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December 5, 2013

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U.S. Department of Transportation
West Building, Ground Floor, Room W12-140
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1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

RE: PHMSA-2012-0082 (HM-251), Hazardous Materials: Rail Petitions and Recommendations to Improve the Safety of Railroad Tank Car Transportation

Dear Sir or Madam:

The Railway Supply Institute Committee on Tank Cars ("RSICTC") submits the attached comments in response to the Department of Transportation, Pipeline and Hazardous Materials Safety Administration's ("PHMSA") request for comments on the Advanced Notice of Proposed Rulemaking in Docket No. PHMSA-2012-00082, regarding improvements to the regulations applicable to the transportation of hazardous materials by rail, which was published by PHMSA in the federal register on September 6, 2013 (78 Fed. Reg. 54849).

Thank you for your consideration of the attached comments.

Respectfully submitted,

Thomas D. Simpson, President

Docket No. PHMSA-2012-0082, Hazardous Materials: Rail Petitions and Recommendations to Improve the Safety of Railroad Tank Car Transportation (RRR)

Comments of the Railway Supply Institute Committee on Tank Cars

Introduction and Scope

The Railway Supply Institute Committee on Tank Cars ("RSICTC") submits the following comments in response to the Department of Transportation ("DOT"), Pipeline and Hazardous Materials Safety Administration's ("PHMSA") request for comments on the Advanced Notice of Proposed Rulemaking ("ANPRM") regarding improvements to the regulations applicable to the transportation of hazardous materials by rail, which was published by PHMSA in the federal register on September 6, 2013 (78 Fed. Reg. 54,849-61). The membership of the RSICTC includes American Railcar Industries; American Railcar Leasing; CIT Rail; GATX Corporation; General Electric Railcar Services Corporation; The Greenbrier Companies; Trinity Rail Group, LLC; and Union Tank Car Company. These companies build more than 95 percent of all new railroad tank cars and own and provide for lease over 70% of railroad tank cars operating in North America. The RSI is the international trade association of the railway supply industry. Its members provide all types of goods and services to our nation's freight and passenger railroads, rail shippers and freight car lessors.

In order to achieve the most substantial safety improvements, RSICTC recommends that PHMSA focus this rulemaking on DOT-111s servicing Class 3, Packing Group ("PG") I and II flammable liquid commodities. Modern methods to ship these specific commodities by rail include the use of unit trains, which have contributed to the severity of the post-derailment consequences of recent major derailments. By focusing on Class 3, PG I and II flammable liquids, PHMSA and the industry will be able to apply resources to most effectively improve tank car safety due to the fact that these commodities have been the ones involved in the most severe derailments. To further improve the scope of this rule, RSICTC supports the re-categorization of all grades of crude oil and ethanol to PG I or II under the DOT hazardous materials regulations. This rule need not address properly characterized PG III commodities as these low hazard commodities by their nature have a very low probability of serving as the catalyst for any event resulting in severe post-derailment consequences. RSICTC appreciates the opportunity to provide comments to PHMSA regarding the various petitions and recommendations that have been presented to the agency and is committed to continue working with its industry partners to enhance tank car safety for newly manufactured tank cars as well as the existing tank car fleet.

Tank Car Transportation is Critical to Our National Economy

Each year, tank cars carry nearly 1.4 million shipments of various commodities including over 150 million tons of hazardous materials on the North American rail system. The safe transport of hazardous materials by rail is a multidisciplinary activity involving infrastructure, rail equipment, maintenance, and other human factors related to train operation. Although these commodities are defined as "hazardous" by DOT regulations, many of them are critical commodities which are part of our everyday lives. These commodities include fuels, fertilizers, lubricants, asphalt, disinfectants, and chemicals that are essential to our economy. Despite the magnitude of these operations, the railroads, shippers, car builders and car owners have an outstanding record of safely delivering hazardous materials to their destination. In fact, more than 99.997% of hazardous material shipments arrive at their destination without a release caused by an accident, making rail the safest way to transport hazardous materials. By way of comparison, while trucks have a smaller average hazardous material spill size, they spill more total quantity of liquid hazmat and spill roughly double the total equivalent hazmat (including gasses, liquids, and solids) than do railroads on either an annual or billion ton mile basis.[1] Notwithstanding the overall safety record of these operations, RSICTC is committed to improving tank car safety.

The DOT-111 Tank Car is an Integral Part of the North American Rail System

Today's North American rail tank car fleet consists of approximately 334,869 tank cars, including pressurized and non-pressurized as well as insulated and non-insulated tank cars. At the core of this fleet is the DOT-111 tank car, which constitutes the majority of the fleet. DOT-111s are non-pressurized tank cars designed to carry a variety of commodities, including hazardous materials and non-hazardous economic staples such as corn syrup or vegetable oil. There are 272,119 cars constructed to a DOT-111/AAR 211 specification that are currently in service, and approximately 63% of these DOT-111s are in hazardous material service.

