liquid service, provided that these commodities are addressed *after* crude oil and ethanol, and that the compliance deadline is reasonable and achievable. This would maximize the safety impact of the final rule and provide the greatest degree of regulatory certainty to tank car manufacturers, owners, shippers, and lessors.

V. Option 1 Should be Eliminated as a Feasible Alternative for New Builds or Existing Tank Cars

The RSI-CTC opposes Option 1 as a feasible alternative for either new builds or existing tank cars for the following reasons. First, rollover protection is largely unproven in the general purpose tank car context, likely will add only slight safety benefits to such tank cars, and may have unintended adverse structural and negative commercial consequences. A full discussion of rollover protection, as compared to top fittings protection for new builds, is set forth in Section VII.C. Second, Electronically Controlled Pneumatic ("ECP") brakes do not offer significant safety advantages during a derailment scenario as compared to other alternative braking systems. Moreover, this technology

only works if the entire train (railcars and locomotives) is equipped with ECP technology. Therefore, tank cars equipped with ECP brakes would need an overlay system. Discussion of ECP brakes and other braking systems is contained in Section VII.D.

Finally, modifying existing tank cars to meet a higher tank shell thickness requirement is not a concept that merits serious consideration for the reasons discussed in Section VIII.E. Because the only way to increase the tank thickness is by adding a thicker jacket to the tank car, this modification 1) would require special equipment to manage the thicker steel; 2) may adversely affect the performance of other safety features in a derailment due to increased jacket weight; and 3) may also introduce stresses that reduce the fatigue life in other areas of the tank.

For these and other reasons discussed below, Option 1 should be eliminated, because it is not a feasible, cost-justified alternative.

VI. Differentiated Requirements for New and Existing Tank Cars are Reasonable and Warranted Under the Circumstances

The RSI-CTC submits that a one-size-fits-all approach for tank car requirements for both new and existing tank cars is not practical. Nor would it be an efficient use of limited North American tank car manufacturing and modification resources. There is precedent in this and other industries where safety objectives were deemed to have been satisfied under rules with differing sets of requirements for future manufacturing vs. existing equipment. Implicit in this precedent is the recognition that overall safety may be best served by an approach that combines future builds at a higher standard with meaningful modifications to the largest possible segment of the existing population over the shortest reasonable timeframe. Requiring equivalency between the two could serve as a distinct disincentive to innovation. For these reasons, and as set forth more fully below, the RSI-CTC suggests that PHMSA clearly differentiate the requirements for new cars from the modifications that would be required for existing tank cars.

VII. New Builds

As applicable to tank cars transporting crude oil and ethanol (PG I, II, or III), the RSI-CTC agrees with the new car construction requirements for the proposed DOT-117 as set forth in Option 2 of the Proposed Regulations, including the requirements for jackets, full-height half inch head shields, top fittings protection, a reconfigured BOV handle, a reclosing PRV, the use of TC128 Grade B normalized steel, and a thermal protection system. We also agree that a 9/16 inch tank shell is appropriate for the transportation of crude oil and ethanol as called for in the construction of new DOT-117 tank cars under Option 2.

For newly built tank cars intended to serve the balance of other Class 3, flammable liquids in PG I, II, or III service, the RSI-CTC supports Option 3, with a 7/16 inch shell thickness. The risk associated with crude oil and ethanol is derived from the volume and density of shipments of those commodities, because crude oil and ethanol typically travel in unit trains. PHMSA has not demonstrated that other Class 3, flammable liquids represent a risk in transportation that warrants transport in a thicker tank car. Therefore, for new cars in other Class 3 flammable liquid service, we support new car requirements consistent with the enhanced CPC-1232 that include: a 7/16 inch thick tank shell, jacket, full-height half inch head shields, top fittings protection, a reconfigured BOV

handle, a reclosing PRV, the use of TC128 Grade B normalized steel, and a thermal protection system.

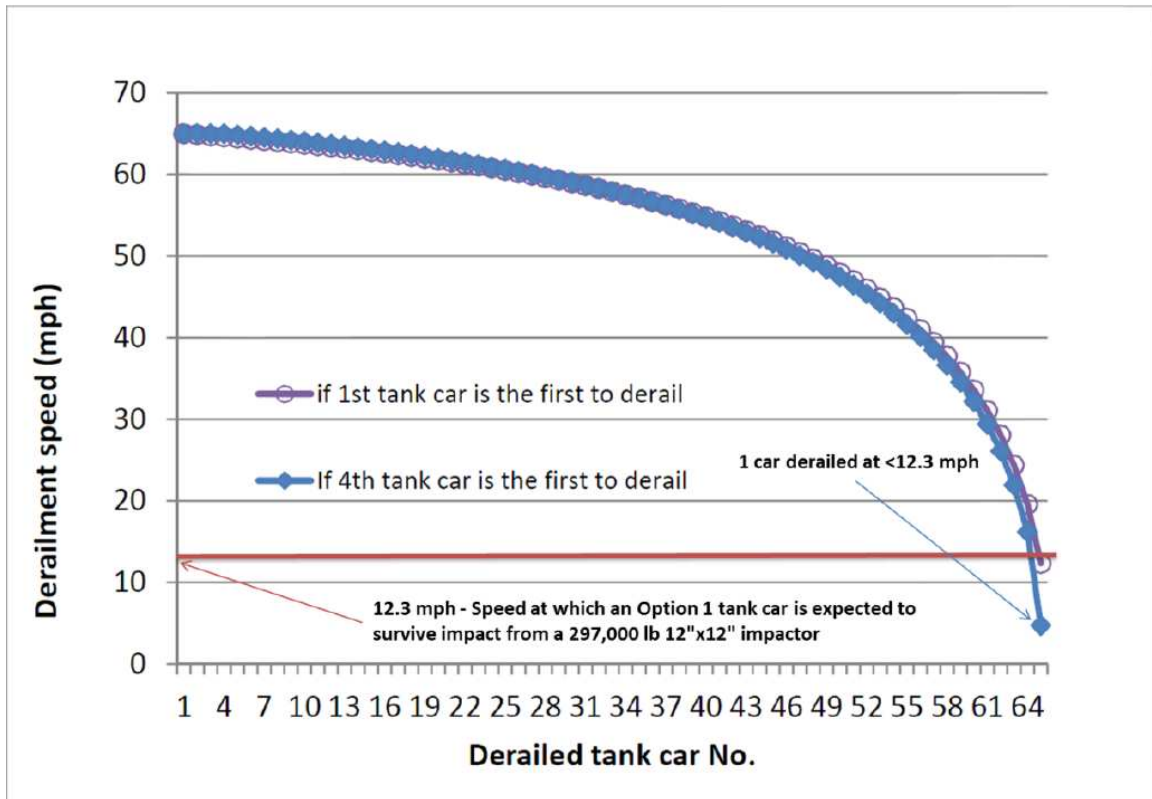
We note that this second set of requirements, absent the requirements for normalized steel and top fittings protection, would also be applicable to all modified tank cars currently operating in Class 3, PG I and II service, regardless of commodity, as discussed in Section VIII below.

A. Tank Car Thickness for New Builds

As stated above, the RSI-CTC supports a requirement that new tank cars entering crude oil and ethanol service be built with a 9/16 inch thick tank shell. The risk associated with the movement of crude oil and ethanol in unit trains reasonably supports this thicker packaging requirement. However, by contrast, new tank cars intended to serve the balance of Class 3, PG I, II, and III commodities do not typically move in unit train service and therefore do not represent a comparable risk. Accordingly, the RSI-CTC submits that new tank cars in other Class 3 flammable liquid service should be built with a 7/16 inch thick tank shell. In other words, crude oil and ethanol would be transported in a thicker shelled tank car (Option 2), and other flammable liquids would be transported in the enhanced jacketed CPC-1232 tank car (Option 3). Other than tank shell thickness, all other features of newly built tank cars would be identical, regardless of commodity.

Although we support a 9/16 inch thick tank shell for new tank cars entering crude oil and ethanol service, we note that increasing shell thickness will never make a tank car completely immune to the forces present in high energy derailments. One way to examine the performance difference between tank cars with 9/16 inch shell thicknesses and tank cars with less than 9/16 inch shell thicknesses is to compare the predicted puncture speed of the 9/16 inch design configuration proposed in Options 1 and 2, as compared to the speed of the derailed cars from the Lac Mégantic tragedy. The NPRM estimates a car with 9/16 inch thick tank shell would experience puncture from a 12 inch x 12 inch indenter with a weight of 297,000 pounds at a speed of 12.3 mph.¹⁴ Using 12.3 mph as the threshold speed at which a car with a 9/16 inch thick tank shell would puncture in a derailment, one can look at the hypothetical effect the Option 1 car configuration would have had on the Lac Mégantic event. Exhibit A2 shows the derailment speed of all cars that derailed at Lac Mégantic, with additional annotations. Therefore, hypothetically, if all derailed cars in the Lac Mégantic event would have had 9/16 inch thick shells, only one additional tank car out of fifty-nine breached tank cars would have survived the incident.

¹⁴ 79 Fed. Reg. 45054, Table 18 and FN 58.



B. The RSI-CTC Supports a Thermal Protection System for New Tank Cars that Satisfies the 100-minute Pool Fire Requirement

We support the requirements contained in the Proposed Regulations that all new tank cars meet the 100-minute pool fire and 30-minute torch fire survivability standards. For newly built tank cars to meet these requirements, the RSI-CTC recommends a thermal protection system consisting of: application of a steel jacket, a high temperature thermal blanket and an appropriately sized PRV. Although thermal blankets are not necessarily required to achieve effective thermal protection, the RSI-CTC believes them to be cost-effective and most beneficial to the overall thermal protection system.

C. The RSI-CTC Supports Top Fittings Protection but Opposes Rollover Protection as a Requirement for New Builds

Both top fittings and rollover protection are intended to prevent loss of lading in a derailment scenario. To date, only top fittings protection has been used in general purpose tank cars, with rollover protection being deployed exclusively in pressure tank cars primarily carrying toxic by inhalation hazard materials (“TIH”). The RSI-CTC supports a requirement that new tank cars be equipped with top fittings protection consistent with AAR Specifications for Tank Cars, Appendix E, paragraph 10.2.1 (CPC-1232 standard) instead of TIH rollover protection because: 1) top fittings protection has

¹⁵ Transportation Safety Board of Canada, Engineering Laboratory Report (LP039/2014), (April 3, 2014).

proved to be suitable for addressing lading losses in derailments involving general purpose tank cars and 2) rollover protection is largely unproven in the general purpose tank car context, likely will add only slight safety benefits to such tank cars, and may have unintended negative structural and commercial consequences.

Recent findings published by Canada's Transportation Safety Board ("TSB") suggest the current CPC-1232 industry standard for top fittings protection on general purpose tank cars already accomplishes its intended purpose of substantially reducing top fittings breaches in derailment scenarios. As stated in the TSB report on Lac Mégantic, "approximately 15% of the cars with impact-damaged top discontinuity protection housings (CPC-1232 standard) had breached top fittings, whereas 62% of the cars with impact-damaged hinged housings [conventional arrangement] had breached top fittings."¹⁶ TSB goes on to conclude "this comparison demonstrates that top discontinuity protection is effective in reducing the release of product from impact-damaged top fittings (including [pressure relief devices])."¹⁷ Hence, for the Lac Mégantic derailment, the CPC-1232 top fittings protection standard reduced loss of loadings through fittings by a factor of four relative to the conventional arrangement.

According to research performed by Sharma and Associates for the U.S. Federal Railroad Administration ("FRA") on top fittings protection, the lading loss that did occur is difficult, if not impossible, to eliminate. As stated in the Sharma report, "severe derailments that involve high impact velocities are likely to result in fittings damage (and lading release), even when protective structures are employed."¹⁸

In contrast, the rollover protection described in the Proposed Regulations is designed for tank cars carrying products, such as TIH, where exceedingly small amounts of product release have a significant impact on environmental health and safety. TIH protection requires installation of a heavier, broader plate to the top of the tank car to secure the protective housings. Because the increased stiffness of this plate stresses other areas of the tank, potentially leading to unanticipated tank failure, TIH rollover protection has only been applied to tanks capable of supporting the additional stiffness associated with rollover protection—i.e. pressure tank cars having a thickness of at least 0.89 inches.¹⁹ Such rollover protection is largely undeveloped and unproven in non-pressure tank cars.

The flammable liquids within the scope of the Proposed Regulations (including crude oil and ethanol) do not present the same risk as TIH commodities; a release of a small amount of crude oil, for example, does not pose imminent health and safety dangers. Moreover, the application of the heavy TIH rollover protection to 7/16 inch and 9/16 inch

¹⁶ Transportation Safety Board of Canada, Railway Investigation Report No. R13D0054, "Runaway and Main-Track Derailment, Lac Mégantic, Quebec, July 6, 2013," at 109 (August 19, 2014) (hereafter "TSB Lac Mégantic Report").

¹⁷ *Id.*

¹⁸ U.S. DOT, Federal Railroad Administration, "Survivability of Railroad Tank Car Top Fittings in Rollover Scenario Derailments," DOT/FRA/ORD-06/11 at 41 (Dec. 14, 2005) (analysis performed by Sharma & Associates, Inc.) (hereafter "Top Fittings in Rollover Scenario Derailments Report")

¹⁹ Responsive to Q3 – New Tank Cars for HHFTs, 79 Fed. Reg. 45057.

tank cars will alter/increase the stresses in other areas of the tank, leading to unknown results, including potential tank failures in both derailment and normal operational scenarios.²⁰ Here too, research performed for FRA by Sharma and Associates indicates “[t]he structural connection of any add-on structure to the tank shell is a major limiting factor in the design of any system of protection.”²¹

Further, mandating TIH rollover protection will have commercial and operational consequences for shippers. The heavier rollover protection will result in a loss of carrying capacity, forcing shippers to bear the cost of using more tank cars to carry the same amount of product. The shipping community also has indicated that TIH rollover protection on general purpose cars built with a 7/16 inch or 9/16 inch tank shell may impair a shipper’s ability to load and unload the tank car.

Under these circumstances, TIH rollover protection is not justified from a safety, technical, or economic standpoint for DOT-117 tank cars. Rather, achieving the safety goals of optimal puncture and product loss protection can be best accomplished through a more effective use of added structure and weight: thicker tanks, jackets, full height head shields, top fittings protection, a PRV and a reconfigured BOV handle.

D. ECP Brakes Do Not Achieve Significant Safety Advantages in Derailment Scenarios

The RSI-CTC wants to emphasize that it does not support the requirement that new DOT-117 tank cars be equipped with ECP brakes, because ECP brakes do not offer significant safety advantages during a derailment scenario, as compared to other alternative braking systems.

In lieu of ECP brakes, we support the use of Distributed Power (“DP”) or two-way End-of-Train (“EOT”) braking systems that are under consideration in Option 2 and Option 3. DP is a system that provides control of a number of locomotives dispersed throughout a train from a controlling locomotive located in the lead position. The system provides control of the rearward locomotives by command signals originating at the lead locomotive and transmitted to the remote (rearward) locomotives. The two-way EOT device includes two pieces of equipment linked by radio that initiate an emergency brake application command from the front unit located in the controlling locomotive, which then activates the emergency air valve at the rear of the train within one second. The rear unit of the device sends an acknowledgment message to the front unit immediately upon receipt of an emergency brake application command. We agree that a two-way EOT device is more effective than conventional brakes because the rear cars receive the brake command more quickly.²²

Starting in April, 2014, railroads and DOT agreed that trains with twenty (20) or more loaded cars of crude oil operating on main track would be required to use either DP or

²⁰ Early estimates for the application of rollover protection to a 9/16 inch shell tank car increase the tank car weight by 1100 lbs. and may increase cost by \$4,500. Responsive to Q2 – New Tank Cars for HHFTs, 79 Fed. Reg. 45057.

²¹ Top Fittings in Rollover Scenario Derailments Report at 41.

²² NPRM, 79 Fed. Reg. 45048.

EOT systems. As a result, DP and EOT systems are already providing safety benefits, as compared to the utilization of ECP brakes which are years from operational effectiveness. As PHMSA has accurately explained in the Proposed Regulations, EOT brake performance is nearly equivalent to DP brake performance. Furthermore, Figure 1 and Figure 2 of the NPRM, shown below, demonstrate that ECP brakes are not appreciably superior to DP brake performance. Based on these figures, ECP brakes present very little advantage for the first 10 cars in a derailment and only 18% advantage, as compared to an EOT device.

