BEFORE THE
PIPELINE AND HAZARDOUS MATERIALS
SAFETY ADMINISTRATION

PETITION FOR AN INTERIM STANDARD FOR TANK CARS USED TO TRANSPORT TIH MATERIALS

SUBMITTED BY THE
AMERICAN CHEMISTRY COUNCIL,
AMERICAN SHORT LINE AND REGIONAL RAILROAD ASSOCIATION,
ASSOCIATION OF AMERICAN RAILROADS,
THE CHLORINE INSTITUTE, AND
THE RAILWAY SUPPLY INSTITUTE

The American Chemistry Council (ACC), the American Short Line and Regional Railroad Association (ASLRRA), the Association of American Railroads (AAR), the Chlorine Institute (CI), and the Railway Supply Institute (RSI) (Petitioners) submit this petition to PHMSA to implement a new interim standard for tank cars used to transport TIH materials. ACC is a trade association representing 130 member companies that account for approximately 85 percent of the capacity for the production of basic industrial chemicals in the United States. ASLRRA is an organization which represents over 450 member railroads in the class II and class III railroad industry. AAR is a trade association whose membership includes freight railroads that operate 72 percent of the line-haul mileage, employ 92 percent of the workers, and account for 95 percent of the freight revenue of all railroads in the United States. CI is a 220 member, not-for-profit trade association of chlor-alkali producers worldwide, as well as packagers, distributors, users, and suppliers accounting for more than 98 percent of the total chlorine production capacity of the U.S., Canada, and Mexico. RSI is the international trade association of suppliers to the nation's freight railroads and rail passenger systems. The RSI Tank Car Committee members include the major North American tank car builders and leasing companies, who own and lease approximately 70% of the North American tank car fleet.

I. Need For A New Interim Tank Car Standard

On April 1, 2008, PHMSA published a notice of proposed rulemaking containing a new tank car standard for TIH materials.[1] Part of that proposal was that two years after issuance of a final rule, newly constructed tank cars transporting TIH materials would be required to comply with the new standard. Five years after issuance of a final rule, only tank cars constructed of normalized steel could be used to transport TIH materials. Eight years after issuance of a final rule, all tank cars transporting TIH materials would need to be in compliance with the new standard.

The proposed standard represents an innovative approach to tank car design. The purpose of the proposed standard is to significantly reduce the probability of release should a tank car be involved in an accident. However, the tank car industry cannot meet the standard today; the NPRM is truly technology-forcing.

Petitioners strongly support PHMSA's initiative to create a new tank car standard that would appreciably improve the safety of TIH transportation. Petitioners are committed to doing their part to minimize the occurrence of accidents and to reduce the possibility of a release should an accident occur. PHMSA's effort to dramatically reduce the probability of a release of TIH materials through enhanced tank car standards is a goal shared by Petitioners.

However, the publication of the NPRM has had two unintended effects. One, publication has delayed the phasing out of aging tank cars. Two, publication has threatened to cause a shortage of cars needed for the transportation of TIH materials.

Since under the NPRM tank cars not meeting the final standard would have to be removed from TIH service within eight years of issuance of the final rule, the NPRM has had the unintended consequence of providing an incentive for shippers and lessors to stop purchasing new tank cars for TIH transportation, pending the issuance of the final rule. From the perspective of both shippers who own tank cars used to transport their TIH materials and lessors who lease tank cars used to transport TIH materials, investments in new tank cars cannot be justified unless

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[1]Docket No. FRA-2006-25169, 73 Fed. Reg. 17818.

those cars will be used for at least two decades. Note that under DOT regulations, tank cars have a service life of fifty years.[2]

Absent the NPRM, many older tank cars likely would be replaced by tank cars exceeding minimum DOT specifications. Unfortunately, because of the economic disincentive to purchase new tank cars for TIH transportation, those tank cars are not being replaced.

During the meetings on the NPRM held in May, shipper after shipper stated that the NPRM threatened to cause a shortage of tank cars for TIH transportation. The shippers stated that lessors are reluctant to renew leases partly due to a concern that the NPRM's call for a dramatically new tank car design will increase their liability should a tank car meeting minimum PHMSA standards be involved in an accident.

II. An Interim Standard Based On Probability Of Release

Petitioners have a solution to these problems. Petitioners propose that PHMSA promulgate an interim standard that provides for the construction of tank cars that significantly reduce the probability of release of product using existing technology and grandfather those cars for twenty-five years following issuance of the final rule. Such a standard is in the public interest for the following reasons.