Each year shippers use DOT-111 tank cars to transport large volumes of a variety of non-flammable hazardous materials, including caustic soda, sulfuric acid, and liquid fertilizers. Flammable liquids, such as crude oil or denatured ethanol, make up one subset of hazardous materials that are shipped in DOT-111s. These flammable liquids are classified as Class 3 materials under DOT's hazardous materials regulations. Approximately one-third of the DOT-111 tank car fleet is dedicated to servicing flammable liquid commodities. Class 3 materials are further broken down by Packing Group ("PG"), with low hazard commodities in PG III and higher hazard commodities in PG I and II. RSICTC believes the most substantial safety improvements can be achieved by focusing on the subset of commodities in PG I and II. Therefore, RSICTC urges PHMSA to focus this rulemaking on DOT-111s servicing Class 3, PG I and II commodities. Additionally, RSICTC shares PHMSA's concerns about shipper classification of crude oil and ethanol. Therefore, as part of our recommendation, we support the re-categorization of all grades of crude oil and ethanol to PG I or II under the DOT hazardous materials regulations.

[1] Association of American Railroads, Just the Facts – Railroads Safely Move Hazardous Materials, Including Crude Oil.

Table 1 provides an overview of the DOT-111 tank car fleet and includes AAR 211 tank cars in all figures, since these tank cars also transport flammable liquids.[2]

Table 1
DOT-111 Tank Car Fleet Breakdown
(As of the Third Quarter of 2013)

DOT-111 Tank Cars	**Total Cars**	**Percent of the Entire DOT-111 Tank Car Fleet**
All DOT-111s	272,119	100.0%
Non-Hazmat DOT-111s	101,360	37.2%
Hazardous Material DOT-111s*	170,759	62.8%
Other Hazardous Materials Service	76,769	28.2%
Flammable Liquids (FL) Service*	94,178	34.6%
CPC-1232 Compliant Tank Car - FL Service (Jacketed and Non-Jacketed)	14,160	5.2%
Jacketed Tank Car - FL Service	14,677	5.4%
Non-Jacketed Tank Car (Existing Base Car) - FL Service *	**65,341**	**24.0%**
Existing Base Car, Ethanol Service	28,970	10.6%
Existing Base Car, Crude Oil Service	21,646	8.0%
Existing Base Car, Other Flammable Liquid Service	25,703	9.4%

* = These figures are not additive of the subcategories because some tank cars carry loads in more than one commodity category.

As an integral part of the North American tank car fleet, the DOT-111 has been operated safely for more than forty years. RSI has long recognized the significance of investing in the research and development of safety improvements for DOT-111s. In 1970, the predecessor to RSI teamed up with the Association of American Railroads (AAR) to create the Railroad Tank Car Safety Research and Test Project ("Tank Car Safety Project"). Since then, over $20 million has been invested in the Tank Car Safety Project yielding vast improvements in safety research, modifications to existing tank cars, construction of new tank cars to meet improved specifications, and reductions in post-derailment consequences. 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, designs, and materials. Over time, manufacturers have implemented a variety of safety improvements as a result of advances in technology, the use of data analytics, and the investigation of accidents. These improvements include: tougher tank steels, stronger stub sill designs, head protection, accident protection for top and bottom fittings, fittings designs that prevent leaks during transportation and double shelf couplers.

In 2009, AAR reexamined the tank car regulations and standards for PG I and II materials. On July 23, 2009, AAR's Tank Car Committee (TCC) charged the T87.5 task force with investigating possible risk-reduction options for DOT-111 tank cars carrying PG I and II materials by examining tank car construction standards. By 2011, the TCC had developed and proposed a new standard for

[2] All fleet data in Table 1 was generated by the University of Illinois at Urbana-Champaign, using the AAR waybill and fleet databases. This table includes AAR 211 tank cars in all figures and is current as of November 9, 2013.

the construction of new DOT-111s carrying PG I and II materials, which included enhanced end-of-tank protection in the form of head shields, thicker tank steel or jackets, and top fittings protection. The TCC further determined that these standards should apply to the construction of new cars. Consistent with its ongoing commitment to improving tank car safety, AAR and supporting organizations including RSI petitioned PHMSA to use these new standards for newly manufactured tank cars as the basis for a federal rule. AAR then implemented these standards in Casualty Prevention Circular 1232 ("CPC-1232"), making the new standards effective for all new tank cars servicing ethanol and crude oil that were ordered after October 1, 2011.