Figure 1: Kinetic Energy vs. Position in Train at a Derailment Speed of 40 Mph

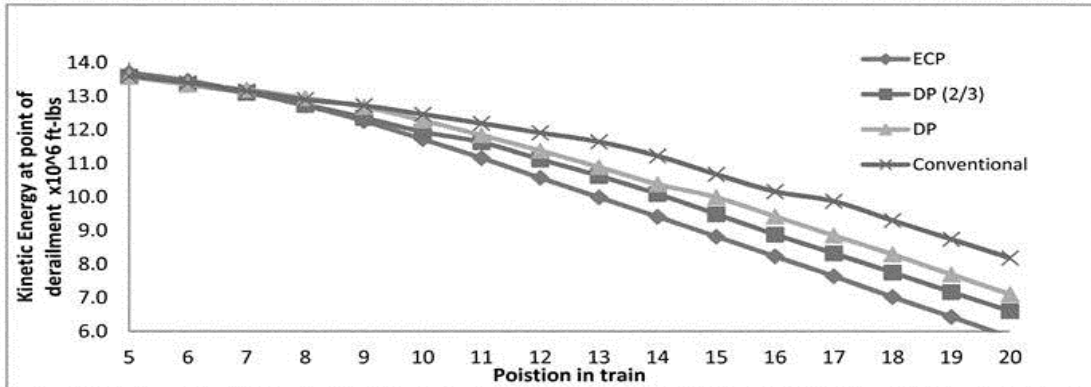
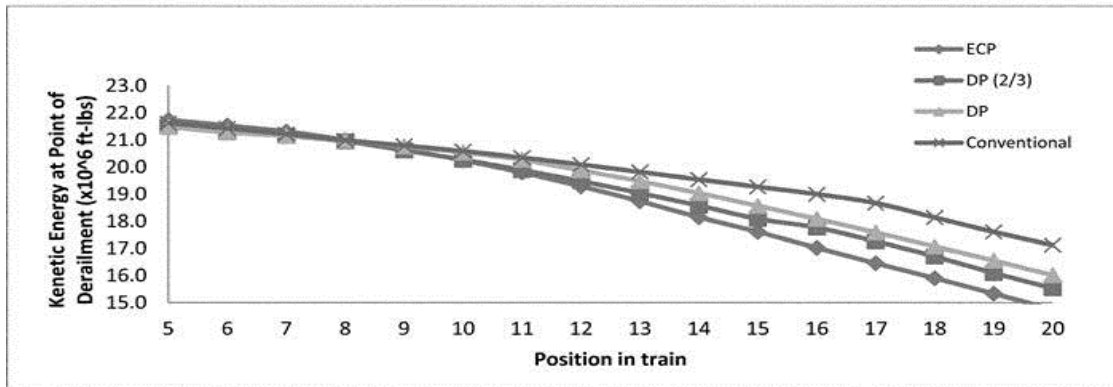


Figure 2: Kinetic Energy vs. Position in Train at a Derailment Speed of 50



Unlike DP and EOT systems, ECP technology only works if the entire train (railcars and locomotives) is equipped with ECP technology. Since the tank cars covered by the Proposed Regulations would not always move in an ECP capable train, car owners would be required to install a system that would allow tank cars to be used in both ECP and conventional braking service. Such dual systems are commonly referred to as “overlay” systems. More importantly, information available on crude oil train incidents indicates that the use of ECP brakes would have had no impact on preventing these incidents.²³ Furthermore, the AAR T87.6 task force reviewed derailment simulations

²³ See John Rimer, CSX Transportation, “Braking Systems and Distributed Power,” (June 10, 2014), Presented to the U.S. White House Office of Management and Budget

involving ECP brakes compared to conventional braking systems and concluded that “the alternatives considered provided marginal benefits.”²⁴ If the U.S. is seeking to achieve the greatest benefits as quickly as possible to improve safety, it should mandate the uniform use of DP or EOT braking systems.

Currently there is no infrastructure available for the testing and repair of ECP brakes at tank car shops or on railroad rip tracks and classification yards.²⁵ Railroads, certified tank car facilities and mini shops that perform tank car brake inspections and repairs will need additional equipment and training to perform the required testing and repair. Effectively all individuals involved in brake repair and testing in North America will require ECP test equipment and training. There will also be a need for replacement parts, such as special batteries, that are not in the current replacement parts system. These requirements will likely increase out of service time and the total cost to operate ECP equipped tank cars in excess of the costs indicated in the NPRM. The RSI-CTC disagrees with PHMSA’s estimates that ECP brakes cost \$3000 per new tank car and \$5000 per modified tank car. PHMSA’s estimates appear to fail to account for installation costs, such as labor, and parts, like pipes to protect the electrical cables and installation brackets. Based on a survey of ECP brake component suppliers, the RSI-CTC estimates the actual incremental cost of ECP brakes with an overlay system to be \$7,300 for new cars and \$7,800 for modified cars.²⁶

VIII. Existing Tank Cars: The RSI-CTC Supports Option 3 for the Modification Requirements for the Existing Tank Car Fleet

Although the RSI-CTC supports Option 2 for newly built cars used to transport crude oil and ethanol, we do not feel that the Option 2 requirements are appropriate for existing cars under the circumstances. This is primarily due to the safety, engineering, and economic consequences associated with applying a jacket that is thicker than 11 gauge to an existing tank car, as discussed in Section VIII.E. below. Moreover, as set forth in Section VI above, it is neither necessary nor efficient for existing cars to be modified to the same requirements as new car builds.

Instead, the RSI-CTC supports most of the elements of the prescribed requirements for new tank cars set forth in Option 3 of the Proposed Regulations for existing tank car modifications, with an exception for existing tank cars carrying Class 3, PG III commodities. Specifically, we propose that modified tank cars be able to utilize the existing head and shell as a base, and we agree that the modification should include jackets, full height half inch head shields, the reconfigured BOV, a reclosing PRV, and a thermal protection system in accordance with 49 C.F.R. § 179.18.

by the Association of American Railroads, available at <http://www.reginfo.gov/public/do/viewEO12866Meeting?viewRule=false&rin=2137-AE91&meetingId=212&acronym=2137-DOT/PHMSA> (“handout 2”).

²⁴ T86.7 Task Force Report at 14, available at www.regulations.gov, Docket No. PHMSA-2012-0082-0012.

²⁵ Responsive to Q1 – Alternative Brake Systems, 79 Fed. Reg. 45051.

²⁶ Responsive to Q2 - Alternative Brake Systems, 79 Fed. Reg. 45051.

Further, we endorse PHMSA's conclusion that top fittings protection should not be included within the required modifications, because it is not justified at a cost of \$24,500 per tank car. And, as indicated below, the RSI-CTC strongly recommends that PHMSA no longer remain silent on the issue of normalized steel and make clear that such steel is not, and should not be, a modification requirement. This would allow existing tank cars originally constructed with non-normalized steel to remain in service once modified. As described in sub-part F below, we support a more limited set of modifications for existing tank cars transporting Class 3, PG III commodities.

A. PHMSA is Correct that Top Fittings Protection is Not a Cost Justified Modification for Existing Tank Cars and May Introduce Unintended Safety Risks

For existing cars, the RSI-CTC agrees with PHMSA's assessment that the costs associated with top fittings protection modifications are not supported by the corresponding benefits.²⁷ As compared to new car builds, modification of existing tank cars to include top fittings protection is very expensive and complex. We estimate the cost of adding CPC-1232 top fittings protection to existing tank cars could be as high as \$24,500 per tank car.²⁸ Moreover, this costly "fix" would be intended to address a "problem" even DOT acknowledges is of relatively small magnitude. Specifically, DOT has concluded that losses from top fittings damage are approximately nineteen (19) times less than those from head and shell damage.²⁹

Statistical accident data corroborates the relatively minimal benefit of applying top fittings protection to existing cars. Based on studies performed within the RSI-AAR Tank Car Safety Project, the conditional probability of release ("CPR") of the non-jacketed legacy car is 0.1955.³⁰ The CPR after adding a jacket and full height head shield is 0.0777, for an incremental CPR improvement of sixty percent (60%). The CPR after adding top fittings protection to the jacketed and full height head shield modified car is 0.0457, providing only twenty percent (20%) of the incremental benefit. Thus, the vast majority of improvement comes not from applying top fittings protection but from adding a jacket and full height head shields to protect the shell. This makes sense, as the shell is the most common area from which commodity is released if a tank car breaches in a derailment.

Finally, the only marginal benefit of top fittings protection for existing tank cars is supported by the calculated aggregate effectiveness rates of modification options presented in the table on page one of the PHMSA technical supplement titled

²⁷ See NPRM, 79 Fed. Reg. 45058. This section is responsive to Q11 – Existing Tank Cars for HHFTs, 79 Fed. Reg. 45061.

²⁸ This is consistent with the PHMSA's cost/benefit analysis of this feature. See NPRM, 79 Fed. Reg. 45058.

²⁹ See NPRM, 79 Fed. Reg. 45055.

³⁰ For CPR estimates cited in this section see RSI-AAR Railroad Tank Car Safety Research and Test Project, Preliminary Report Ra-13-04A, at p. 3, Table 1, Column 3 (November 3, 2013) (TWP-17 for mainline/siding derailments with CPR values for commodity released greater than 100 gallons).

“Calculating Effectiveness Rates of Tank Car Options.”³¹ The report determined that top fittings protection accounted for an aggregate effectiveness rate of only 1.3, or 3.1% of the total effectiveness of a comparably equipped Option 3 tank car. By contrast, should it be mandated, top fitting protection would account for approximately 30% of the total modification cost of a non-jacketed legacy DOT-111 tank car to meet Option 3 requirements.³²

Modifying legacy cars to meet the CPC-1232 standard of top fittings protection could also introduce unintended safety risks. Such modification would require substantial cutting, grinding, and welding on the existing tank car structure. By their nature, these activities tend to weaken the structural integrity of the tank and are only undertaken when absolutely necessary. Overhead welding specifically would be required to secure the steel plate that would serve as the base for the modified top fittings protection to the top portion of the existing tank car. Ideally, to avoid the welder having to work against gravity, the entire tank car would be rotated upside for this welding to be performed in a downhand position. Many repair facilities are not presently equipped with the heavy machinery required to rotate the tank car. Regardless, such extensive work could introduce defects that result in fatigue cracking or otherwise cause premature tank failure—problems of far greater impact than the damage caused by relatively small and infrequent releases that occur through top fittings during derailments.

Given the above, including top fittings protection within the scope of mandated modifications for existing cars is neither warranted nor justified. We respectfully urge PHMSA to work closely with Transport Canada to harmonize this aspect of the Proposed Regulations to ensure that a top fittings modification requirement is not included for existing tank cars remaining in Class 3 Flammable Liquids service.

We note that current AAR rules require all DOT class non-pressure tank cars ordered after December 31, 2003 weighing in excess of 263k Gross Rail Load (“GRL”) to be equipped with top fittings protection in accordance with Appendix E, paragraph 10.2.³³ Under this rule, all new builds are required to have top fittings protection consistent with this provision. It is expected that any existing cars that are modified to operate at 286k GRL would need a waiver from the AAR to allow the cars to operate without having to comply with this rule. In the event that a waiver is not granted, requiring top fittings modifications will increase the number of tank cars that we expect to be retired prematurely and/or scrapped rather than modified. It will also amplify the unintended consequences associated with removing a large portion of the fleet cars service. The RSI-CTC is already in the process of seeking this waiver from AAR, and we encourage PHMSA to support the RSI-CTC in this endeavor.

³¹ DOT Report, “Calculating Effectiveness Rates of Tank Car Options,” (August 25, 2014), www.regulations.gov, PHMSA-2012-0082-0180.

³² It was not previously possible to incorporate these changes without government approval.

³³ AAR MSRP Section C-III (Specification for Tank Cars), Paragraph 2.5.

B. It is Critical that PHMSA Clarify that Normalized Steel is Not A Modification Requirement for Existing Tank Cars

While the RSI-CTC supports the use of normalized steel for new builds, we do not support this as a modification requirement for existing cars. Although the NPRM is silent on this point and we understand from discussions with PHMSA personnel that the agency does not intend to make this a modification requirement, it presently is included within the scope of the TC Proposed Regulations. The RSI-CTC wants to emphasize the implications of such a requirement, should PHMSA be reconsidering it at this point.

First, it is not technically possible to modify a tank car to the standard of normalized steel if the tank car was not originally constructed with such material. Of the population of existing tank cars owned by the RSI-CTC members that are potentially eligible for modification, 47,300 were manufactured from non-normalized steel. Most of these cars were constructed to carry 263k GRL and built in accordance with then-existing regulations which did not require normalized steel. The remaining 44,100 legacy DOT-111 tank cars eligible for modification for 286k GRL service were constructed of normalized steel. The existing CPC-1232 tank cars were all built with normalized steel, per the current regulations. Therefore, if normalization were included as a modification requirement, 47,300 tank cars with non-normalized steel would become obsolete, resulting in their being forced into early retirement.³⁴

Second, there is no compelling safety justification to support normalized steel for modified cars. During its investigation of the Lac Mégantic derailment, the TSB Engineering Branch concluded that “there was no indication that the use of non-normalized steels for some of the tanks was a contributing factor to the product release in this derailment.”³⁵ Data compiled by the RSI-AAR Tank Car Safety Project does not show a performance improvement in derailments when comparing normalized steels to non-normalized steels.

In further support of its position, the RSI-CTC retained independent technical expertise to assist in analyzing the implications and benefits of normalized steel. The results of this analysis indicate that the requirement to normalize is not justified from an engineering perspective or based upon the study of past accidents.³⁶

The development of brittle fracture has evoked concern regarding tank car structure performance which has led to the presumption that normalized TC-128B steel would preclude brittle fracture as compared to the higher brittle to ductile transition temperatures on non-normalized A516-Grade 70 and non-normalized TC-128B steel.

³⁴ As discussed in Section X.A and B, the RSI-CTC does not believe there are many other commodities whose density, shipment volumes, and packaging requirements would be suited to the use of re-purposed crude oil or ethanol tank cars. We also disagree that these tank cars would be repurposed to serve heavy crude oil from Western Canada.

³⁵ TSB, Operational Services Branch, Engineering Laboratory Report LP149/2013 at 30 (March 21, 2014).

³⁶ “Investigative Report: Fracture Behavior of Tank Car Steels,” Prepared by ESI for the Railway Supply Institute (September 15, 2014).

These assumptions are not correct for a number of reasons. First, service experience suggests that brittle fracture is not significantly higher in non-normalized cars versus normalized tank cars. Second, tank cars are constructed to favor deformation rather than fracture, so that the tank steel yields easily when impacted. Third, bi-axial stress fields occur more frequently than tri-axial stress fields required for brittle fracture. Fourth, tank cars are built with a “clean” vessel design with few “hard” points, which means they are more likely to experience ductile tearing instead of a brittle fracture.

C. The RSI-CTC Supports a Thermal Protection System for Existing Tank Cars that Satisfies the 100-minute Pool Fire Requirement

We support the requirement that all existing tank cars must meet the 100-minute pool fire and 30-minute torch fire survivability standards, which are in the Proposed Regulations. The RSI-CTC contends that the thermal protection systems utilized to meet these standards should differ, however, depending on whether the existing car is non-jacketed or jacketed.

Our recommendations are based upon the results of a number of Analysis of Fire Effects on Tank Cars (“AFFTAC”) simulations. AFFTAC is a fire simulation software tool which FRA has previously accepted as a means to verify existing thermal protection performance standards for tank cars currently operating. The simulations were performed for a range of flammable liquid commodities, including crude oil and ethanol. With respect to crude oil specifically, the RSI-CTC worked with the American Petroleum Institute (“API”) to verify the thermodynamic properties of several grades of crude oil, including that from the Bakken region.³⁷ Accordingly, these properties were used as inputs in the AFFTAC simulations. Thermal protection systems consisting of glass wool insulation (in the degraded condition) or high temperature thermal blankets were accounted for, as were several PRV configurations. The tank car geometry inputs are representative of both the existing tank car fleet as well as current proposals from both PHMSA and Transport Canada. Using the scenarios described below, the AFFTAC simulation results indicate tank cars in all flammable liquids service will survive in excess of 100 minutes in a pool fire and 30 minutes in a torch fire if equipped with the RSI-CTC recommended thermal protection systems.