- By authorizing the use of tank cars that exceed PHMSA minimum standards for a period of time exceeding the eight-year phase-out period suggested in the NPRM, the disincentive to replace minimum specification cars will be reduced.

- To the extent shippers and lessors replace older cars with cars less likely to release TIH in the event of an accident, safety will be significantly enhanced. Similarly, by reducing the disincentive to replace older cars with cars less likely to release TIH in the event of an accident, PHMSA's goal of replacing older cars will be realized sooner.

- By limiting the grandfather period to twenty-five years, instead of the normal fifty year useful life provided by DOT regulations, PHMSA would prevent creating an incentive to replace cars prematurely prior to the

[2] 49 C.F.R. § 215.203

effective date of the final TIH standard to avoid, perhaps, the greater costs involved in constructing cars meeting the final standard.

– PHMSA will avoid the unintended consequence of creating a shortage of cars for the transportation of TIH materials.

– An interim standard providing for a significant reduction in the probability of release is consistent with PHMSA's objective of promulgating a new tank car standard representing a significant improvement over the existing minimum specifications. At the same time, such an interim standard would reduce the commercial and liability concerns of lessors that are contributing to a reluctance to enter into new leases for TIH tank cars.

III. The Research Underlying Conditional Probability Of Release

Petitioners' proposed interim standard is based on research conducted by the University of Illinois at Urbana-Champaign (UIUC) and the RSI-AAR Railroad Tank Car Safety Research and Test Project (Tank Car Project). UIUC set out to analyze the "conditional probability of release" (CPR) of product should a tank car be involved in an accident.[3]

UIUC's work is based on a report assessing lading loss probabilities published by the Tank Car Project.[4] The lading loss report is based on 6,752 cars damaged in accidents. Consequently we can demonstrate with confidence through the CPR method a significant safety improvement.

UIUC calculated the CPR for tank cars used to transport chlorine and anhydrous ammonia, the 105A500W and 112J340W tank cars, respectively.[5] UIUC then compared the CPR for the chlorine and anhydrous ammonia cars with CPRs for enhanced cars. The enhanced cars had thicker heads and shells and improved top fittings protection. In the case of chlorine, the thicker heads and shells were based on the 105J600W specification. For anhydrous ammonia, the

[3] While there have been questions raised as to the extent to which safety is enhanced by top fittings modifications in the UIUC report, there is no doubt that the proposed interim tank car would reduce the CPR by a substantial amount and provide for improved accident survivability.

[4] Railroad Tank Car Safety Research and Test Project, "Safety Performance of Tank Cars in Accidents: Probabilities of Lading Loss" (RA -05-02 January 2006).

[5] Saat and Barkan, "Risk Analysis of Rail Transport of Chlorine & Ammonia on U.S. Railroad Mainlines," (Feb. 27, 2006).

thicker heads and shells were based on the 112J500W specification. Because the enhanced cars are existing DOT specification tank cars, the tank car database again served as the basis for the CPR calculation for the head and shell improvements.

The top fittings protection was based on a new top fittings design. The design was intended to survive potential forces exerted on the top fittings in a rollover accident. More specifically, the top fittings were designed to survive a rollover with a 9 mph linear velocity.

IV. Using CPR As The Basis For Improved Performance

UIUC's research points the way to a performance improvement which is PHMSA's ultimate objective in its rulemaking proceeding on TIH tank car standards. In the case of both chlorine and anhydrous ammonia, the CPR improvement as calculated by UIUC is significant. For example, chlorine calculations show an improvement of 63 percent, a reduction from 5 to 2 percent. For anhydrous ammonia, the improvement shown is 71 percent, a reduction from 8 to 2 percent.

Consequently, Petitioners propose an interim tank car design with the following features:

- a design standard achieving CPR improvement from the head and shell through the use of higher DOT class tank cars than currently required by DOT regulations (See the table attached hereto as Exhibit 1);
- an alternative performance standard requiring CPR improvement equivalent or better in the head and shell as compared to the design standard; and
- a top fittings protection performance standard.