The data from the AAR-Bureau of Explosives (BOE) Annual Report of Hazardous Materials Transported by Rail (2012)[3] illustrates the results of the industry's robust commitment to tank car safety and underscores the fact that rail remains the safest way to transport hazardous materials. During the ten year period between 2003-2012 a total of 14,229,880 hazardous material tank car shipments were initiated in the US and Canada. Out of over 14 million shipments during this ten year period, 508 individual tank cars experienced damage enroute such that any reportable quantity (which varies by commodity)[4] of hazardous material was released to the environment.

Looking specifically at 2012, there were 1.76 million hazardous material shipments by rail last year. Out of these shipments, there were twenty-six separate events impacting forty-six individual tank cars that resulted in release of hazardous materials during transportation. Twenty of these twenty-six events involved the release of material from a single car. Eleven of these events resulted in the release of materials from flammable liquid carrying cars. Four of the flammable liquid release events involved multi-car releases of material. The frequency of these events has continued to decrease over the years through the collective efforts of tank car manufacturers and tank car owners along with railroads, shippers, regulators and other partners to improve the safe shipment of hazardous materials by rail.

Comparing hazardous material shipment by rail to other modes of transportation further illustrates that rail is the safest way to transport hazardous materials. From 2002-2012, the "spill rate" for railroads was an estimated 2.2 gallons per million crude oil ton-miles generated, while the comparable spill rate for pipelines was approximately 6.3 gallons per million crude ton-miles.[5] Similarly, 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.[6]

Changes in Hazardous Material Transportation

As PHMSA contemplates the standards for its proposed rule, RSICTC notes that tank car safety enhancements should be responsive to changes in traffic flows and operational practices adopted by the industry. The most significant changes to the way hazardous materials are

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[3] These statistics are based on the most up-to-date report available, however, RSICTC notes that data compiled for the 2012 AAR-BOE Annual Report does not encompass 2013 and therefore does not account for the derailment in Lac-Megantic, Quebec.

[4] For each hazardous material listed in 49 C.F.R. § 172.101, Appendix A, PHMSA has designated a specific quantity as the "reportable quantity" for the commodity.

[5] Association of American Railroads, Moving Crude Oil by Rail (May 2013).

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

transported by rail are attributable to the rising demand for ethanol and crude oil and the use of unit trains. Rail transportation of ethanol and crude oil has increased substantially in recent years due to the ethanol fuel revolution and new oil and gas extraction technologies, which have led to a dramatic increase in domestic oil and gas production. Facing limited pipeline capacity, shippers are now using rail to move large volumes of crude oil, condensates, and natural gas liquids. Across the United States, rail carloads of crude oil, which totaled only 9,500 in 2008, were up to 97,000 in just the first quarter of 2013.[7]

To accommodate these rising shipment volumes, the industry began using hazmat 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 and each tank car carries 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, the probability of the release of hazardous materials during a derailment increases given that every car in the train is now carrying a hazardous commodity. In today's DOT-111 fleet, approximately 11% of the tank cars are in ethanol service while 14% are in crude oil service.[8]

It should be recognized that the safe transportation of hazardous materials by rail is a multidisciplinary enterprise requiring equal focus on infrastructure, rail equipment, maintenance and other human factors related to train operation. The industry is committed to safety and continuous improvement, but derailments do happen. The 2013 derailment at Lac-Megantic, Quebec underscores the need to examine every aspect of hazardous material transportation so that the industry can take a holistic approach to implementing safety improvements that will further reduce the frequency of future derailments and limit the consequences when they do occur. In other high profile derailments, including the derailments at Tiskilwa, IL (2011),[9] Cherry Valley, IL (2009),[10] Painesville, OH (2007),[11] and New Brighton, PA (2006),[12] the NTSB determined that not one of these accidents was caused by a tank car deficiency. In fact, NTSB investigations determined that the probable cause for each of these accidents was attributable to railroad operating practices including track maintenance and track inspection programs.

Although tank cars were not a direct cause of the derailment, the NTSB investigation of the Cherry Valley accident commented on certain DOT-111 tank car design characteristics that NTSB determined contributed to the severity of the post-derailment accident consequences. NTSB noted in particular that DOT-111s have experienced more serious damage in accidents than pressurized

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[7] *Id.*

[8] As noted in Table 1, these figures are not additive because some tank cars may service more than one commodity.

[9] National Transportation Safety Board ("NTSB"), Railroad Accident Brief - Tiskilwa, Illinois at 11 NTSB/RAB-13/02 ("probable cause of the accident was a broken rail").