1. Existing Non-Jacketed Tank Cars

For existing non-jacketed tank cars (both legacy DOT-111s and CPC-1232s), the RSI-CTC recommends application of a steel jacket, high temperature thermal blanket, and properly sized PRV.³⁸ These elements will work together to form a thermal protection system appropriate for cars originally constructed without jackets. Although thermal blankets are not necessarily required to achieve effective thermal protection, the RSI-CTC supports their use in this situation as a cost-effective means to enhance the benefits of the overall thermal protection system. The only caveat is that with respect to

³⁷ API Crude Oil Physical Properties Ad-Hoc Group, “Predicted Effects of Crude Oil Properties on Railroad Tank Car Survival in a Pool Fire,” (June 24, 2014).

³⁸ As stated below in Section VIII.F., all existing tank cars serving Class 3, PG III commodities would satisfy the thermal protection system requirement by application of an appropriately sized PRV. Accordingly, legacy DOT-111s in Class 3, PG III service would not be equipped with jackets or full height head shields.

non-jacketed CPC-1232s, we do not recommend the application of a high temperature thermal blanket under the side ladder area, as it will create clearance problems. Since a thermal blanket will still be applied to the remaining area of the tank shell, the RSI-CTC believes this will result in minimal adverse safety impact.

2. Existing Jacketed Tank Cars

For the existing fleet of jacketed tank cars, the RSI-CTC recommends a thermal protection system consisting of a properly sized PRV in addition to the existing glass wool insulation and steel jacket. The difference between this proposed modification and that for the non-jacketed cars is the use of glass wool insulation vs. a thermal blanket. In this situation, we believe that the application of a thermal blanket is of limited safety benefit compared to the high costs of application. Here, unlike the situation with non-jacketed cars, the existing jacket would need to be removed before the thermal blanket could be installed and the jacket then reapplied. This process is labor-intensive and expensive. Significantly, the RSI-CTC's engineering analysis indicates that the existing fleet of jacketed tank cars can meet the fire survivability standards even without a high temperature blanket by using glass wool insulation and the PRV instead.

The presence of the jacket alone provides a radiation "shielding" effect that protects the tank from direct exposure to fire conditions. And, although the glass wool insulation degrades under fire conditions, FRA tests³⁹ have shown that the residual insulation still retains some level of insulating properties. The occurrence of a thermal tear on a tank car insulated with glass wool insulation is an extremely rare event with only two documented cases occurring over the last 30 years of accident experience. In conjunction, these two components substantially limit thermal exposure.

To further mitigate the effects of heat exposure, the PRV can be sized and configured to minimize pressure build-up in the tank, thereby further reducing the potential for a high energy event. When sized properly, the PRV will provide only the necessary release of commodity to accomplish this. Hence, the steel jacket, glass wool insulation, and a properly sized PRV, in combination, provide an effective tank car thermal protection system.

3. Existing Tank Cars in Class 3, PG III Service

For existing tank cars transporting PG III flammable liquids other than crude oil and ethanol, the RSI-CTC recommends only the addition of the PRV to satisfy the thermal protection system requirement. These commodities have higher flash points which reduce the likelihood they will cause or contribute to a fire. Should they be subjected to fire conditions, a properly sized PRV provides adequate thermal protection.

D. Truck Upgrades Will Be Necessary for Most DOT-111 Legacy Tank Cars

In the Proposed Regulations, PHMSA assumes that legacy DOT-111 tank cars will be able to withstand the additional weight of the proposed modification without truck

³⁹ Wright, William P, Slack, Wayne A, Jackson, Willis F, "Evaluation of the Thermal Effectiveness of Urethane Foam and Fiberglass As Insulation Systems For Tank Cars," US Army Laboratory Command, July 1987.

replacement.⁴⁰ This is based largely on PHMSA's belief that the majority of tank cars in crude oil and ethanol service were built within the past 15 years, and therefore were already built to operate at 286k GRL with trucks that would support the additional weight.⁴¹ This assumption is incorrect. In reality, some level of truck modification will be required for nearly all legacy DOT-111s and the cost associated with this work is substantial.

Based on the Proposed Regulations and consistent with the RSI-CTC's position, legacy DOT-111s in crude oil and ethanol service will be modified to include the addition of full-height head shields. Additionally, jackets and thermal blankets will be applied to the non-jacketed DOT-111s along with other protective features. These added features will increase the tare weight (i.e. the weight of the empty tank car) of a 30,000 gallon non-jacketed DOT-111 tank car by a minimum 13,000 pounds (or more depending on the final regulatory requirements).⁴² As the NPRM indicates, to offset the increase in tare weight and to prevent a loss of shipping capacity, the GRL of the tank would need to be increased from 263k GRL to 286k GRL during the modification process.

AAR Office Manual Rule 88⁴³ states that freight cars operating at the increased 286k GRL must be in compliance with AAR MSRP S-286, which in turn provides the specifications for roller bearings, axles and adaptor—which requires new components in order to operate at 286k GRL.⁴⁴ Even if an existing legacy DOT-111 tank car had been built with the appropriate truck castings,⁴⁵ all four wheel sets on that car would still need to be replaced during the modification process to comply with existing AAR rules. New wheel sets are an additional cost of approximately \$10,000 per tank car.

The AAR interchange rules further require that trucks be of an M-976 approved design.⁴⁶ While some existing legacy DOT-111s have truck systems with castings that could be reconfigured to match an approved truck design, the majority of these tank cars would require completely new truck systems, because the original ones cannot be reconfigured to match an approved design.⁴⁷ Most legacy DOT-111s will require, at a minimum, new

⁴⁰ NPRM, 79 Fed. Reg. 45059. This section is responsive to Q7 – Existing Tank Cars for HHFTs, 79 Fed. Reg. 45061.

⁴¹ *Id.*

⁴² The 30,000 gallon non-jacketed tank car is used as the most common, but not the only, type of modified tank car impacted by the increased GRL requirements.

⁴³ See AAR Office Manual Rule 88, Section C.1.e(1).

⁴⁴ AAR MSRP S-286 requires trucks to have 6 ½ inch x 9 inch, 7 inch x 9 inch, or 7 inch x 12 inch roller bearings (Section 2.3) and new axles (Section 2.4) along with various other requirements.

⁴⁵ Many legacy DOT-111 tank cars were built for 263k GRL service with 6 ½ inch x 9 inch roller bearings, which is one of the AAR MSRP S-268 compliant roller bearing specifications.

⁴⁶ See AAR MSRP S-286, Section 2.8.1.

⁴⁷ The M-976 approved truck designs are listed in Table 2 of the AAR Field Manual Rule 46. Some existing truck systems may be reconfigured to conform to one of these

wheel sets and, in some cases, additional truck components. Others will also require new side frame and bolster castings. This truck work will cause a spike in demand for wheel sets, truck castings, and other truck hardware. The number of tank cars that can be modified would be limited if there is a shortage of any of these materials.

The RSI-CTC will seek a waiver from the AAR to allow legacy DOT-111s to operate at 286k GRL without having to replace the wheelsets. If this waiver is granted, then those tank cars with trucks capable of reconfiguration to an M-976 approved design would be modified by adding specific new components such as steering adaptor technology. However, the cost would be substantially reduced because entire new wheel sets would not be required. If the waiver is not granted, then the new wheel sets must be included as an additional modification cost. It simply would not be economically feasible to continue to operate the modified legacy tank cars with the additional weight at anything other than 286k GRL due to the decrease in carrying capacity. The absence of a waiver would also lead to additional tank car retirement beyond the 28% estimated by the RSI-CTC, which is discussed in more detail in Section IX.A. See Appendix B for specific costs associated with truck upgrades with and without a waiver.

E. Consequences of Requiring a Thicker Tank Car Jacket

In the NPRM, PHMSA asks how existing tank cars would comply with the requirement for an additional 1/8 inch thickness, should the agency select Option 1 or 2 as the modification requirements.⁴⁸ As delineated below, the RSI-CTC does not believe that this is a concept that ultimately merits serious consideration.

The only way for cars built with tank shells less than 9/16 inch to meet the thickness requirement of Option 1 or 2 is by adding additional thickness through the jacket material. However, a thicker jacket would require steel that is less flexible and more difficult to conform to the contour of a tank car. Roll forming would be required to fit the thicker jacket to the tank car, a process that occupies a great amount of physical space and requires specialized heavy equipment. Today, this process is rarely performed outside the existing railcar manufacturing sites in North America. In order to accommodate the demands of a mandated modification under the Proposed Regulations, the few repair shops with sufficient physical capacity to add the thicker jackets would need to undertake the significant capital investment necessary to procure the appropriate equipment to perform the required work.

Additionally, fabrication of the thicker jacket will require modified welding practices that go beyond those required for standard jacket fabrication. Only the most experienced welders would likely be qualified to complete such work. Anchoring the jacket to the car will also be problematic. The heavier the jacket, the more prone it will be to shifting caused by impacts during regular train operations. The tank nozzle is the primary anchor point for jackets. Increasing the weight of the jacket may require the tank nozzle to be reinforced at the tank. This could adversely affect the performance of the nozzle to tank connection in a derailment.

designs through the addition of certain truck system elements such as steering adapter pads, additional load springs, or friction wedges. See Appendix B for component costs.

⁴⁸ NPRM, 79 Fed. Reg. 45061 (responsive to Q6 - Existing Tank Cars for HHFTs).

The increased thickness will increase the weight of the jacket and further reduce the carrying capacity of the legacy cars should they not be able to operate at a GRL above 263k. The additional weight of the jacket may also introduce stresses that reduce the fatigue life in other areas of the tank. And, if a thicker jacket is mandated, there is a risk that lighter gauge jacket materials could be used on repairs to avoid having to roll form replacement sections. This may undermine the integrity of the jacket itself.

Finally, as stated previously, based on studies performed within the RSI-AAR Tank Car Safety Project, the CPR(100) of the jacketed and full height head shield CPC-1232 tank car is 0.0457; whereas, the jacketed and full height head shield CPC-1232 built with a ½ inch thick tank is 0.0365 and the jacketed and full height head shield CPC-1232 built with a 9/16 inch thick tank car is 0.0293. This means that if 100 CPC-1232s with a 7/16 inch tank were derailed in FRA-reportable accidents, we would expect approximately 4 or 5 of them to release more than 100 gallons of lading, whereas if all 100 cars were built either with a ½ inch thick tank shell or a 9/16 inch thick tank shell then we would expect about 3 to 4 of them to release more than 100 gallons. Thus, increasing the shell thickness from 7/16 inch to either ½ inch or 9/16 inch would only reduce the amount of breached cars by approximately 1 car on average. In contrast, the same data shows that the vast majority of improvement comes from adding a jacket and full height head shields to protect the shell where the commodity is most commonly released if tank cars breach in a derailment.

For these reasons, we strongly recommend that PHMSA permit existing tank cars built to 7/16 inch thickness to remain in service without requiring these tank cars to meet an increased shell thickness requirement. There are several risks associated with adding a thicker jacket to these tank cars which outweigh the safety benefit that may be associated with a thicker jacket.

F. Limited Modifications for Existing Tank Cars in PG III Service

The RSI-CTC respectfully suggests that a separate approach be taken with respect to modification of existing tank cars transporting Class 3, PG III commodities.⁴⁹ The transportation of Class 3 PG III flammable liquids does not warrant the same tank car packaging requirements as those needed for transport of Class 3 PG I and II commodities. PG III commodities have less hazardous characteristics (typically higher flash points) than crude oil, ethanol and other PG I and II commodities and do not generally move in either the volume or density as experienced with crude oil or ethanol. PG III commodities have been transported safely over many years in cars meeting existing regulatory requirements. Given the lower risks associated with transporting PG III commodities, the RSI-CTC recommends that changes to requirements for existing tank cars transporting PG III commodities be limited to the application of a reconfigured BOV and a reclosing PRV. Application of these features is an effective way to reduce the amount of product released and prevent high energy events if these cars are impacted by a derailment. Moreover, BOV and PRV modifications can be performed at the time of scheduled requalification, allowing the industry to direct its limited modification resources to those tank cars transporting commodities that typically move in unit trains.

⁴⁹ This section is responsive to Q1 – Inclusion of PG III Materials, 79 Fed. Reg. 45062.

IX. PHMSA's Proposed Modification Timeline Cannot be Achieved Based on Repair Network Facility Constraints and Does Not Account for Several Unintended Consequences

Under the Proposed Regulations, PHMSA would require that all modifications for all legacy DOT-111s and CPC-1232 tank cars in PG I service be completed by October 1, 2017, only 36 months from now. Roughly 50,000 of these tank cars (the "NJ Legacy Cars") are non-jacketed legacy DOT-111s in crude oil (23,000) and ethanol (27,000) which will require the full package of modifications to achieve compliance with the Proposed Regulations. At this time, it is nearly impossible to determine how many of these are PG I versus PG II because only the lessee (i.e. the shipper) has absolute knowledge of what commodity is shipped in the tank car. Therefore tank car owners and manufacturers would have to assume that all tank cars in this commodity service would be required to undergo modification or be removed from service to comply with the deadlines.

Based on the RSI-CTC's survey of maintenance and repair shop capacity currently expected to be available for completing these extensive modifications, only approximately 15,000 of the NJ Legacy Cars can realistically be modified by the proposed October 1, 2017 deadline. The RSI-CTC estimate of shop capacity assumes a ramp-up period of approximately six months for existing facilities, following the issuance of a final, non-appealable rule to allow for facility configuration, material procurement and workforce acquisition/training. We further estimate that because of technical barriers to modification, twenty-eight percent (28%) of the legacy DOT-111s, or approximately 25,600 tank cars, will be retired early from crude oil, ethanol and other flammable liquids service, rather than undergo modification.

A. Recommended Timeline⁵⁰

In order to accommodate the complexities and concerns identified in the sections below, the RSI-CTC has developed a timeline for the required modifications which is both aggressive and achievable. This timeline assumes the following:

- A final rule, no longer subject to legal challenges, would be in place by January 1, 2015.
- The compliance schedule includes a ramp-up period of a minimum of 6 months following the publication of a final rule to allow time to order materials, component parts, certify and train skilled labor, etc.
- Most manufacturing and repair facilities would not perform modifications until after the 6 month ramp-up period.
- Manufacturing and repair facilities are operating at an estimated capacity of 6,400 cars/year in year two of the modification program.⁵¹

⁵⁰ This section is responsive to Q5 – Existing Tank Cars for HHFTs, 79 Fed. Reg. 45061.

⁵¹ The RSI-CTC estimated the annual modification capacity based on a survey of member companies' maintenance and repair shop capacity and those shops most frequently used by the RSI-CTC members. We also included information from the Alltranstek survey conducted by API. Each company was asked to estimate the capacity

- The estimated population of modified cars accounts for a 28% early retirement rate applied equally to jacketed and non-jacketed legacy DOT-111s.

Legacy DOT-111 Crude Oil and Ethanol Tank Cars: All legacy (jacketed and non-jacketed) tank cars transporting crude oil (all Packing Groups) would be modified or removed from crude oil and ethanol service by **December 31, 2020**. This would require modification of approximately 36,000 non-jacketed legacy tank cars and 5,100 jacketed legacy tank cars. In the event a final rule is not in place by January 1, 2015, then the compliance period would be 72 months after publication of a final rule.

Non-Jacketed CPC-1232s Crude Oil and Ethanol: All non-jacketed CPC-1232 tank cars transporting crude oil and ethanol (all packing groups) would be modified or removed from crude oil and ethanol service by **December 31, 2022**. This would require modification of approximately 22,000 tank cars in crude oil service and 750 tank cars in ethanol service. In the event a final rule is not in place by January 1, 2015, then the compliance period would be 96 months after publication of a final rule.

Legacy DOT-111s in Class 3, PG I & II Service: All legacy (jacketed and non-jacketed) tank cars transporting Class 3 Packing Group I and II materials other than crude oil and ethanol would be modified or removed from Class 3 PG I and II service by **December 31, 2025**. This would require modification of approximately 14,300 non-jacketed tank cars and 5,400 jacketed tank cars in other flammable liquids service. In the event a final rule is not in place by January 1, 2015, then the compliance period would be 120 months after publication of a final rule.