The design standard would require that in lieu of 105*300W or 112*340W tank cars, a 105J500W or 112J500W car, respectively, would be required, with a minimum head and shell thickness of 13/16" and a full height ½" thick or equivalent head shield. A minimum head and shell thickness would be included to prevent a shipper from using a peculiar tank car that, for example, contains shell protection but does not contain sufficient head protection.

Similarly, in lieu of a 105*500W car, a 105J600W car would be required, with a minimum head and shell thickness of 15/16" and a full height ½" thick or equivalent head shield. For those commodities currently shipped in 105J600W cars, the minimum thickness would also apply, but no upgrading of the DOT class tank car would be required since the 600-pound car is the highest DOT class tank car.

The top fittings protection standard would require a design that could survive a rollover with a 9 mph linear velocity, the criterion used in the UIUC study. Note that AAR's Tank Car Committee has already approved two designs meeting this standard. In addition, AAR understands the Chlorine Institute is developing its own top fittings standard that will meet the 9 mph criterion and DOT regulations. In order to achieve this performance, a stronger top fittings protection system must be permitted in lieu of the bolted-on protective housing now mandated in the regulations. Welded attachment has proven to be an effective method and should be allowed.

For the alternative performance standard, Petitioners propose that DOT use a formula requiring improvements to the head and shell that are at least as good, from a CPR perspective, as the designs standard. Petitioners propose the following formula:

> 1 - (CPR of tank car - CPR of minimum specification tank car) ≥ tank improvement factor for the commodity.

The tank improvement factor is a factor that achieves a CPR improvement from the head and shell at least as good as the design specifications. The table in Exhibit 1 shows the tank improvement factors for TIH materials commonly transported by rail. As the table indicates, the tank improvement factor for a specific commodity is based on a particular head and shell thickness. The head and shell thicknesses were derived from the formula in 49 C.F.R. § 179.100-6, taking into account design criteria such as commodity density, gross rail load, outage, and car length and diameter.

Petitioners also suggest that DOT permit use of an alternative methodology to demonstrate improvement equivalent to the tank improvement factor calculation. Of course, use of such an alternative would be subject to DOT approval.

Finally, in the case of chlorine, ACC and CI have taken the performance criteria one step further. ACC and CI worked with UIUC to calculate an alternative design that would achieve the desired CPR improvement, 45 percent for head and shell improvements, 63 percent including top fittings.

- The chlorine design has a 0.777 inch head, a 0.777 inch shell, and a 0.375 inch jacket with head shield of 0.625 inch. [6]
- This specific alternative design utilizes jacket material which is steel with minimum tensile strength of 70 ksi and minimum elongation in 2 inches of 21%.

The calculations show that the CPR target can be met in more than one way. With this calculation having been made for chlorine, Petitioners also propose that this alternative specification specifically be included in the interim standard.

V. Proposed Regulatory Language

Accordingly, Petitioners propose the following regulatory improvements.

1. In section 171.8, add the following definitions:

    Conditional probability of release means the probability of release from a DOT specification tank car should the tank car be involved in an accident.
    Tank improvement factor means the amount of improvement that must be achieved from head and shell improvements, as specified in section 173.250.

2. In section 172.101, for each TIH entry, add a reference to Special Provision B120 in the special provisions column.

3. In section 172.102(b)(3) add a new note B120 as follows:

    Materials meeting the definition for a material poisonous by inhalation (see Section 171.8 of this subchapter) are subject to the bulk packaging requirements of section 173.250 in addition to the requirements identified in column 8.

4. Add a new section 173.250 as follows:

[6] UIUC's CPR calculations assume that an equivalent level of safety performance can be obtained by thickening the head shield and jacket to compensate for equivalent reductions in thickness in the tank head and shell, respectively. Further technical review of the head shield is currently taking place to determine the appropriate thickness. This thickness will be between 0.625 inch and 0.859 inch.

§ 173.250 Materials poisonous by inhalation.

Materials meeting the definition of a material of poisonous by inhalation must be packaged in accordance with this section.

(a) In lieu of the minimum specification tank car specified for a material poisonous by inhalation in this Part, tank cars built after [insert effective date of regulation] must meet DOT specifications as follows:

(1) Where elsewhere in this Part it is specified that a DOT specification 105*300W or 112*340W tank car shall be used, a DOT specification 105J500W or 112J500W tank car, respectively, shall be used. The minimum head and shell thickness shall be 13/16 inches and a full-height ½-inch thick or equivalent head shield shall be used.