[10] NTSB, Railroad Accident Report, *Derailment of CN Freight Train U70691 with Subsequent Hazardous Materials Release and Fire – Cherry Valley, IL* at 89, NTSB/RAR-12/01 (June 19, 2009) ("probable cause was washout of the track structure…and the inadequacy of the CN's emergency communications procedures") (hereafter "NTSB Cherry Valley Report").

[11] NTSB, Railroad Accident Brief – Painesville, OH at 7, NTSB/RAB-09/02 ("probable cause…was a broken rail due to a track inspector's installation of an incorrect type of rail joint bar").

[12] NTSB, Railroad Accident Report, *Derailment of Norfolk Southern Railway Company Train 68QB119 with Release of Hazardous Materials and Fire – New Brighton, PA* at 41, NTSB/RAR-09/02 (Oct. 20, 2006) ("probable cause…was the Norfolk Southern Railway Company's inadequate rail inspection and maintenance program that resulted in a rail fracture from an undetected internal defect").

tank cars, such as DOT-105 or the DOT-112 cars, due to the fact that pressure tank cars have thicker shells and heads, are typically equipped with metal jackets, and have a different style of protective housing for top fittings. Based on these conclusions, NTSB recommended several safety enhancements to the DOT-111 design that it believed would improve the performance of these tank cars in a derailment.[13] These recommendations included: enhanced tank head and shell puncture-resistance systems and top fittings protection for tank cars transporting denatured fuel ethanol and crude oil in Packing Groups I and II (R-12-5); design improvements to bottom outlet valves on non-pressure tank cars to ensure the valves remain closed during accidents involving impact to the valve and operating handle (R-12-6); and improvements to the stub sill design for tank cars authorized for transportation of hazardous materials (R-12-7).[14]

RSICTC views each derailment as an opportunity to review all dimensions of the overall rail transportation system. While serious derailments are rare, RSICTC recognizes that these incidents can result in serious consequences, particularly where flammable liquids are involved. It should be noted that none of the high profile derailments mentioned above would have been prevented by any of the recommended improvements to tank car designs. The overall safety of hazardous material transportation by rail cannot be achieved by placing the sole burden of that goal on the designs of tank cars. Therefore while the industry supports safety-enhancing improvements to the designs of tank cars, it also supports operational enhancements that will address these root causes.

Many of these operational enhancements have already been evaluated by the T87.6 task force. RSICTC agrees that broken rails are an indisputable factor in the frequency of derailments and support efforts to improve rail integrity throughout the entire North American rail system. A reduction in broken rails must be central to the effort to improve the safety of tank car operations, given that this is one of the leading causes of derailments. RSICTC also supports the work of the task force to examine additional operational enhancements such as the alternative brake signal propagations systems, speed restrictions for "Key Trains"—unit trains containing 20 or more loaded tank cars of PG I and II hazardous materials, enhanced track inspection programs and improvements to the emergency response system. In order to build on the task force committee's examination of each of these aspects of operational enhancements, RSICTC encourages an ongoing discussion within the industry relative to improved operating practices and procedures where appropriate.

Benefits of the P-1577 Enhancements for New Tank Cars

Through its role on the AAR Tank Car Committee and its participation in the T87.6 task force, RSICTC has worked closely with its industry partners to expeditiously address the concerns regarding the documented damage to the tank cars involved in recent derailments, including Cherry Valley. On March 9, 2011, with support from RSI and others in the industry,[15] AAR submitted to PHMSA Petition 1577 ("P-1577" or the "Petition") to amend 49 C.F.R. Part 179 for tank cars used to transport PG I and II hazardous materials. The Petition includes both a jacketed and a non-jacketed option for new tank car construction, which reflects the industry's consensus that both options provide an increased level of tank car safety. RSICTC strongly endorses the P-1577 enhancements

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[13] NTSB Safety Recommendation to PHMSA (March 2, 2012).
[14] NTSB Cherry Valley Report at 90-91.
[15] This petition was submitted by the AAR on behalf of itself, its member railroads, and the members of the AAR Tank Car Committee which includes multiple representatives for RSI.

for newly constructed tank cars and recommends that the agency's proposed rule continue to include both the jacketed and non-jacketed construction option.

RSICTC supports a rulemaking that would require the P-1577 design features for newly constructed DOT-111 tank cars transporting Class 3, Packing Group I and II materials. We also support reclassifying denatured ethanol and crude oil grades that are currently classified as PG III, to PG I or II, so that the rule addresses all grades of these two commodities. The key tank car enhancements for newly constructed tank cars included in the Petition include:

- PG I and II material tank cars to be constructed to 286,000 lb Gross Rail Load standards;
- Heads and shells must be constructed of normalized steel;
- New cars must be equipped with at least a ½ inch half-head shields;
- For tank cars constructed of normalized TC128 Grade B steel, head and shell thickness must be ½ inch for non-jacketed cars and 7/16 inch for jacketed cars;
- For tank cars constructed of normalized A516-70 steel, shells of non-jacketed tank cars must be 9/16 inch thick while shells of jacketed tank cars must be ½ inch thick;
- Top fittings must be protected by a protective structure as tall as the tallest fitting;
- Installation of a reclosing pressure relief valve.