Jacketed CPC-1232s in any Class 3, PG I & II Service: All jacketed CPC-1232 tank cars transporting Class 3 PG I and PG II materials (including crude oil and ethanol) would be modified at next shopping event or requalification, whichever occurs first, but no later than **December 31, 2025**. This would require modification of approximately 1,580 tank cars in other flammable liquids service. In the event a final rule is not in place by January 1, 2015, then the compliance period would be 120 months after publication of a final rule.

Legacy DOT-111s in Class 3, PG III Service: All legacy DOT-111 tank cars transporting Class 3 PG III materials would be modified at next shopping event or requalification, whichever occurs first, but no later than **December 31, 2025**. This would require modification of approximately 4,925 tank cars in other flammable liquids service. In the event a final rule is not in place by January 1, 2015, then the compliance period would be 120 months after publication of a final rule.

expected to be available for completing these extensive modifications based on the RSI-CTC's proposed modifications. Our members provided a range of capacity projections. We have used the 6,400 figure here to illustrate a more realistic approach, but our recommended compliance deadlines assume some additional growth in annual modification capacity will occur.

Exhibit A3: Modifications by Existing Tank Car Sub-fleet

Sub-fleet	Number of Tank Cars (Adjusted for 28% early retirement)	Deadline for Modification	Modifications Required
NJ Legacy DOT-111s	16,625 (crude oil)	12/31/2020	Full-height head shield, Jacket, Thermal Protection System, Reclosing PRV, Reconfigured BOV, Increase to 286k GRL
	19,467 (ethanol)		
J Legacy DOT-111s	14,279 (other FL, PG I & II)	12/31/2025	Full-height head shield, Thermal Protection System, Reclosing PRV, Reconfigured BOV, Increase to 286k GRL
	5,052 (crude oil)	12/31/2020	
NJ CPC-1232s	63 (ethanol)	12/31/2025	Jacket, Thermal Protection System, Reclosing PRV, Reconfigured BOV
	21,993 (crude oil)	12/31/2022	
J CPC-1232s	751 (ethanol)	12/31/2025	Thermal Protection System, Reclosing PRV, Reconfigured BOV
	2,395 (other FL, PG I & II)	12/31/2025	
All existing tank cars in PG III Service	35,608 (crude oil)	12/31/2025	Reclosing PRV, Reconfigured BOV
	23 (ethanol)	12/31/2025	
	1,580 (other FL, PG I & II)		

We also suggest including progress intervals and reporting requirements for modification compliance, particularly for those cars that must be modified or retired before the 2020 (i.e. 72 month) deadline. This approach was utilized when FRA mandated that reflectors be applied to new and existing tank cars.

B. The Modification Timeline Must Account for the Limited Resources and Practical Constraints of the Maintenance and Repair Facility Network

Tank car modification is an extremely complex process that requires numerous engineering, safety and mechanical activities to occur both in preparation for and after the application of the features required by the Proposed Regulations. This section discusses: 1) the complexity of the modification process; 2) practical constraints on the maintenance and repair facility network; and 3) the challenges associated with bringing a new “greenfield” facility online.

1. Complexity of Large Scale Modifications

a. Prior to Modification

Preparing a tank car to undergo the modifications contemplated by the Proposed Regulations involves numerous steps that must occur when the car arrives at a repair facility. Upon entry, the tank car must be visually inspected and assessed for any damage requiring repair. Next, the tank car must be steam cleaned to remove all commodity residue. Crude oil cars may then require a more involved process including manual labor to scrape commodity heels from the tank interior, followed by a chemical

wash or second steam cleaning. Cars with corrosion or rust may require a commercial grade interior blast to make the tank suitable for interior inspection and repair. Once clean, facility personnel will perform a series of tests to inspect the structural integrity of the attachment welds and the underframe and to test the shell thickness. These tests determine the tank car's suitability for modification, repurposing, or scrapping.

Next, the tank car must be readied for non-modification repairs. These repairs may include draft sill repairs, draft component replacement, truck casting repairs, truck component replacement, or attachment weld repairs. After that, all valves and fittings—including the top unloading valve, the pressure relief device, the manway cover, and the fittings plate and protective housing—must be removed. The side ladders, top platform, the bottom outlet valve, and the guardrails and brackets on the underside of the tank must also be removed. Finally, the entire brake system, including the brake rigging, the hand brakes, control valves, brake pipe, brake rods, and supports would all need to be removed from the tank car. If truck upgrade is required, the road truck would be removed and the car would be placed on shop trucks to facilitate the modification of the car. Only at this point is the tank car ready to undergo modification.

b. During Modification

First, head shield supports must be welded to the ends of the tank car to support the application of a full-height head shield. These supports are then heat treated with blankets to locally stress-relieve the tank in the areas where the welding occurred. Next, the tank must be blasted and primed to create the appropriate profile for application of the thermal blanket. Blasting consists of spraying the tank with hard sand or grit at a high velocity to remove old paint and shop dirt prior to painting the tank shell to prepare it for application of the thermal blanket. It also creates a textured pattern or profile on the tank surface to allow the paint to properly adhere to the tank. Then, jacket spacers are applied to hold the jacket a certain distance from the tank to keep it from crushing the thermal blanket that rests between the jacket and the tank shell. The thermal blanket is then applied to the tank.

The jacket must then be fabricated, with the most efficient process to do this being the use of large scale rolling equipment to conform the jacket to the correct shape and semi-automatic welding equipment to weld the jacket sections together prior to application on the tank car. However, most repair facilities do not presently own or have access to this type of equipment—typically costing approximately \$1 million and usually only found in manufacturing facilities suited to large scale tank car production. Accordingly, most facilities would need to manually roll and weld the sections. The interior of the jacket is then primed. Next, the head shields and jacket would be applied to the blasted and primed tank car. Re-application of the requalified top and bottom fittings and nozzles would then take place, followed by assembly and application of the new brake brackets, supports and carriers. All other external equipment that was removed prior to modification would then be reapplied to the modified tank.

c. Post-Modification

After the modifications are complete, the road trucks would be reapplied, and the tank car would undergo required testing to confirm the proper functioning of the equipment. This includes an airbrake test, qualification of the valves, a leakage pressure test, testing

of the full brake system, and a curve test to check the wheel clearance. Before the tank can be returned to service, it must be painted and stenciled. The painting process typically takes 48 hours so that the cars have sufficient time to dry prior to stenciling. The tank car also must be weighed to determine the tare weight of the car so that it can be stenciled appropriately. Finally, all regulatory and registration paperwork must be completed before the tank car can be released from the facility and returned to service.

Rarely has PHMSA found need to call for such a large and complex modification program to an existing fleet of tanks such as is now proposed. In fact, the only previous ruling that comes close to the complexity now under discussion is HM-144 dating back to the late 1970's. Within that rule, certain non-insulated 114A and 112A pressure cars were to be modified by the application of full head shields, thermal insulation and metal jackets. The final rule outlined that 20,400 cars were subject to the full scope of the rule and that approximately 12,500 cars were scheduled to be modified with jackets, insulation and full head protection. The text of the rule-making documents clearly recognized the difficulty of the modification tasks called for, and for that reason, in part, specified a four-year time frame for compliance.⁵² We note that the population of cars covered by the current proposal is at least four times larger, while the suggested compliance period has been cut in half.

2. Practical Constraints on the Maintenance and Repair Facility Network

In addition to the complexity of the modifications noted above, there are several practical constraints on the maintenance and repair facility network that will complicate and may delay the execution of the modification program. First, there is the fact that these modifications do not occur in a vacuum. At the same time that tank cars are entering a facility for modification, the same facility is also handling bad orders (i.e. equipment repairs), reassignments of the tank car into new commodity service, and mandatory requalifications. Based on build dates, we anticipate that the required 10-year requalifications will peak in 2017 and 2018, the same time when the most extensive modifications would be required by the Proposed Regulations. See Table 2 for the requalification schedule.

Exhibit A4: Tank Car Requalification Schedule

Year	Cars Inspected Initial Cycle ^a	Cars Built Initial 10-yr Cycle ^{a, b}	Cars Built Second 10-yr Cycle ^c	Total
2010	6,275	9,766	NA	15,460
2011	10,752	7,560	NA	17,854
2012	10,582	5,519	NA	15,698
2013	11,590	8,176	NA	19,272
2014	12,576	8,939	NA	20,977

⁵² See Shippers: Specification for Pressure Tank Car Tanks, Docket No. HM-144, 43 Fed.Reg. 20250 (May 11, 1978)(describing the relative difficulty of retrofit tasks); See also Specifications for Pressure Tank Cars, 42 Fed. Reg. 46306, 46308 (Sept. 15, 1977) (noting commenters concerns that modifications could not be allotted in the required time and extending the compliance period).

2015	12,387	11,563	NA	23,351
2016	13,097	12,075	14,034	38,226
2017	15,230	10,415	21,433	45,901
2018	15,923	12,992	21,700	49,350
2019	19,230	13,243	8,942	40,380
2020	6,275	9,766	4,837	20,356
2021	10,752	7,560	8,727	26,363
2022	10,582	5,519	17,666	32,923
2023	11,590	8,176	28,996	47,543

^a T87.6 Task Force data.

^b American Railcar Institute (ARCI) data.

^c Total includes a standard 2.5 % retirement rate.

Second, there is the potential unavailability of materials and component parts. The RSI-CTC has assumed a six month ramp-up period prior to modification, but there is no guarantee that the necessary materials and parts would be delivered within that time frame. Third, the availability of skilled labor is also a factor that could impact the modification program. Many facilities anticipate hiring additional workers or adding shifts to meet the modification schedule. These complicated modifications require welders with special certifications and substantial on the job training. Fourth, PHMSA should consider that most repair facilities do not exclusively service tank cars. Many other types of freight cars require maintenance and repairs. Industries relying on other types of freight cars also need access to repair network capacity during the tank car modification program.

Finally, there are several execution risks beyond the control of the car owner that may also impact its ability to comply with the modification deadlines. To comply with the proposed timeline, such individual car owners will attempt to create balanced flows of cars from customers to repair locations and then back to customers after work is complete. They will need to mitigate and manage the risks that could cause their car flows to become unbalanced, leading to missed compliance deadlines. These risks are as follows:

- Shippers generally size their fleets for projected production volumes so that there are few excess cars in their fleets. Unless they are confident they have enough cars to meet short term production needs, shippers may hold on to cars instead of shopping them as scheduled.
- Railroad performance in moving cars to and from shops is erratic. This can cause customers to hold cars that have been scheduled for shopping and cause disruption in the flow of cars through shop work centers.
- Lack of geographic proximity between where cars are used and the location of the shops may increase costs and cause delays in getting cars to the shops.
- Projected cycle times are often longer than expected due to disruptions in staffing levels, material shortfalls and production equipment failures.

- Tank cars are frequently not in the expected condition when they arrive at a shop and often need additional repair or maintenance work. Condition issues may include excess or inaccurate commodity left in the car, additional components requiring repair, or unreported changes to the car requiring engineering review or verification.
- Tank cars will need to be shopped by Builder and Lot Numbers to the maximum extent possible to avoid the need to reconfigure the production line more often than necessary. This requires coordination of multiple customers shopping their cars at the same time or working with one large customer to shop a majority of their cars at the same time.
- Natural bottlenecks in a repair facility (most notably paint and lining) will be exacerbated by the influx of modification work, possibly leading to delay in the release of cars.
- Multiple shoppings may be required if a repair facility does not have the capabilities required to do all work needed (i.e. cleaning, mechanical (including the capability to perform requalifications), modification, paint/lining). This may increase the cycle time and complicate the logistics of the modification program.

3. Greenfield Facilities

There are significant barriers to entry into the business of performing the types of modifications set forth in the Proposed Regulations. Obtaining the requisite certifications and environmental permits alone could take well over a year. Not only does the labor force need certification to perform certain types of welding work, but the facility itself must be certified by the AAR and the Bureau of Explosives. Additionally, the cleaning and painting operations at a typical repair facility require complex air permits that must be approved by federal and state regulators. The “greenfield” cost is likely prohibitive for many potential facility owners given the significant capital investment required. This is particularly true when the most extensive modifications under the Proposed Regulations would need to be completed before October 1, 2017. In light of these barriers, it is unrealistic for PHMSA to assume an increase in capacity of the maintenance and repair network based on the addition of a significant number of new facilities.

C. New Tank Cars Cannot Begin Replacing the Existing Fleet Immediately

It is clear in the NPRM that PHMSA has assumed that the tank car manufacturing industry is in a position to begin immediately replacing existing tank cars with new builds. This assumption is incorrect and reflects a misunderstanding of the information that RSI-CTC presented to OMB during a meeting in June 2014.⁵³ To be clear, the backlog for new cars built to serve crude oil and ethanol will consume all available production through the end of 2015. Starting in 2016, the tank car manufacturing industry will have capacity to build approximately 20,000 new cars annually for crude oil and ethanol. The remaining new car capacity is expected to be required to meet tank car construction

⁵³ See U.S. DOT/PHMSA Draft Regulatory Impact Analysis, PHMSA-2012-0082-0179 at p. 77 (hereafter “Draft RIA”).

demands for other commodities.⁵⁴ Given that the existing legacy DOT-111 crude oil and ethanol tank car fleet is over 57,000 tank cars, and that a portion of new car builds will be needed to support increased demand for crude oil transportation, it will take over 3 years to replace the existing fleet of DOT-111 cars.

Unlike the assumptions made by PHMSA, the RSI-CTC anticipates that crude oil demand will continue, resulting in additional growth of the crude oil fleet. Satisfaction of new crude oil tank car demand should, therefore, be considered alongside efforts to replace the existing DOT-111 fleet.

D. PHMSA Fails to Account for the Unintended Consequences of its Timeline

The RSI-CTC has retained The Brattle Group (“Brattle”) to fully assess the economic impact of the Proposed Regulations.⁵⁵ According to Brattle’s analysis, the immediate effect of the Proposed Requirements would be to force over 90,000 tank cars to be withdrawn from service at various times during the modification program and parked until the shop capacity required to carry out the necessary modifications becomes available. See Exhibit B1 for details. Brattle estimates that the total out of service time for these parked cars could amount cumulatively to over half a million car-years.

A major portion of this loss would involve cars carrying flammable liquids other than crude oil and ethanol. These commodities pose a relatively smaller risk, so under any rational modification schedule that prioritizes tank cars associated with the highest risk, these tank cars would be modified last (i.e. only after the necessary work had been carried out for the crude oil and ethanol fleets). Even among the crude oil and ethanol fleets, however, total out of service time would come to well over a quarter million car years.

Exhibit B1: Tank Cars in Crude, Ethanol and Other Flammable Liquids Service

Number of Cars Subject to Deadline	145,219
Number of Cars Modified by Deadline	25,487
Number of Cars Retired at Deadline	25,602
Number of Cars Awaiting Modification at Deadline	94,130

If PHMSA elects to follow our recommendations (outlined above) and allow jacketed CPC-1232 cars to remain in service until the necessary modifications can be carried out in conjunction with ordinary maintenance or requalification work, this figure drops to

⁵⁴ These capacity figures reflect tank car manufacturing only and are not expected to impact the manufacturing of other types of freight cars.

⁵⁵ Founded in 1990, the Brattle Group employs a staff roughly 200 professionals, many with advanced training and degrees, and supplements their capabilities through affiliations with leading international academics and industry specialists. Brattle provides consulting and expert testimony in economics, finance, and regulation to corporations, law firms, and governments around the world. As a result of its long-standing and extensive experience in working with regulated network industries the company has particular expertise in the fields of energy, transportation and regulatory economics.

170,000 car years – a much smaller but still significant reduction in capacity. This loss in capacity would be equivalent to removing the entire crude oil and ethanol fleets from service for a period of several years. If this loss were allowed to occur, between 2018 and 2020, thirty percent (30%) to fifty percent (50%) of the total crude oil and ethanol fleet not expected to be retired could be idled and unavailable to move product. See Exhibit B2 found in Appendix D. The impacts of such a loss of capacity could dwarf the direct compliance cost for the proposed modifications, which comes to approximately \$3.0 billion dollars for the entire crude oil and ethanol fleet, even after accounting for a projected twenty-eight percent (28%) early retirement rate for Legacy DOT-111 cars.⁵⁶ See Exhibit B3 found in Appendix D.

The effect of removing these cars from service while they await modification will be substantial. Brattle's preliminary analysis of the effect of requiring legacy DOT-111 and noncompliant CPC-1232 cars to be modified or removed from crude oil and ethanol service by October 1, 2017 indicates that there will be significant disruption to major sectors of the North American economy. The resulting reductions in annual tank car loads, as set forth in the Exhibit B4 found in Appendix D, illustrate the impact that the Proposed Regulations will have on rail capacity. In 2017, the year in which the first proposed compliance deadline falls, tank car loads of crude oil and ethanol will be reduced by approximately 170,000. In the following year, the first full year in which the restrictions apply, the effects on North American crude oil and ethanol rail traffic will be substantially larger. Brattle projects that crude oil and ethanol car loads will be reduced by approximately 820,000. Year by year details are shown in Exhibit B4 found in Appendix D.

These effects on rail capacity translate into significant implications for shippers and other affected parties. Service interruptions and supply chain disruption will be commonplace. It is difficult to project how producers, shippers and other affected parties will respond to this situation. Possible responses include diverting commodity transport to other modes, cutting back production, and/or scrapping the existing fleet and rebuilding. There are significant uncertainties regarding what might become of the affected cars, what might become of the affected traffic, and what might become of the affected crude oil and ethanol production.

1. Fate of the Affected Fleets

For purposes of modeling the likely impacts of the Proposed Regulations, Brattle has assumed that any existing tank cars that do not comply with requirements at the time of the compliance deadline will be taken offline and parked until the shop capacity needed to carry out the required modifications becomes available, at which point Brattle assumes they will return to their original service. Brattle recognizes, however, that this is but one of a number of possible outcomes. Some of these cars might be transferred to other services, either permanently or temporarily. It is also possible that they might simply be removed from service and scrapped.

⁵⁶ The RSI-CTC surveyed its members regarding fleet demographics, materials of construction, and design criteria to develop the estimated 28% retirement rate for all legacy DOT-111s.

PHMSA has assumed that major portions of the affected fleets would be permanently transferred to serve heavy crude oil from Western Canada, which PHMSA refers to as “tar sands.” Below in Section X.A. Brattle identifies the regulatory, technical and economic barriers to such a transfer and discusses why it thinks it is unlikely to occur. The affected fleets are large, and have been configured for the requirements of the markets they serve. The RSI-CTC does not believe there are many other commodities whose density, shipment volumes, packaging requirements and capacity needs would be suited to the use of significant numbers re-purposed crude oil or ethanol tank cars. These markets are already adequately served by existing tank car fleets, and absent significant growth would not have the ability to absorb the repositioned assets. Even if transfer to another commodity were possible, these cars would still need to be cleaned for reassignment—which would utilize scarce repair network capacity and further constrain the limited resources available to complete the modification program.

While Brattle has assumed that the affected cars will be parked until the resources required for the modification become available, it also recognizes that for some of the fleet, this may not turn out to be an economically viable course of action. There are significant unanswered questions regarding what it would cost to store thousands of idle cars for multi-year periods, or what condition these cars might be in at the end of these periods. In many cases, the modification costs that would have to be incurred to bring them into compliance is a significant fraction of the original cost of the car. It is likely that in many cases, the economically rational solution will be to remove them permanently from service and scrap them. However, this decision will be made by individual owners based on the remaining economic life of the car.

Another possible effect of the Proposed Regulations might be to encourage affected parties to purchase new cars to replace the capacity that would potentially be idled by the Proposed Regulations. While Brattle concedes that this is a possibility, its quantitative significance is very difficult to assess. Tank cars are highly durable assets that can under normal circumstances be expected to remain in service for decades. There is an inherent economic tension involved in a decision to invest in such a durable asset in order to offset the effects of a temporary capacity shortfall. Brattle recognizes that it might happen, but it is difficult to judge the magnitude or potential economic significance of any such investments. Moreover, replacement of the existing fleet cannot take place until after 2015 when all committed tank cars in the order back log have been filled and delivered. See Section IX.C. for additional discussion.

2. Fate of the Affected Traffic

Faced with a sudden and significant loss of rail capacity, shippers will undoubtedly attempt to shift traffic to alternative modes. Their choices, however, are limited. Some crude oil may move toward barge or pipeline transportation. However, because pipeline and barge are cheaper modes of transportation than both rail and trucking, we can assume that if these are not currently utilized, it is because these modes are unavailable for crude oil transportation in the relevant geographic regions.⁵⁷ For this reason, it is

⁵⁷ A variety of industry observers have noted that pipelines lack the flexibility of rail, and so are less suited to many of the new oil developments. See e.g. Kevin Sterline, William Horner, Chip Rowe, BB&T Capital Markets Report “Examining the Crude by Barge Opportunity” (June 10, 2013); Curtis, Trisha, “Lagging Pipelines Create US Gulf

reasonable to assume that truck transportation is the only available alternative mode for much of this traffic.

Brattle estimates that replacing lost rail capacity in 2017 with truck transportation for crude oil and ethanol shipments in North America would require approximately 20,000 trucks carrying over 370,000 truckloads on North American highways. In 2018, the full year in which the loss of capacity will be felt, replacement transportation would require approximately 70,000 trucks carrying almost 1.6 million loads. Note that these figures already reflect what Brattle believes to be reasonable assumptions regarding potential diversions to pipeline and barge transportation.

Table B5: Crude Oil and Ethanol Truck Traffic Required to Replace Lost Rail Capacity

With Regulation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Trucks Dedicated to Crude and Ethanol Service, thousands	0	0	0	20	69	65	64	56	45	30	14	1
Truckloads, thousands	0	0	0	371	1,600	1,227	1,090	956	762	506	234	12

The safety and environmental consequences of a substantial increase in truck traffic are significant. From 2002-2009, the over-the-road truckers transporting hazardous materials spilled 58% more total liquid hazardous materials and roughly double the total equivalent hazardous materials (including gasses, liquids and solids) than railroads did per year and per billion ton-miles.⁵⁸ These trucks would be traveling on major highways and roads alongside passenger traffic. Additionally, between 2015 and 2025, 6.41 million tons of CO2 emissions would be associated with this increase in truck traffic.

From an economic standpoint, if such traffic diversions were to occur, they would lead to significant increases in transportation costs for shippers. Brattle estimates that, at normal truck transportation rates, the increased costs would amount to \$5.4 billion in 2017, and would rise to \$21.0 billion in 2018. In subsequent years, these additional costs would decline slowly as the fleet of legacy DOT-111 tank cars is gradually modified or replaced.

Light Sweet Crude Glut,” *Oil & Gas Journal* (Mar. 3, 2014). While barge transportation can be an attractive alternative in some situations, its role is limited by transloading and terminal availability and capacity, the size of the barge tanker fleet, and lack of geographic proximity to production areas. In order to use barge transportation, shippers must get crude oil to barge terminals. Often this has been accomplished through reliance on rail.

⁵⁸ Association of American Railroads, *Just the Facts – Railroads Safely Move Hazardous Materials, Including Crude Oil* (July 2013).

It is unreasonable, however, to assume that a sudden and substantial increase in truck demand would not affect rates. The current tank truck fleet is fully occupied today hauling other hazardous commodities that require secure trailers with sufficient strength and safety features to provide safe highway transport. If the demand for these same trailers suddenly rises in order to satisfy substantial additional demand from crude oil producers, a shortage of hazardous materials tankers will arise quickly in this market. Rates for their services can be expected to soar. Such increases can be expected to lead to even greater increases in costs to shippers of crude oil and ethanol, but also to significant disruptions to the markets for other commodities currently carried by these tankers.

The direct effects of a shift toward an inherently much more costly mode, especially when combined with significant rate increases, can be expected to have a significant effect on costs to refiners and ultimately to the prices paid by consumers for gasoline and other petroleum products. The magnitude of these effects could be substantial, and that the increased burden on consumers could have measurably adverse effects on the national economy.

It is also unclear whether a modal shift of this magnitude to truck transportation is either operationally or economically feasible. We can assume that the current fleet is matched to the current demand for the commodities it transports. The Proposed Regulations would create a sudden surge in demand for these vehicles. Any rapid change in their production rate would take time to roll out. More importantly, however, it is unclear how fleet owners would respond to what is essentially a temporary surge in demand. Expanding the truck fleet capacity to meet this temporary surge could potentially lead to a situation in which motor carriers would be left with capital investments in trailers that are not fully depreciated, yet are non-competitive with the new rail cars, once the rail fleet is in compliance with the new requirements. Whether they would, in fact, be willing to make the necessary investments under such circumstances is unclear.

Trucking companies would also be required to recruit, screen and train a corresponding number of additional truck drivers to operate an increasing number of trucks. For the past three decades, however, driver retention and recruitment has historically been a significant challenge for the trucking industry.⁵⁹ This problem has become especially acute for drivers who qualify and are licensed for transport of hazardous materials.

The rapidly increasing demand for tank trucks, to replace the unusable tank cars, would also distort the truck and trailer manufacturing sectors.

3. Fate of the Affected Production

Even if it were the case that the trucking industry would be able to provide the requisite amount of service, it is not clear that crude oil and ethanol producers would be willing or able to pay for it. Faced with onerous costs of bringing product to market, shippers may

⁵⁹ Southern, R. Neil, James P. Rakowski, and Lynn R. Godwin. 1989. "Motor Carrier Road Driver Recruitment in a Time of Shortages." *Transportation Journal* Vol.28, No.4:pp 42-48. Mele, Jim. 1989. "Carriers Cope With Driver Shortage." *Fleet Owner* Vol.84, No.1:pp 104-11. Machalaba, Daniel. 1993. "Long Haul: Trucking Firms Find It Is a Struggle to Hire and Retain Drivers". *Wall Street Journal*, December 28, 1993, pg. 1.

simply opt to decrease North American production rather than incur the costs and absorb the risks associated with a major modal shift to trucking.

Brattle projects that in 2018 over 300 million barrels of oil and 130 million barrels of ethanol that would otherwise have moved to market by rail could potentially be stranded by the unavailability and/or high cost of alternative transportation. To put these figures in perspective, 300 million barrels of oil amounts to 820,000 barrels per day. In 2018, the Energy Information Administration's ("EIA") most recent forecast projects that total U.S. crude oil production will amount to 9.6 million barrels per day. Thus, the potential loss amounts to roughly one twelfth of national production. Proportionately, the impact on ethanol production could be even greater. By 2018, EIA forecasts project that ethanol production will rise to 323 million barrels. Thus, over one third of U.S. ethanol production could be put at risk.

X. PHMSA's Cost-Benefit Analysis

Thorough cost-benefit analysis is the well-established, systematic method by which the U.S. government justifies the imposition of significant new regulations.⁶⁰ By Executive Order, PHMSA is required to "assess all costs and benefits of available regulatory alternatives" including quantifiable measures and qualitative measures that may be difficult to quantify.⁶¹ We support the regulatory principles in Executive Order 13563, signed by President Obama on January 18, 2011, which require that "our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation."⁶² We further support PHMSA's and the Administration's objective of accurately assessing both the costs and benefits of the regulation in order to inform adoption of a final regulation that is tailored to "impose the least burden on society, consistent with obtaining regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations."⁶³

In the Proposed Regulations, PHMSA invited comments to address any cost or benefit figures or factors, alternative approaches, and relevant scientific, technical and economic data to help PHMSA evaluate whether the proposed requirements are appropriate. Below we respond to PHMSA's invitation to help evaluate the regulation and identify areas where we disagree with PHMSA's underlying assumptions. The RSI-CTC is primarily concerned with PHMSA's assumptions about repurposing existing tank cars, its predictions regarding the frequency and severity of future derailments, and specific instances where it has underestimated the cost of compliance and the secondary impacts of the Proposed Regulations. Our primary goal is to assist PHMSA in producing a final rule issued "only upon a reasoned determination that the benefits of the intended standard justify its costs."⁶⁴

⁶⁰ *Regulatory Planning and Review*, Executive Order 12866 (Sept. 30, 1993).

⁶¹ *Id.*

⁶² *Improving Regulation and Regulatory Review*, Executive Order 13563 (Jan. 18, 2011).

⁶³ *Id.*

⁶⁴ *Regulatory Planning and Review*, Executive Order 12866 (Sept. 30, 1993).

A. PHMSA Should Not Assume 23,000 Tank Cars Will be Reassigned to Serve Heavy Crude Oil from Western Canada Without Costs or Modifications⁶⁵

PHMSA vastly underestimates the number of tank cars that would be impacted by the Proposed Regulations, because it assumes over 23,000 existing tank cars will be reassigned to serve heavy crude oil from Western Canada.⁶⁶ In reality, over 109,000 tank cars would be impacted by this rule, not just the 61,880 non-jacketed CPC1232s and non-jacketed DOT-111 tank cars in crude oil and ethanol service identified by PHMSA.⁶⁷ (See Appendix C: Measuring the Size of the Affected Tank Car Fleet.)

In its Draft Regulatory Impact Analysis (“Draft RIA”), PHMSA assumes that a large number of cars currently in crude oil service – 7,787 unjacketed Legacy DOT-111 cars, 5,600 jacketed Legacy DOT-111 cars and 9,850 jacketed CPC-1232 cars – will be transferred to serve heavy crude oil from Western Canada. This assumption removes these cars from the fleet of cars that might otherwise require modification to bring them into compliance with the Proposed Regulations that would take effect on October 1, 2017. For a number of reasons, Brattle believes that this assumption is highly speculative.

First, PHMSA has produced no evidence suggesting that Transport Canada will permit a transfer of large numbers of unmodified legacy DOT-111 cars into Canadian service. Indeed, allowing the use of unmodified legacy DOT-111s directly conflicts with the TC Proposed Regulations for flammable liquids.

Second, many of these cars would require extensive modifications before they would be suitable for such service. Heating coils are required in order to permit the unloading of cars loaded with heavy crude oil from Western Canada.⁶⁸ Many of the cars that PHMSA assumes would move into Canadian service currently lack such coils.⁶⁹ Third, many of the cars that PHMSA suggests would be reassigned are not designed to handle this product efficiently. Heavy crude oil from Western Canada is much denser than the crude oils that these cars normally carry. In order to keep them under applicable weight limits, it would be necessary to operate them at less than full capacity.

⁶⁵ This section is responsive to Q1, Q3 – Existing Tank Cars for HHFTs, 79 Fed. Reg. 45061.

⁶⁶ Although we use the term “heavy crude oil from Western Canada” this is synonymous with the term “Canadian tar sands” which is used by PHMSA in the NPRM and the Draft RIA.

⁶⁷ Draft RIA at 84.

⁶⁸ As an alternative to reliance on heating coils, heavy crude oil from Western Canada could be mixed with diluent, as is currently done in order to permit these crudes to be shipped by pipeline. Doing so, however, would convert this from a Class 3, PG III product into a Class 3, PG I or II product, undermining the whole rationale for moving these cars into this service in order to take them outside of the coverage of the proposed regulations.

⁶⁹ We understand that all of the unjacketed Legacy DOT-111 cars and a large fraction of the jacketed CPC-1232 cars lack such coils.

Finally, at present, the number of cars that will be required to transport heavy crude oil from Western Canada is highly uncertain. The Environmental Impact Statement for the Keystone pipeline prepared by the U.S. Department of State discusses a wide range of possible scenarios that differ in terms of the projected volume of domestic crude oil production, the projected rate of growth in U.S. energy consumption, and in the location and amount of pipeline capacity that will be built in coming years. The projected demand for rail transportation of heavy crude oil from Western Canada varies widely across these various scenarios. To assume, as PHMSA has, that thousands of cars could immediately be absorbed into this market appears to be unsupported by data or precedent.

B. PHMSA Underestimates the Cost of Its Modification Program

PHMSA's analysis of the modifications for the existing crude oil and ethanol fleets understates the cost, difficulty and time that will be required to complete them. Its analysis reflects a number of assumptions that do not appear to be realistic.

First, PHMSA assumes that the sizes of the crude oil and ethanol fleets that will require modification will be substantially reduced by the transfer of thousands of cars into service of heavy crude oil from Western Canada. As we explained above, we do not believe that this is a realistic assumption. Moreover, even if the transfer were accomplished, the modifications required to make these cars suitable for this service would have to be carried out in parallel with the modifications required to meet PHMSA's requirements for cars in crude oil and ethanol service. Thus, there is little reason to believe that such a transfer would substantially reduce the burdens imposed by PHMSA's modification requirements.