The rail industry has long recognized that derailments involve the energy of thousands of tons of moving train mass, traveling at normal track speeds, in widely diverse terrain. As a result, derailments are high-energy, chaotic events. In the absence of the ability to test tank car design features in the variety of circumstances in which derailments can occur, the Tank Car Safety Project developed a Conditional Probability of Release (CPR) metric based on 40 years of rail accident data. This tool provides a means to assess design features for their effectiveness in reducing the probability that the contents of loaded tank cars will be released in an accident based on the history of actual accidents. CPR has been used to evaluate the efficacy of design alternatives in recent years and was used to assess the effectiveness of features during the development of the P-1577 petition tank car requirements. To evaluate the P-1577 enhancements, a non-jacketed, 30,000 gallon tank car with bottom fittings, 7/16 normalized tank heads and shells, and no top fittings protection or head shields, serves as the "base car" for the CPR metric.

A. Non-Jacketed P-1577 Tank Cars

Increasing tank shell thickness and applying head protection will improve the puncture resistance of these tank cars and provide more protection in the event of a derailment. The P-1577 enhancements also include a pressure relief device with a higher exit flow and lower trigger point. These changes to the pressure relief device will improve the potential for this equipment to operate as intended in a fire situation. Additionally, this enhancement is consistent with the T87.6 task force's conclusion that new cars in ethanol or crude oil service should be equipped with a pressure relief device with a higher exit flow and lower trigger point. The improved puncture resistance will result in less product release and therefore smaller fires in the event of a derailment. If any fire exposure should occur, the enhanced pressure relief system will serve to further reduce the probability of a high-energy release event.

Using the data contained in the Tank Car Safety Project Database and the CPR methodology, one can estimate that the various P-1577 risk reduction options for new tank cars will improve the safety of hazardous material transportation by rail. Based on the analysis, the CPR for a 30,000 gallon base tank car with bottom fittings and a 7/16 inch tank shell and heads is 19.6%.[16] By adding top fittings protection,[17] ½ inch TC128B normalized steel, and trapezoidal/conforming head shields, the CPR is reduced to 10.3%. This represents a 47.4% reduction in the overall probability that this new design car will release commodity in a derailment.

B. Jacketed P-1577 Tank Cars

As noted above, the enhancements for new jacketed tank cars include a jacket with head protection which improves puncture resistance during a derailment. With these enhancements, the jacketed P-1577 tank car further reduces the CPR to 4.6%. While RSICTC supports the jacketed P-1577 construction option, RSICTC notes that there may be limits to the safety improvements that can be achieved with a jacket. The jacketed P-1577 tank car reduces the tank capacity due to AAR weight restrictions and therefore may require more tank cars to transport the same volume of commodity. This in turn would increase the overall number of tank cars facing derailment exposure thereby preventing the full CPR reduction from being realized. Allowing tank car users to order both the jacketed or non-jacketed P-1577 version of newly constructed tank cars will improve the safety of the overall fleet.

RSICTC's Modification Proposal for Existing Tank Cars

While the P-1577 enhancements will significantly improve tank car safety for newly manufactured tank cars, RSICTC strongly urges PHMSA to adopt a separate approach for existing tank cars that is uniquely tailored to the needs of the existing DOT-111 tank car fleet.

At the outset, RSICTC notes that because the industry voluntarily adopted the CPC-1232 standard for all cars ordered after October 1, 2011, a significant number of DOT-111s in the existing fleet are already compliant with the P-1577 enhancements. Many builders and shippers have already made a significant capital investment in ordering and manufacturing new tank cars that are built to the CPC-1232 standard and thus are also compliant with the P-1577 standards. A total of 55,546 CPC-1232 compliant tank cars will be in service by the end of 2015.[18] This level of activity represents an industry investment in excess of $7.0 billion. In light of the industry's proactive decision to incorporate these new safety enhancements by adopting this standard, RSICTC requests that PHMSA recognize that these cars already contain safety enhancements and thus exempt them from any additional modifications that may be required under the future rule. RSICTC urges PHMSA to expeditiously address this aspect of the rulemaking to remove any uncertainty which may otherwise impede the enhancement of overall fleet safety performance.

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[16] CPR numbers are from the new RSI/Safety Project Report being developed under ATCCRP TWP-17. The report will be released in first quarter of 2014. Numbers are subject to change until final release. These values are based on the analysis of a subset of the FRA Reportable Incident data that includes incidents where more than 100 gallons of product were released.