Second, PHMSA apparently assumes that all of the jacketed CPC-1232 cars (other than the 9,850 that it believes would move to Canadian service) will be built with the improved PRVs and BOVs that are called for in the Proposed Regulations.⁷⁰ These assumptions are incorrect. According to the AAR, by the end of the first quarter of this year there were already 7,104 of these cars operating in crude oil and ethanol service. According to RSI-CTC members, a total 13,647 of these cars are scheduled for delivery in 2014, and another 9,730 in 2015. Given that designs for these new valves have not yet been finalized, it is highly unlikely that they will be installed on any of the jacketed CPC-1232 cars scheduled for delivery in 2014. It is doubtful that designs will be finalized and production of the new valves will be far enough along to permit their installation on newly built cars until sometime well into 2015.

Thus, when the rule is finalized, and even assuming for argument's sake that PHMSA's predictions regarding transfers to Canadian heavy crude oil service prove to be correct, there will still be a large subset of jacketed CPC-1232 cars requiring valve replacements. While these modifications are small relative to those required by other sub-fleets, the cars must still be cleaned before these modifications can be carried out. Since car cleaning capacity is a major factor limiting the pace at which the entire modification program can be carried out, this imposes additional maintenance and repair network capacity constraints.

⁷⁰ Draft RIA at 77.

A straightforward solution to this problem, which the RSI-CTC urges PHMSA to consider, is to require that valve replacement occur when a jacketed CPC-1232 comes into the shop for normal repair or requalification work, rather than compel an additional shopping. This would allow existing shop capacity to be focused on the modification of cars that do not contain the many safety features already present within the jacketed CPC-1232 fleet.

Third, PHMSA's analysis reflects unrealistically optimistic assumptions about the rate at which modifications can be carried out. PHMSA's Draft RIA assumes that over the 2016-2018 period modifications will be carried out on 43,805 unjacketed legacy DOT-111 cars and 22,380 unjacketed CPC-1232 cars.⁷¹ It is worth noting that even PHMSA's own modification program does not assume that the required modifications can be carried out by the October 1, 2017 deadline, since the modification period it suggests for DOT-111s is from 2016-2018. This timeline assumes that modifications can be carried out at a rate of over 1,800 cars per month.⁷² Even if one were to assume that these modifications could begin on January 1, 2015 (an assumption that RSI-CTC members do not believe is realistic, give the ramp up period that would be required to order parts and components and hire and train the necessary workforce), achieving PHMSA's timeline would require that modifications be carried out at a rate of nearly 1,400 cars per month. These rates are far in excess of the most optimistic estimates of industry capacity prepared by RSI-CTC members. During the initial years of the program when the most complex modifications are being carried out on the non-jacketed legacy DOT-111 cars, the RSI-CTC does not believe that it will be possible to process more than 550 cars per month. While it may be reasonable to assume some increase in throughput rates as shops become more familiar with the process, we do not believe that under any realistic scenario it will be possible to approach anything close to the rates assumed in PHMSA's analysis.

Finally, PHMSA's analysis also seems to have made a number of overly optimistic assumptions about the costs of carrying out the required modifications. Specifically, PHMSA has assumed that the cost of installing a full height head shield on non-jacketed legacy DOT-111s adds only \$400 to the cost of installing a full jacket, whereas in previously filed comments, the RSI-CTC had estimated that installation of these shields would cost \$17,500. PHMSA also reduces the costs of its overall modification packages by ten percent due to unspecified economies of scale. The RSI-CTC questions the reasonableness of this assumption, and believes that a major modification program of this nature carried out under enormous time pressures is equally—if not more likely—to experience *increases* in cost due to production bottlenecks, shortages of critical materials and categories of skilled labor, payment of overtime wages and other such factors.

⁷¹ Draft RIA at 91-92.

⁷² Draft RIA at 91, Table TC12.

C. PHMSA's Benefit and Cost Calculations Do Not Adequately Not Support Its Recommended Course of Action

We have a full appreciation of the seriousness of the situation PHMSA is attempting to address, the complexity of the issues to be dealt with, and the time constraints under which it is operating; however, we believe that there are a number of significant weaknesses in the benefit and cost calculations as they have been presented by PHMSA. We question whether its findings provide adequate support for its recommended course of action.

We focus here on what we believe are some of the most serious weaknesses in the calculations PHMSA has presented. The RSI-CTC intends to file a separate report prepared by Brattle further analyzing the economic impacts of the Proposed Regulations.

1. PHMSA's analysis significantly overstates the likelihood of extraordinary events like Lac Mégantic

PHMSA's Draft RIA relies to an extraordinary extent on a single tragic event—the derailment at Lac Mégantic—to estimate the cost of a derailment. There is no reason to believe that this event is representative of other potential events. Indeed, by a number of objective measures, this tragic event is an extreme outlier. This one extraordinary event plays a major role in PHMSA's analysis. PHMSA recognizes this fact, admitting that “benefits fail to exceed costs for all options if no high-consequence events are assumed to occur.”⁷³ Thus, PHMSA's benefit conclusions depend critically on the value the analysis assigns to the probability of another such event occurring.

PHMSA's upper bound benefits calculation assumes a 1 in 20 chance of another Lac Mégantic-like event (adjusted for population density) occurring in the next twenty years. The Draft RIA provides no statistical basis for this probability. Objective measures of the probability suggest a much lower likelihood that a similar event will occur over this period.

As shown in the figures below, several of the event characteristics—speed, number of tank cars having a release, and gallons spilled—were more than two standard deviations above the averages of historic events.⁷⁴ The Lac Mégantic train was traveling at 65 mph. This is 2.89 standard deviations above the mean of 23.6 mph. A total of 59 cars released product in the Lac Mégantic incident.⁷⁵ This is 8.04 standard deviations above the mean of 4.38. Finally, 1,582,032 gallons of oil spilled in the Lac Mégantic incident. This is 9.02 standard deviations above the mean of 71,915 gallons. Thus, by all three of these significant measures, Lac Mégantic was an extreme outlier event.

⁷³ Draft RIA at 190.

⁷⁴ Draft RIA, Appendix B.

⁷⁵ TSB Lac Mégantic Report at 39.

Figure 3: Incidents by Speed (mph)

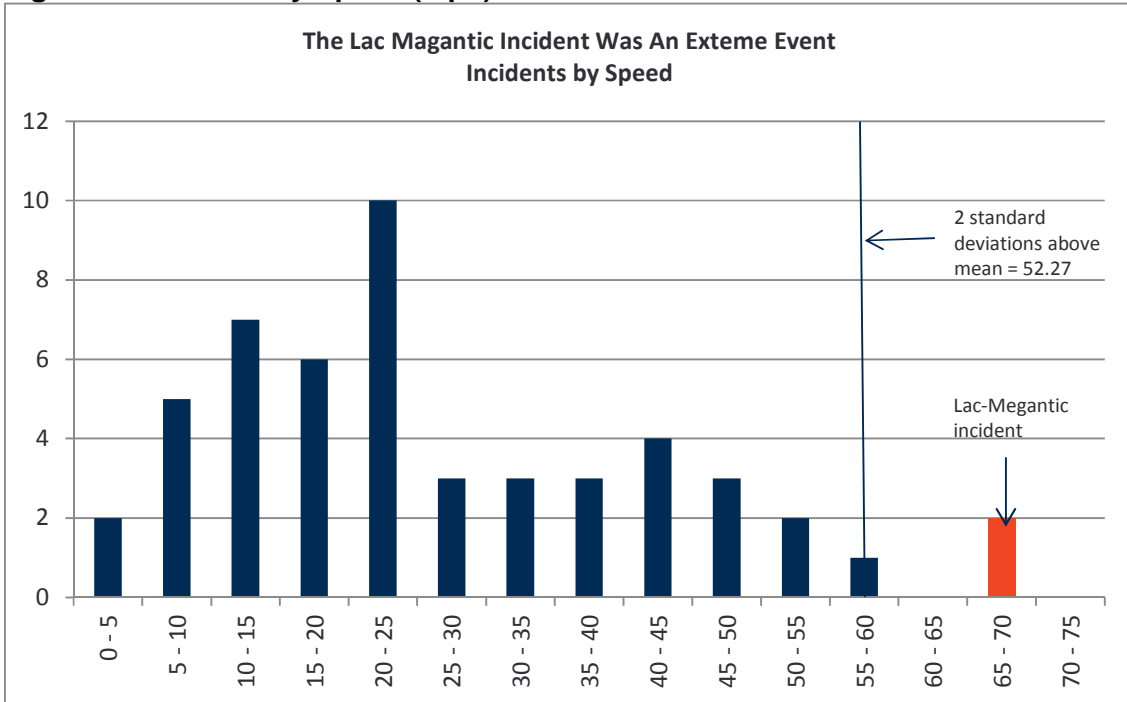


Figure 4: Incidents by Number of Cars Releasing Hazardous Material

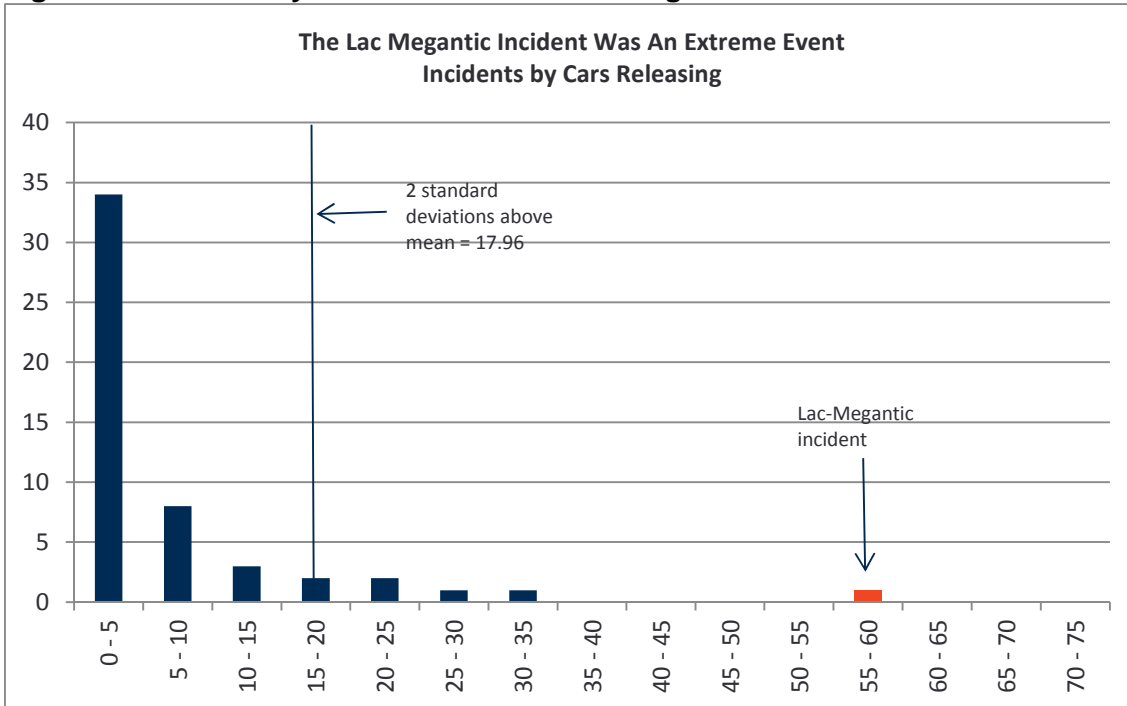
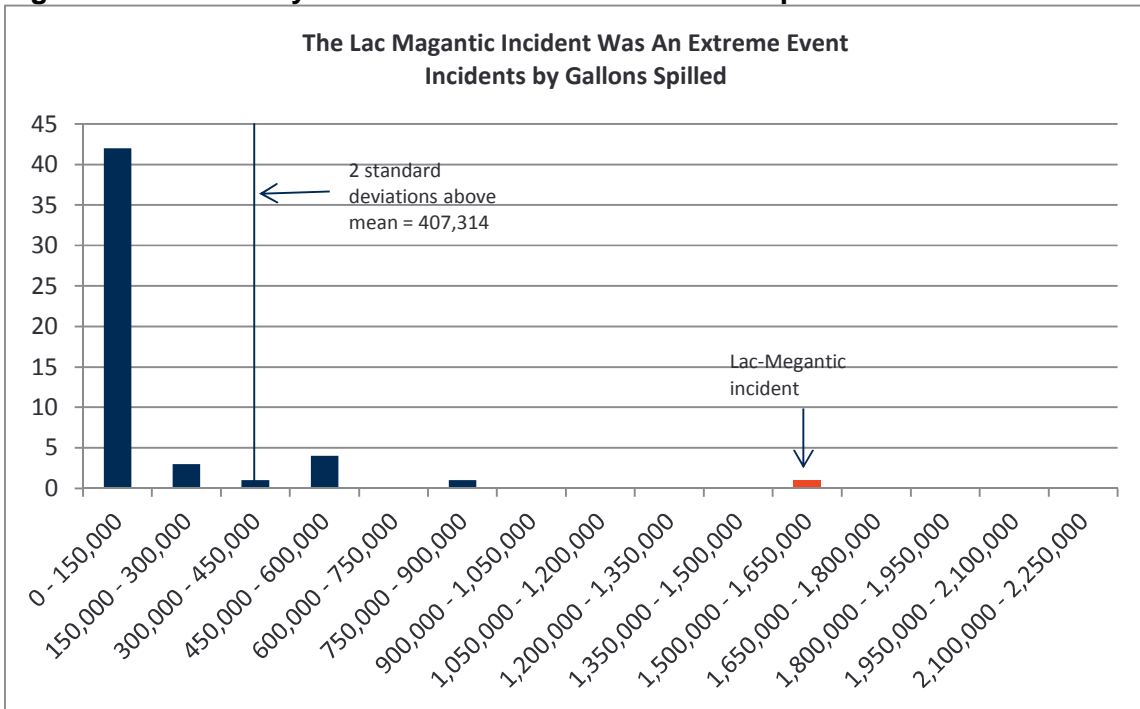


Figure 5: Incidents by Gallons of Hazardous Materials Spilled



2. The Effectiveness of the Proposed Regulation Does Not Account for Unintended Consequences of Modal Shift

Effectiveness is not adjusted for the increased accidents that can be expected to result from increased reliance on trucks. More trucks on the road carrying crude oil and ethanol will result in increased truck accidents that will offset a portion of any gains from reduced rail accidents. Brattle’s model projects that there will be a substantial increase in truck accident related spills associated with the increased reliance on truck shipments for the period 2017-2025, if the proposed regulatory schedule is implemented. Based on PMSHA data on accidents per ton mile and costs per accident, the modal shift will result in \$145 million in additional costs not reflected in the Draft RIA calculations.

Exhibit B6: Changes in Truck Incidents by Year

Year	Increase in millions of ton-miles shipped	Incidents per million ton-miles	Increase in incidents	Costs per incident	Increase in Costs
	[1]	[2]	[3] = [1] x [2]	[4]	[5] = [3] x [4]
2014	0	0.0169	0	\$39,730	\$0
2015	0	0.0169	0	\$39,730	\$0
2016	0	0.0169	0	\$39,730	\$0
2017	19,397	0.0169	328	\$39,730	\$13,015,185
2018	66,037	0.0169	1,115	\$39,730	\$44,310,724
2019	61,579	0.0169	1,040	\$39,730	\$41,319,815
2020	60,847	0.0169	1,028	\$39,730	\$40,828,274
2021	53,871	0.0169	910	\$39,730	\$36,147,674
2022	43,150	0.0169	729	\$39,730	\$28,953,447
2023	28,633	0.0169	484	\$39,730	\$19,212,906
2024	13,171	0.0169	222	\$39,730	\$8,838,058
2025	670	0.0169	11	\$39,730	\$449,487
2026	0	0.0169	0	\$39,730	\$0
2027	0	0.0169	0	\$39,730	\$0
2028	0	0.0169	0	\$39,730	\$0
2029	0	0.0169	0	\$39,730	\$0
2030	0	0.0169	0	\$39,730	\$0
2031	0	0.0169	0	\$39,730	\$0
2032	0	0.0169	0	\$39,730	\$0
2033	0	0.0169	0	\$39,730	\$0
2034	0	0.0169	0	\$39,730	\$0
Total					\$233,075,570
NPV					\$145,433,465
<i>Sources and Notes:</i>					
[1] Output from mode-shifting model					
[2] PHMSA data for trucking incidents					
[4] Calculated average costs per incident from PHMSA data for trucking incidents					
NPV is calculated using a 7% discount rate					

D. PHMSA's Cost Benefit Analysis Fails to Make a Compelling Case for Any of the Policy Options Under Consideration

PHMSA's cost-benefit analysis does not support any of the options under consideration. Ideally, benefits should exceed costs to indicate that a policy meets OMB Circular A-4 standards.⁷⁶ Even if one were to assume that PHMSA's benefit and costs are calculated correctly, then by PHMSA's own estimates, costs exceed benefits for most of the elements of its proposal, and often by a very significant margin. These calculations are summarized below. As noted elsewhere in these comments, there are reasons to question the accuracy of both the benefits (too high) and the costs (too low) presented in the Draft RIA.