[17] It should be noted that top fittings protection is not part of P-1577 but became a standard for the PG I and II flammable liquids in July 2010. Therefore, it is reasonable to include it as a risk reduction option for new tank cars since most of the existing DOT-111 fleet does not yet have this protection.

[18] This data was generated by the University of Illinois at Urbana-Champaign, using AAR waybill and fleet databases and a survey of RSICTC tank car builders for CPC-1232 tank cars on order.

Table 2 details the large number of recently constructed existing DOT-111s in hazardous material service that are already CPC-1232 compliant.[19]

Table 2
Existing Tank Car Compliance with CPC-1232
(As of the Third Quarter of 2013)

	Cars with New CPC-1232 Safety Features	**Total Cars**
Crude Oil 111s	11,549	38,679
Ethanol (Denatured) 111s	476	29,547
All Flammable Liquid 111s	14,160	94,178
All 111s in Hazmat Service	16,165	170,759
Total Hazmat 111s In Service by the End 2015*	55,546	

*Based on cars currently in service and on order.

Moving beyond the CPC-1232 compliant cars manufactured since 2011, RSICTC recognizes that a significant portion of the existing fleet is not equipped with the CPC-1232 safety features. To address this, RSICTC supports the ongoing research of the AAR Tank Car Committee and puts forth the following modification proposal consisting of four elements which are consistent with the findings and conclusions of the committee.

For existing non-jacketed DOT-111s servicing Class 3, PG I and II materials, RSI proposes that PHMSA consider the following safety modifications:

- Trapezoidal or conforming half height head shields;
- Equipping tank cars with a pressure relief valve that is sized properly to protect the tank against over-pressurization, should the T87.6.1 task force determine this is appropriate;
- Reduction in fitting height or some other method of fittings protection as deemed appropriate by the RSI task force; and
- Bottom outlet valve handles that may be removed in transit, or otherwise protected in a way that the T10.7.5 task force determines is appropriate, to assure the handle does not open in derailment.

This set of modifications reduces the CPR from the base tank car value to 12.4%, representing a 37% reduction. Once modified, these cars should be permitted to remain in active service for the duration of their legal life, as permitted by the regulations. For an estimate of the costs associated with these modifications please see the Appendix.

Given that existing jacketed DOT-111s already provide substantial protection in the event of a derailment, only minor modifications are needed to improve the safety of this subset of existing

[19] All fleet data in Table 2 was generated by the Rail Transportation and Engineering Center at the University of Illinois at Urbana-Champaign. This table includes AAR 211 tank cars in all figures and is current as of November 9, 2013.

cars. The Tank Car Safety Project has modeled the survivability of the jacketed tank car in a pool fire using the "Analysis of Fire Effects on Tank Cars" ("AFFTAC") which simulates a survival time of nearly 250 minutes in ethanol service and 480 minutes diesel fuel service.[20] Furthermore, the CPR for this configuration is 8.5%, a 56.6% improvement over the CPR of the base tank car. RSICTC recommends that these cars also be equipped with high capacity pressure relief valves should this modification be deemed necessary by the T87.6.1 task force and a bottom outlet valve handle configuration as determined by the T10.7.5 task force. Should modifications be made to the existing jacketed DOT-111s, we again urge PHMSA to allow these modified cars to remain in active service for the duration of their regulatory life.

RSICTC's modification proposal would provide the industry with an organized and efficient path to improved safety for these cars. However, an orderly process for modification is critical to successful implementation of any rule mandating modifications. At this time, tank car repair facilities are running at full capacity to handle the normal repairs and qualifications of the existing tank car fleet. Given the complexity of the work and the capacity of the repair network, a reasonable timeline must be established for the completion of this work. If all the existing non-jacketed tank cars are mandated to undergo requalification work at the same time to incorporate the proposed modifications, the existing repair network may be overwhelmed by this demand. In order to achieve these modifications in a timely way that will not overwhelm the tank car maintenance and repair system, RSICTC submits that PHMSA adopt a ten-year program allowing compliance to be achieved in phases through modification, re-purposing or retirement of unmodified non CPC-1232 tank cars in Class 3, PG I and II flammable liquid service. RSICTC further recommends that PHMSA permit each owner to submit individual plans to the agency articulating the manner in which it will achieve compliance on or before the end of the ten-year period. This would give individual car owners the flexibility they need to ensure compliance in the most efficient and expeditious manner possible. Without such a timeline, these modifications will exacerbate the existing repair backlog and may exceed the current capacity of repair and supply shops.

To further illustrate the necessity of a ten-year phase-in program, RSICTC urges PHMSA to consider the following. First, RSICTC anticipates the modifications, as proposed by RSICTC, will increase the average annual required tank car maintenance labor hours by 31.8%. This increase in average estimated labor hours represents the additional maintenance capacity needed to implement mandated modifications while still meeting the regular qualification and maintenance demands necessary to keep the fleet compliant with existing regulations. Based on the increased annual labor demand associated with a ten-year program, RSICTC anticipates that any modification period less that the recommended ten-year period will force the early shopping of tank cars which may have the effect of driving up the cost of all cars shopped and may extend out-of-service times. Second, any compliance period must take into account the time needed to design, test, and engineer modification solutions for the existing fleet, once the final rule is determined. These modifications will require substantial planning and utilization of engineering resources that cannot commence in earnest until the full scope of the final rule modification requirements is known. Third, the actual infrastructure needs of the repair shop network cannot be fully assessed until a final rule is issued. Therefore, any

[20] The AFFTAC model estimates tank car survivability by assuming a 1500 ºF pool fire, completely engulfing a tank car. The modeling assumes a pressure relief device with a 27000 SCFM flow capacity and a 75 psi STD pressure. It is also based on the assumption that the general purpose insulation has fully degraded and heat conduction is governed by a jacket assembly with an air gap between the jacket and the tank. It is critical that the real world condition of the air gap that develops between the tank and the jacket be taken into account to avoid overly conservative estimates of the tank survival time.

substantial expansion of the repair shop network infrastructure, which requires design, engineering, permitting and construction, will not be immediately available to meet the modification needs. Finally, under the ten-year program, RSICTC anticipates roughly 3,000 cars will be out of service at any given point during the program period. Given the constraints on barge shipments and pipeline capacity, shippers will likely compensate for this decrease in rail transport capacity, by turning to long haul trucking. Assuming that the average tank car carrying 28,000 gallons of a commodity makes two turns per month and 3.5 tank truck shipments are required to equal one tank car, this will result in nearly 252,000 additional long haul truck shipments, which creates substantial additional risk for transporting hazardous materials. A shorter phase-in period will only amplify the added risk of using long haul trucking to compensate for out-of-service tank cars because more tank cars will be out of service at any given time.

Thermal Protection Systems

In direct response to PHMSA's questions regarding the utility of thermal protection systems for newly manufactured and existing tank cars, RSICTC notes that the use of thermal jacketing or spray-on thermal protection would only provide minimal secondary safety benefits in light of the other enhancements proposed. The application of thermal protection systems was carefully reviewed by the T87.6 task force at the time the original CPC-1232 standards were developed—the task force examined both spray-on thermal protection and thermal protection systems including an increased flow capacity pressure relief device. The purpose of thermal insulation is to delay the occurrence of and minimize the consequences from a post-derailment, high energy event induced by pool fire. The proposed enhancements for newly constructed tank cars will have the effect of reducing the likelihood that such an event would occur by using alternative methods. The proposed P-1577 tank cars, and the existing CPC-1232 compliant tank cars, implicitly provide a thermal protection system because the thicker tank materials decrease the likelihood of release in a derailment which in turn decreases the likelihood of a fire. In the event a fire should occur, the high capacity pressure relief valve reduces the potential for a high energy event resulting from pressure build-up during a fire.

With regard to the alternative of using spray-on thermal insulation without application of a metal jacket, RSICTC considers the methodology without merit. Historically, the use of spray-on thermal insulation has resulted in a variety of problems including cracking, break-down due to UV exposure, loss of adhesion and other issues resulting in tank corrosion. For these reasons, the materials available have not proven themselves as viable in dynamic environments such as railroad rolling stock. What may work for stationary storage applications is not directly transferable to the rail operation environment. Accordingly, PHMSA should discount the thermal protective performance of the application of spray-on insulation as a viable option to modify the existing tank cars.

Turning to metal jackets, RSICTC has several concerns regarding the technical complexity of the application of thermal protection and metal jacket to the existing fleet of non-jacketed 30,000 gallon DOT 111 tank cars. First, RSICTC notes that such a modification mandate may lead to several unintended consequences. It is probable that for certain existing cars, a mandate for metal jackets is technically infeasible due to structural design and railroad clearance requirements. The process of modifying and welding an existing tank car, as would be required to add a metal jacket, can negatively impact the long term integrity of the car in ways that are unknowable today. For example, adding a thermal jacket could cause tank shell defects which are undetectable for many years but may ultimately progress into fatigue cracks over time. Second, it is also likely that for certain existing cars the additional weight represented by the insulation and metal jacket will impact the load carrying capacity of those individual cars. Such a situation will result in an increase in the number of tank cars needed to ship the same volume of a commodity in order to meet the current economy's commodity demands. A jacket retrofit mandate may also require several tank car owners to retire portions of their existing fleet, effectively amounting to the forced retirement of nearly one fifth of the North American tank car fleet. This additional capacity challenge may lead shippers to turn to less safe modes of transportation for Class 3, PG I and II materials. Finally, RSI is concerned about capacity and capabilities of the current tank car repair network if such a retrofit were mandated. Many repair facilities do not currently have the capabilities needed to undertake such a complex modification requirement. The availability of skilled labor that could be properly trained and certified for the work tasks required will likewise be a major undertaking with uncertain results.