Exhibit B7: Costs and Benefits of Regulatory Proposals as Calculated by DOT

Regulatory Proposal	Cost (millions)	Benefits		Net Benefits	
		Low	High	Low	High
Rail Routing	4.5	na	na		
Classification of Mined Gas and Liquid	16.2	na	na		
Notification to SERCs	0	na	na		
Speed Restriction: 40mph all areas	2,680	199	636	-2,481	-2,044
Speed Restriction: 40mph areas 100k population	240	33.6	108	-206.4	-132.0
Speed Restriction: 40mpg in HFUAs	22.9	6.8	21.8	-16.1	-1.1
Braking	500	737	1759	237	1,259
PHMSA and FRA designed car (option1)	3,030	822	3,256	-2,208	226
AAR 2014 car (option 2)	2,571	610	2,426	-1,961	-145
Jacketed CPC-1232 (new construction) (option 3)	2,040	393	1,570	-1,647	-470
PHMSA and FRA (option 1) stripped of braking	2,530	85	1,497	-2,445	-1,033

**Bold indicates benefits approximately equal or exceed costs*

While we fully support PHMSA's efforts to improve safety, we believe that the agency's own calculations make a powerful case for the importance of finding ways to reduce the costs of achieving these improvements.

⁷⁶ OMB Circular A-4 (September 17, 2003), available at http://www.whitehouse.gov/omb/circulars_a004_a-4, page 2 ("The motivation is to (1) learn if the benefits of an action are likely to justify the costs or (2) discover which of various possible alternatives would be the most cost-effective.")

E. Critical Economic Impact Analysis is Missing

1. No consideration of Modal Shift

As explained above in Section IX.C.2, the Proposed Regulations will likely result in modal shift resulting in an increase in transportation by truck. Should the Proposed Regulations cause a substantial shift to transport by truck, the resulting costs could be as high as \$21 billion in 2018, as we previously noted. However, neither the Proposed Regulations nor the Draft RIA account for the implications that mode choice will have on shipping costs and ultimately consumer prices.

2. Potential Impacts of Crude Oil Production Losses

The majority of legacy non-insulated, non-coiled DOT-111 tank cars transporting crude oil carry a light, sweet (low sulphur), low viscosity grade of crude oil. Since 2008, exploration and development of oil resources in various nontraditional locations has led to a dramatic increase in production of this type of crude oil. The most important of the major new producing areas is the Bakken region of North Dakota and Montana. However, there has also been new production in the Eagle Ford region of Texas and from Niobrara Formation in Colorado and New Mexico. These resources are located far afield and are not connected to the nation's existing pipeline network. Transport by rail has played a critical role in their development.

Concurrent to the development of these new resources, Eastern refiners were subject to economic distress caused by offshore oil supply disruptions and rising raw material costs. It is not unreasonable to say that if it were not for the availability of the lighter grades of crude oil being produced in North Dakota or South Texas, that the North American economy would have experienced significant reductions in refining capacity. These reductions would have increased the prices of transportation fuels throughout the economy.⁷⁷

It should also not be forgotten that a significant portion of the Bakken production flows to the west coast supplying refineries in California and Washington. These supplies of raw materials are required primarily as replacement for declining production from the Alaskan Northern Slope production areas. The only viable supply alternative for these refineries would be to source water-born raw materials from foreign sources.

The economic impacts of crude oil production losses of the magnitude we have projected are possible and would result in substantial national effect. And, the direct effects on the regions in which this production is located could be devastating. The growing availability of affordable, light, domestically produced crude oil has had a beneficial effect on many industrial sectors, including refining, chemicals, and many others, providing an important boost to the economy during an otherwise difficult period. Many of the resulting economic gains could be, at best, postponed, or, at worst, reversed, if the proposed regulations results in a sudden loss of vitally needed transportation capacity.

⁷⁷ U.S. Energy Information Administration, "Potential Impacts of Reduction in Refinery Activity on Northeast Petroleum Product Markets" (February 2012, updated May 11, 2012).

3. Potential Impacts of Ethanol Production Losses

Ethanol has come to play a crucial role in gasoline production. Required reductions in carbon monoxide (CO) and nitrous oxide (NOX) emissions established by the Clean Air Act of 1990 compelled refiners to produce gasoline with higher oxygen content and to vary gasoline formulations seasonally. The oil refining industry initially responded by blending the gasoline fuel stock with a material known as MTBE. While MTBE performed well as a gasoline blending agent, ground water contamination concerns in California forced refiners and gasoline marketers to seek alternatives. Ethanol has become that alternative. Its importance was further stimulated by enactment of Renewable Fuel Standard (RFS) as created under the Energy Policy Act of 2005. The RFS mandate was later expanded under the Energy Independence and Security Act of 2007, which called for a ramp-up of gross production of renewable fuels, resulting in today's mandate of roughly 14 billion gallons of ethanol being produced annually.

For a variety of reasons, rail transportation has played an important role in facilitating the expansion of ethanol production. The economics of ethanol production require that plants locate in rural areas close to raw materials, namely corn. Ethanol does not travel well by pipeline given its tendency to absorb water which leads to corrosive mixtures. Historically, the distances from production locations to centers of consumption were such that truck transportation was, in most cases, uneconomic.

A number of significant consequences could flow from a major reduction in ethanol production. Given that failure to properly blend oxygenate per seasonal requirements is a criminal offense prosecuted by the U.S. Environmental Protection Agency, suppliers can be expected to err on the side of caution. Restricted ethanol supplies could cause gasoline blenders/marketers to approach EPA for waivers to the RFS as well as reformulated gasoline standards. Any such waivers would result in higher emissions of CO and NOX and place emission systems on today's vehicle fleet at risk. This would result in higher emissions and place emission systems on today's vehicle fleet at risk. Alternatively, ethanol could be imported but the only significant source of supply is Brazil. The U.S. supply of primary transportation fuel then would be dependent upon Brazil's output of sugar cane as well as the world's output of hydrocarbons.

We respectfully urge PMHSA to consider potential economic consequences in weighing the costs and benefits of the proposed regulations.

XI. Nationally Uniform Prescriptive Standards Are Essential to Safe and Efficient Rail Transportation

Compliance with a single set of nationally uniform federal standards is critical to ensuring a safe and efficient rail transportation system. The alternative is a patchwork of inconsistent state laws and regulations requiring different equipment and different operating practices in every state. The DOT's relevant authorizing legislation has recognized the importance of national uniformity, and the current rule making should be careful to recognize those Congressional priorities. Specifically, both the Federal Railroad Safety Act ("FRSA") and the Hazardous Materials Transportation Act ("HMTA") contain express preemption provisions to protect the national uniformity of federal safety standards. PHMSA's new regulations should be crafted to be consistent with these

statutes, and should be designed to promote federal uniform safety standards as reflected in this authorizing legislation.

A. Compliance Under the FRSA and HMTA

Congress enacted the FRSA in 1970 “to promote safety in every area of railroad operations and reduce railroad-related accidents and incidents.”⁷⁸ The FRSA gives the Secretary of Transportation broad powers to prescribe appropriate rules, regulations, orders, and standards for all areas of railroad safety.⁷⁹ In order to ensure national uniformity of federal safety standards, including those relating to tank cars, the FRSA includes an express preemption clause:

Laws, regulations, and orders related to railroad safety and laws, regulations, and orders related to railroad security shall be nationally uniform to the extent practicable. A State may adopt or continue in force a law, regulation, or order related to railroad safety or security until the Secretary of Transportation (with respect to railroad safety matters), or the Secretary of Homeland Security (with respect to railroad security matters), prescribes a regulation or issues an order covering the subject matter of the State requirement.⁸⁰

In 2007, Congress amended the FRSA preemption clause to add a “[c]larification regarding State law causes of action.”⁸¹ The new language permits certain state actions to proceed where a plaintiff alleges failure to comply with a Federal standard of care established by a federal regulation or order, or failure to comply with a defendant’s own plan, rule, or standard created pursuant to a federal regulation or order.⁸²

Congress enacted the HMTA, 49 U.S.C. § 5101 – 5128, in 1975 to develop “a uniform, national scheme of regulation regarding the transportation of hazardous materials.”⁸³ Congress subsequently expanded on this objective fifteen years later when it amended the HMTA and found, among other things, that “many States and localities have enacted laws and regulations which vary from Federal laws and regulations pertaining to the transportation of hazardous materials, thereby creating the potential for unreasonable hazards in other jurisdictions and confounding shippers and carriers which attempt to comply with multiple and conflicting registration, permitting, routing, notification, and other regulatory requirements.”⁸⁴

⁷⁸ 49 U.S.C. § 20101; *Norfolk So. Ry. Co. v. Shanklin*, 529 U.S. 344, 347 (2000).

⁷⁹ 49 U.S.C. § 20103(a); *CSX Transp., Inc. v. Easterwood*, 507 U.S. 658, 662 (1993).

⁸⁰ 49 U.S.C. § 20106(a)

⁸¹ 49 U.S.C. § 20106(b).

⁸² *Id.*

⁸³ *Roth v. Norfalco LLC*, 651 F.3d 367, 370 (3rd Cir. 2011)(citing *CSX Transp., Inc. v. Williams*, 406 F.3d 667, 674 (D.C. Cir. 2005).

⁸⁴ *Id.* at 371 (citing the Hazardous Materials Transportation Uniform Safety Act of 1990, Pub L. No. 101–615, § 2, 104 Stat. 3244, 3245 (1990)).

The HMTA empowers the Secretary of Transportation to “prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce.”⁸⁵ The Hazardous Materials Regulations, 49 C.F.R. §§ 171-180.605, which are promulgated under this authority, include the tank car specification requirements found in Part 179. Like the FRSA, the HMTA has an express provision that preempts state and local laws that are not substantively the same as the laws and regulations pertaining to the packaging of hazardous materials and the design, manufacture, fabrication, inspection, maintenance, and repair of hazardous materials packaging.⁸⁶

Because the FRSA preemption clause refers to acts “by the Secretary,” a regulation affecting railroad safety promulgated pursuant to the HMTA also enjoys the FRSA’s preemptive effect.⁸⁷ Accordingly, regulations addressing tank car specifications for new builds and existing tank cars will fall within the purview of HMTA and FRSA preemption.

B. The Final Regulations Should Reiterate the Importance of Federal Preemption

In order to protect the uniformity of national safety standards, it is essential that PHMSA provide prescriptive standards that clearly advise a tank car owner whether its new tank cars or modified tank cars are in compliance with the federal regulations. There are two things that PHMSA can do to ensure the Proposed Regulations protect the national uniformity of safety standards. First, PHMSA should promulgate clear, specific, prescriptive standards for new builds and for the modification of existing tank cars. Second, PHMSA should add additional language to the Proposed Regulations to make certain there is no doubt about what PHMSA requires, and reconfirm that the new federal requirements preempt all other requirements related to flammable liquids tank cars.

Prescriptive standards are the most effective way for PHMSA to ensure that manufacturers and tank car owners are able to determine whether new and existing tank cars are in compliance with federal regulations. Although the RSI-CTC recognizes that performance standards may afford some manufacturers and builders an alternative route for design approval, the RSI-CTC respectfully recommends that PHMSA adopt express prescriptive design requirements for each modification that would be required for existing tank cars. For example, the Proposed Regulations include 18 MPH and 12 MPH performance standards for head and shell puncture resistance as an alternative means to achieving compliance with the new car requirements. However, merely providing such performance standards, particularly for modified cars, makes it difficult for owners and

⁸⁵ 49 U.S.C. § 5103(b)(1).

⁸⁶ 49 U.S.C.A. § 5125; *see also* 49 C.F.R. § 179.8.

⁸⁷ *CSX Transp., Inc. v. Pub. Util. Com'n of Ohio*, 901 F.2d 497, 501 (6th Cir.1990)(finding that Congress intended for the preemption provisions of FRSA to apply to hazardous material regulations adopted under HMTA applicable to the railroads). *Missouri Pacific Railroad Co. v. Railroad Com'n of Texas*, 671 F.Supp. 466, 471 (W.D.Tex.1987), *aff'd* 850 F.2d 264 (5th Cir.1988).

builders to be certain that they are in compliance. Accordingly, there is no substitute for express specifications and design requirements.

If performance standards remain a component of the final rule for either new cars or modified tank cars, it is critical that PHMSA also provide detailed regulations explaining the type of testing/modeling required, which commodities must be tested, and an express procedure for submitting tank car designs and models for approval and certification of compliance with the regulation. Unless the performance standards provide this level of detail, manufacturers and tank car owners will be reluctant to utilize the performance standards given the compliance uncertainty.

To the extent performance standards are included in the final regulations as a means to encourage innovation in the design of tank cars and appurtenances, use of new materials, PHMSA should consider adding language detailing the effect of FRA approval of tank cars designed to satisfy performance standards. We recommend including language similar to the following in the performance standard provisions, for proposed sections 179.202-11, 179.203-11, 179.204-11:

Effect of FRA Approval. If the Associate Administrator for Railroad Safety/Chief Safety Officer, FRA approves by order a new tank car design and a tank car is constructed in accordance with the conditions of the approval, this determination is conclusive evidence of compliance with the regulation and preempts any State law, statute, regulation, common law, or order concerning the adequacy of the tank car design consistent with 49 U.S.C. § 20106.⁸⁸

We also recommend that PHMSA use explicit language regarding the duty to modify, to leave no doubt that the federal tank car specification regulations cover the subject matter, consistent with the FRSA preemption standard. If PHMSA merely explains that once modified existing cars may continue in use, it may not be sufficient to dispel uncertainty as to whether modifications imposed by state law are preempted. To address these concerns, we recommend that PHMSA consider including a provision expressly outlining the scope of the duty to modify, which clearly states that tank car manufacturers, owners, lessors, lessees and operators have no duty to modify, repair, or retrofit existing tank cars to conform to the new requirements except as specified in the final regulations.

Finally, we respectfully urge PHMSA to add language that clarifies that tank cars need not be modified until the compliance date set forth in the regulations. Such language would eliminate confusion as to whether the modifications must be performed immediately or whether they may be performed at any point prior to the compliance deadlines contemplated by the regulations. During such a transition period, PHMSA should make clear that the regulations in effect prior to the effective date of the new regulations will continue to preempt claims under any non-federal law, statute, regulation, common law, order, or other requirement that purports to impose additional requirements upon a tank car covered under this section. Addressing this issue directly

⁸⁸ Similar language has been used to describe the preemptive effect of Secretarial approval in the context of fostering innovation of new technology to improve safety at highway-rail grade crossings. See 49 U.S.C. § 20161(d).

would make it clear that the new regulations do not limit or eliminate preemption under the HMTA, 49 U.S.C. § 5125, or the FRSA, 49 U.S.C. § 20106.

It is critical that the final regulations continue to protect the uniformity of our national safety standards to prevent a patchwork of state regulations and inconsistent state imposed duties from arising. A varying set of state regulations would undermine the safety, effectiveness, and efficiency of the national rail transportation system and the federal regulations implemented to protect this system.

XII. Conclusion

The RSI-CTC appreciates the opportunity to submit comments to PHMSA and requests that you give them serious consideration as you prepare for publication of the Final Rule. The RSI-CTC also intends file a separate report prepared by The Brattle Group further analyzing the economic impacts of the Proposed Regulations. This report will be completed and submitted to the HM-251 docket soon after the September 30, 2014 deadline. We look forward to working cooperatively with U.S. Department of Transportation and Transport Canada to ensure the safe transportation of flammable liquids through an effective, timely, and harmonized final rule that will maintain the viability of the North American rail transportation system. Please contact me should you have any questions about our comments or recommendations.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Simpson", written in a cursive style.