For the reasons outlined above, it is more effective to achieve the benefits associated with a thermal protection system by equipping existing cars and newly constructed cars with the pressure relief device and other enhancements recommended by the RSICTC. Therefore, RSICTC urges PHMSA to adopt the proposed enhancements set forth in the RSICTC's proposal to achieve thermal protection benefits rather than mandate a jacket retrofit or spray-on thermal protection for existing tank cars.

Conclusion

The safety enhancements to tank cars carrying PG I and II flammable liquids must focus on those elements of the transportation system that are most exposed to recent changes in traffic flows and operational practices. RSICTC fully supports a standard for newly manufactured DOT-111 tank cars servicing PG I and II flammable liquids that includes additional protection for top fittings, high flow pressure relief devices, higher strength steel, increased thickness of the non-jacketed tank car, and a mandatory head shield as outlined in the P-1577 petition. While we support certain modifications to the subset of non-jacketed tank cars within the existing DOT-111 fleet that service Class 3, PG I and II flammable liquids, such modifications must be implemented in a way that reflects the complexity of the modifications, the capacity of the repair network, and the technical and economic feasibility of such modifications.

As a key stakeholder in this rulemaking, RSICTC urges PHMSA to resolve the issues raised in the ANPRM as expeditiously as possible within the context of a formal rulemaking, which includes the full notice and comment process. Once RSI member companies can act on the certainty of a final rule, the industry will coordinate required modifications with the qualification schedule for existing tank cars to address existing non-jacketed base cars in crude oil and ethanol service on a priority basis with the least possible disruption to commerce. RSICTC remains committed to improving tank car safety and looks forward to working with PHMSA in the future as it develops a final rule on this issue.

Appendix

Cost of Modifications

The cost figures listed below are an estimate of the average direct cost associated with modifications to existing DOT-111 tank cars. These figures were developed by RSICTC member companies using a common template to assure all pricing was developed using comparable processes. Individual company figures were submitted confidentially to RSI staff and the figures in the table are the average selling prices for those figures submitted. The pressure relief valve and bottom outlet modifications are not yet fully defined by the AAR TCC and therefore are the RSICTC engineers' best representation of modification possibilities. All prices assume that work will be performed in AAR certified shops to AAR engineering and quality standards. RSICTC notes that the overall economic costs of implementing these modifications may actually be higher because these figures don't include the additional cost for moving cars to shops and for the inevitable disruption of service while the cars are undergoing maintenance. These figures represent 2013 dollars and have not been indexed for inflation, which may occur during the life of the program as proposed.

RSICTC respectfully requests that PHMSA consider the estimated costs of these modifications to the existing DOT-111 tank cars in Class 3, PG I and II service to fully evaluate the most effective way for the industry to achieve compliance with a future rule. RSICTC also notes that the out-of-service time reflects the amount of time an individual tank car would be required to be removed from service to undergo the particular modification, but does not account for the timing of a phased in approach to compliance, as recommended by RSICTC.

Average Cost of Safety Enhancements

Modification	**Cost to Existing Cars on a Per Car Basis**	**Out-of-Service Time For Each Car**
High Capacity Pressure Relief Valve • If done at Requalification • Not at Requalification	 $2,100 $3,400	 No additional time 5 Weeks
Bottom Outlet Valve Handle Removal	$600 - $3,000	Under Review
Trapezoidal/Conforming Head Shield	$17,500	5 Weeks
Top Fittings Protection • Assuming Existing Nozzle* • Assuming New Nozzle*	 $6,000 $24,500	7 Weeks
Top Fittings Protection – New Nozzle, Jacket, Full Head Shield • Thermal Insulation • Cost of trucks, if upgradable	$63,500 +$3,700 +16,500	12 Weeks **

* Top fittings protection based on AAR Standard Appendix E, Part 10.2. Actual modification used depends on specific tank car design.

** The out of service time reflects the time each individual tank car would be required to be removed from service during the phase-in period of any modification program. For a full discussion of the capacity of the maintenance and repair network and the modification timeline proposed by RSICTC, see the section on RSICTC's modification proposal.