Thomas D. Simpson
President

Appendix A: Comparison of U.S. and Canadian Proposed Regulations

	TRANSPORT CANADA	US DOT		
Operation	Operating in Canada	High Hazard Flammable Trains (HHFT) - Speed Restriction		
New Tank Car Specifications	TC 140	DOT 117(1)	DOT 117(2)	DOT 117(3)
	9/16" tank thickness	9/16" tank thickness (TC128B)	9/16" tank thickness (TC128B)	7/16" tank thickness (TC128B)
	TC128 Grade B, normalized	TC128 Grade B, normalized	TC128 Grade B, normalized	TC128 Grade B, normalized
	TIH Rollover protection	TIH Rollover protection	Top fittings protection	Top fittings protection
	Reconfigured BOV	Reconfigured BOV	Reconfigured BOV	Reconfigured BOV
	ECP brakes	ECP brakes	Distributed Power/2 way EOT	Distributed Power/2 way EOT
	Reclosing PRV	Reclosing PRV	Reclosing PRV	Reclosing PRV
	11 ga. Jacket; A1011 steel	11 ga. Jacket; A1011 steel	11 ga. Jacket; A1011 steel	11 ga. Jacket; A1011 steel
	Thermal protection system	Thermal protection system	Thermal protection system	Thermal protection system
	286k GRL	286k GRL	286k GRL	286k GRL
Full height headshield (1/2")	Full height headshield (1/2")	Full height headshield (1/2")	Full height headshield (1/2")	
New Tank Car Performance Standard	Head: 17 MPH on center, 12x12 with 286k	Head: 18 MPH on center, 12x12 with 286k	Head: 18 MPH on center, 12x12 with 286k	Head: 17 MPH on center, 12x12 with 286k
	Shell: 12 MPH on center, 12x12 with 286k	Shell: 12 MPH on center, 12x12 with 286k	Shell: 12 MPH on center, 12x12 with 286k	Shell: 9 MPH on center, 12x12 with 286k
Existing Tank Car Modification Requirements	Legacy DOT-111s	Legacy DOT-111/CPC-1232		
	Top Fittings Protection	n/a		
	Reconfigured BOV	Reconfigured BOV		
	Reclosing PRV	Reclosing PRV		
	7/16 inch shell thickness*	Tank shell/head puncture criteria (per adopted Tank Car Spec.)		
	11 ga. Jacket*	11 ga. Jacket or meet 117P performance standard		
	Insulation/Thermal Blanket	Thermal protection system (CFR § 179.18)		
	Full height headshield (1/2")*	Full height headshield (1/2"); Must meeting 117P performance standard. Note: 18 MPH (Option 1 and 2) and 17 MPH		
	TC128 Grade B, normalized	TC128 Grade B		
	n/a	Distributed Power/2 way EOT		
	CPC-1232			
	Reconfigured BOV	* If minimums are not met, then performance standard applies		
	Reclosing PRV			
11 ga. Jacket				
Insulation/Thermal protection				
Full headshields				
Time Line				
Crude Oil/Ethanol	May 1, 2017			
Class 3, PGI	May 1, 2020		October 1, 2017	
Class 3, PGII	May 1, 2022		October 1, 2018	
Class 3, PGIII	May 1, 2025		October 1, 2020	

Appendix B: Schedule of Costs and Out-of-Service Time

Modification/Component	Cost to Existing Cars (Per Car Basis)	Out-of-Service Time (Per car basis)
Pressure Relief Valve <ul style="list-style-type: none"> If added at requalification If additional shopping is required 	<ul style="list-style-type: none"> \$2,100 \$3,400 	<ul style="list-style-type: none"> No add'l time 5 weeks
Jacket	\$16,000	[1]
Full Height Head Shield	\$23,000	[1]
Reconfigured Bottom Outlet Valve Handle <ul style="list-style-type: none"> If added at requalification If additional shopping is required 	<ul style="list-style-type: none"> \$600 \$2,500 	<ul style="list-style-type: none"> No add'l time 5 weeks
Top Fittings Protection	\$24,500	7 weeks
Thermal Blanket Application	\$3,700	1 week
Truck Upgrade (with M-976 compliant castings) <ul style="list-style-type: none"> With waiver (cost of adaptor pads, friction wedges, springs) Without waiver (new wheel sets required) 	<ul style="list-style-type: none"> \$2,850 \$16,050 	<ul style="list-style-type: none"> [1] [1]
Truck Upgrade (w/o M-976 compliant castings) <ul style="list-style-type: none"> With Waiver (cost of castings, adaptor pads, friction wedges, springs) Without Waiver (new wheel sets required) 	<ul style="list-style-type: none"> \$11,400 \$24,600 	<ul style="list-style-type: none"> [1] [1]
ECP Brake Overlay <ul style="list-style-type: none"> As a new car feature As applied to modified tank cars 	<ul style="list-style-type: none"> \$7,300 \$7,800 	<ul style="list-style-type: none"> [1] [1]
Railroad Delivery of Tank Car to Repair Facility	n/a	2 weeks
Railroad Delivery of Tank Car from Repair Facility	n/a	2 weeks
Option 3 – Full Modification of a Non-Jacketed Legacy DOT-111 (top fittings protection not included)	\$48,250 - \$70,000 (depending on truck upgrade)	16 weeks including railroad delivery times
[1] = To be completed as part of the full Option 3 package		

Appendix C: Measuring the Size of the Affected Tank Car Fleet

PHMSA's Draft RIA significantly understates the number of cars that might require modification under the Proposed Regulations. While the RSI-CTC appreciates the difficulty of developing accurate measurements of the size of a rapidly changing fleet, we also believe that it is critically important that, in crafting regulations, PHMSA understand just how many cars will be affected by those regulations.

In the introduction to its Proposed Regulations, PHMSA notes the rapid growth that has taken place in shipments of crude oil by rail. Between 2009 and 2013, the number of car loads of crude oil moving by rail grew from 10,800 to over 400,000.⁸⁹ Obviously, this growth in traffic could not have taken place without a comparable expansion of the crude oil tank car fleet. To accommodate actual and planned growth, crude oil producers have ordered, taken delivery of, and placed into service large numbers of new crude oil cars. These realities mean that the size of the crude oil fleet is a moving target. Snapshot views of its size can quickly become out of date.

The rapid growth of this fleet is illustrated by Table C-1, which contrasts AAR measurements of the sizes of the crude oil tank car fleets as of the end of 2013 and the end of April of 2014.⁹⁰ To qualify for inclusion in the end of calendar year 2013 totals, a tank car had to have shipped at least one car load of the commodity in question over the period from January 1, 2012 through December 31, 2013. To qualify for inclusion in April 30, 2014 totals, a tank car had to have shipped at least one car load of the commodity in question over the period from January 1, 2013 through April 30, 2014. Over even this brief period, the crude oil fleet expanded substantially.

Table C-1
Number of Cars in Crude Oil Service as of 12/31/13 and 04/30/14

Sub-fleet	Fleet as of 12/31/13	Fleet as of 4/30/14
Non-jacketed Legacy DOT-111s	22,957	23,090
Jacketed Legacy DOT-111s	6,407	7,016
Non-jacketed CPC-1232	9,402	11,364
Jacketed CPC-1232s Cars	4,966	7,712

The task of tracking changes in the crude oil and ethanol fleets is further complicated by the fact that cars are sometimes transferred from one service to another. Because a car must be thoroughly cleaned before it is ready to carry a new commodity, such changes do not occur often. But they do occur. This fact is illustrated by Table BP-1. Over this period, the number of jacketed DOT-111 cars in crude oil service grew from 6,407 to 7,016. Over this period, the only new cars being built for crude oil service were CPC-

⁸⁹ NPRM, page 9.

⁹⁰ PHMSA appears to have based its estimates of the size of the crude oil and ethanol fleets on the end of 2013 car counts. See Draft RIA at 78.

1232 cars. The increase in the size of the jacketed DOT-111 crude oil fleet could thus have come about only through the transfer of existing cars from other services.

The new car order backlogs provide another indication of the rate at which the tank car fleets covered by the Proposed Regulations are expanding. Table C-2 shows the number of new cars scheduled for delivery in 2014 and 2015. In calendar year 2014, the CPC-1232 tank car fleet is expected to expand at a rate of nearly 1,800 cars per month. Substantial deliveries of both the jacketed and non-jacketed versions of this car are anticipated. These deliveries will continue at a reduced, but still substantial, pace through 2015.

Table C-2
Delivery Schedule for Current New Car Orders

Sub-Fleet	2014 Deliveries	2015 Deliveries
Non-jacketed CPC-1232s	7,481	1,180
Jacketed CPC-1232s	13,647	9,730

The figures presented in Tables C-1 and C-2 do not tell the complete story. A long supply chain connects the facilities where tank cars are manufactured with the unit trains in which crude oil and ethanol move. There are time lags between when crude oil producers place an order and when a car is manufactured, between when a car is manufactured and when it is delivered, between when the tank car is delivered and when the car is placed into service, and between when it is placed in service and when it completes a shipment, and so gets included in AAR car counts. Given the rapid rate at which the crude oil fleet has been expanding, at any given point in time there can be significant numbers of cars at each point in this supply chain.

The best estimate by the RSI-CTC members of what the flammable liquids tank car fleet will look like in 2015 is shown in Table C-3. This estimate is based upon the most recent tank cars counts prepared by AAR, but have been updated to account for projected deliveries of back ordered cars and for cars “in transit” as described above but not yet included in the AAR counts because they have not completed their first shipment.⁹¹

⁹¹ As noted above, to qualify for inclusion in April 30, 2014 totals, a tank car had to have shipped at least one car load of the commodity in question over the period from January 1, 2013 through April 30, 2014. Because it is possible for an individual car to have carried more than one commodity over this period, it is also possible for a car to appear in more than one fleet. Therefore these numbers are not additive.

**Table C-3
Projected Flammable Liquids Tank Car Fleet as of the End of 2015**

Sub-fleet	Crude Oil	Ethanol*	Other Flammable Liquids*
Non-jacketed Legacy DOT-111s	23,090	27,037	24,790
Jacketed Legacy DOT-111s	7,016	88	9,413
Non-jacketed CPC-1232s	21,993	751	2,944
Jacketed CPC-1232s	35,408	23	1,975
Total	87,507	27,899	39,122

* Note: Ethanol and Other Flammable Liquids car counts are based on AAR counts of cars that shipped at least one carload of the commodity in question over the period from January 1, 2013 through April 30, 2014. If an individual car switched services during this period, that car will be counted as part of more than one fleet.

PMSHA's fleet size estimates are derived from a presentation given by RSI to NTSB early in 2014.⁹² That presentation included some figures showing the sizes of the various crude oil and ethanol sub-fleets, and counts of number of cars on order. The fleet size figures in this presentation were based on AAR end of year 2013 car counts.⁹³ In using these figures to derive 2014 and 2015 fleet size estimates PHMSA makes a number of assumptions that are not correct. Specifically, PHMSA assumes that all non-jacketed CPC-1232 cars on order will be delivered in 2014, and that an additional 5,000 jacketed CPC-1232 will be delivered this year.⁹⁴ Based upon the delivery schedules set forth above in Table C-2, neither of these assumptions is correct.

Further, PHMSA incorrectly assumes that beginning in 2015, only enhanced jacketed CPC-1232s will be delivered into service.⁹⁵ While industry has committed to building only enhanced jacketed CPC-1232 cars for crude oil service going forward, these cars may still need minor valve modifications (i.e. addition of the reconfigured BOV and appropriately sized PRV) if they are built before a final rule is in place. Additionally, as table C-2 illustrates, there are 1,180 non-jacketed CPC-1232s on order in the backlog for delivery in 2015. These contracts would need to be renegotiated between the manufacturers and their customers before the order could be changed to a jacketed car.

Table C-4 compares PHMSA's projection of the size and composition of the crude oil and ethanol fleets as of the end of 2015 with that of RSI as set forth above in Table C-3.

⁹² RSI-CTC presentation to NTSB rail safety forum April 22, 2014.

⁹³ The figures that appear in this presentation appear, when rounded to the nearest 100, to match counts that appear in end of year 2013 AAR tabulations.

⁹⁴ Draft RIA at 77.

⁹⁵ Draft RIA at 32. This paragraph is responsive to Q1 – New Tank Cars for HHFTs, 79 Fed. Reg. 45057. Although we are seeing a rise in the demand for jacketed CPC-1232s, in the absence of new regulations the non-jacketed CPC-1232 would still be permissible for the transport of Class 3, flammable liquids.

These projections differ somewhat, especially at the sub-fleet level. The most significant difference involves jacketed CPC-1232 cars, where PHMSA appears to understate the size of the fleet by almost 6,000 cars.

Table C-4
Comparison of PHMSA and RSI Estimates of End of 2015 Crude Oil and Ethanol Fleets

Sub-Fleet	PHMSA Projection	RSI Projection	Difference
Non-jacketed Legacy DOT-111s	51,592	50,172	1,420
Jacketed Legacy DOT-111s	5,600	7,104	(1,504)
Non-jacketed CPC-1232s	22,380	22,744	(364)
Jacketed CPC-1232s	30,150	35,431	(5,281)
Total	109,722	115,451	(5,729)

Sources: Draft RIA, Table TC5 and C-3.

PHMSA's fleet size estimates and assumptions significantly understate the challenges of modifying the existing fleet of jacketed CPC-1232 cars to bring it into compliance with the proposed regulations. PHMSA starts with a 2013 end-of-year estimate of 4,850 cars, and then assumes that 5,000 additional cars will be added to this fleet in 2014, resulting in a 2014 end-of-year fleet of 9,850 cars. In contrast, if one combines the 4,966 cars shown in Table C-1 above for the 2013 end-of-year jacketed CPC-1232 fleet with the expected 2014 deliveries of 13,647 cars, shown above in Table C-2, one arrives at a 2014 end-of-year fleet of 18,613 cars.⁹⁶

⁹⁶ The figure of 4,850 cars for the 2013 end-of-year jacketed CPC-1232 fleet appears to come from an RSI presentation delivered to OMB on June 16, 2014. The car count shown in Table BP-1 differs from this figure due to rounding and due to the inclusion of 123 cars built to the AAR 211 standard, a closely related standard that would require similar modifications under the proposed regulations. We have not been able to identify a source for the assumption that only 5,000 additional cars would be added to the fleet.

Appendix D: Additional Tables – Exhibits B2-B4

Exhibit B2: Cars in Crude and Ethanol Service Idled by Modification Process (Car Years)

Total Fleet Size without Regulation	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude Oil		65,991	87,507	87,707	96,522	108,722	119,664	130,853	130,853	130,853	130,853	130,853	130,853
Ethanol		30,749	31,300	31,453	31,876	32,045	32,155	32,418	32,539	33,117	33,117	33,133	33,133
Total Car-Years	1,738,266	96,740	118,807	119,160	128,398	140,767	151,819	163,271	163,392	163,970	163,970	163,986	163,986
Cars Undergoing Modification	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude Oil		0	740	1,608	1,608	601	0	0	386	1,608	1,608	1,608	288
Ethanol		0	0	0	0	418	1,608	1,608	1,238	0	0	0	188
Total Car-Years Lost	15,115	0	740	1,608	1,608	1,019	1,608	1,608	1,624	1,608	1,608	1,608	476
Noncompliant Cars Awaiting Modification	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Crude Oil		0	0	0	11,704	48,437	43,358	39,797	35,811	27,111	17,119	7,126	7

Exhibit B3: Modification Cost Summary for Cars in Crude and Ethanol Service

\$, millions	Total	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Modification Costs	3,028.2	0.0	181.3	314.6	314.6	262.3	314.6	314.6	318.4	314.6	314.6	314.6	63.9

Exhibit B4: Crude and Ethanol Rail Traffic Summary

Without Regulation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tank Cars Dedicated to Crude and Ethanol Service, thousands	97	119	119	128	141	152	163	163	164	164	164	164
Carloads, thousands	1,154	1,369	1,375	1,427	1,542	1,645	1,757	1,755	1,764	1,764	1,769	1,764
With Regulation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tank Cars Dedicated to Crude and Ethanol Service, thousands	97	118	118	113	68	95	117	127	138	149	159	169
Carloads, thousands	1,154	1,364	1,362	1,255	720	1,007	1,266	1,404	1,525	1,623	1,721	1,812
Decrease Due to Regulation	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tank Cars Dedicated to Crude and Ethanol Service, thousands	0	1	1	16	72	57	46	36	26	15	5	(5)
Carloads, thousands	0	5	13	171	822	638	491	351	240	141	48	(48)