(2) Where elsewhere in this Part it is specified that a DOT specification 105*500W or 105*600W tank car shall be used, a DOT specification 105J600W tank car shall be used. The minimum head and shell thickness shall be 15/16 inches and full-height ½-inch thick or equivalent head shield shall be used.

(3) A 105J500W tank car with a head 0.777 inch thick, a shell 0.777 inch thick, a jacket 0.375 in. thick and 0.625 in. thick head shield may be used to transport chlorine. Jacket material is steel with minimum tensile strength of 70 ksi and minimum elongation in 2 inches of 21%.

(b) (1) As an alternative to paragraph (a), a tank car may be used if it can be demonstrated that the tank car has a reduced conditional probability of release (CPR) relative to the minimum specification tank car according to the following formula:

1 - (CPR of tank car - CPR of minimum specification tank car) $\geq$ tank improvement factor for the commodity.

For commonly transported materials poisonous by inhalation, Table 1 contains the minimum DOT specification tank car, the associated CPR, and the tank improvement factor. Upon request, FRA will supply tank improvement factor for additional materials poisonous by inhalation.

(2) Subject to approval by the Associate Administrator for Safety, as an alternative to the formula in paragraph (1), other validation methodology and analysis techniques may be utilized to document safety performance for designs that meet or exceed the commodity-specific tank improvement factor.

(c) Tank cars built after [insert effective date of regulation] must be equipped with top fittings protection designed to withstand, without loss of lading except through the pressure relief device, a rollover with a linear velocity of 9 mph minimum, measured at the geometric center of the loaded tank as a transverse vector. The rolling surface is assumed to be flat, level, and rigid. The protective housing may be attached to the tank by welding in lieu of the bolting requirements of 170.100-12(c) .

(d) Subject to 49 C.F.R. § 215.203, tank cars meeting the requirements of subsections (a) and (b) of this section may be used for twenty-five years after the effective date of the final rule issued in Docket No. FRA-2006-25169.

Table 1

Commodity Name	DOT Minimum Specification	Tank Improvement Factor (TIF)	Conditional Probability of Release
Acetone Cyanohydrin, Stabilized	105J500W	0.67	0.0855
Acrolein	105J600W	0.80	0.0419
Allyl Alcohol	105J500W	0.67	0.0855
Ammonia, Anhydrous	105J500W	0.69	0.0855
Bromine	105J500W	0.68	0.1028
Chlorine	105J600W	0.69	0.0509
Chloropicrin	105J500W	0.56	0.0855
Chlorosulfonic Acid	105J500W	0.56	0.0855
Dimethyl Sulfate	105J500W	0.57	0.0855
Dinitrogen Tetroxide	105J500W	0.57	0.0855
Ethyl Chloroformate	105J500W	0.57	0.0855
Ethylene Oxide	105J500W	0.67	0.0855
Hexachlorocyclopentadiene	105J500W	0.68	0.1028
Hydrogen Chloride, Refrig. Liquid	105J600W	**	0.0284
Hydrogen Cyanide, Stabilized	105J600W	0.80	0.0419
Hydrogen Fluoride, Anhydrous	105J500W	0.63	0.0809
Hydrogen Sulfide	105J600W	**	0.0299
Methyl Bromide	105J500W	0.56	0.0855
Methyl Mercaptan	105J500W	0.67	0.0855
Nitrosyl Chloride	105J500W	0.57	0.0855
Phosphorus Trichloride	105J500W	0.57	0.0855
Sulfur Dioxide	105J500W	0.57	0.0855
Sulfur Trioxide, Stabilized	105J500W	0.56	0.0855
Sulfuric Acid, Fuming	105J500W	0.51	0.0802
Titanium Tetrachloride	105J500W	0.56	0.0855

Thank you for considering this petition.

Respectfully submitted,

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EXHIBIT 1

	Baseline DOT Tank (DOT Min. or Accepted DOT STD)				DOT Specification Tank Car Used to Calculate TIF				
Commodity Name	Current DOT Specification	Head Shields Types	Head Thickness (in.)	Shell Thickness (in.)	Proposed DOT Specification Meeting TIF	Head Shields Type	Head Thickness (in.)	Shell Thickness (in.)	Tank Improvement Factor (TIF)
Acetone Cyanohydrin, Stabilized	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8951	0.8951	0.67
Acrolein	105J500W	No	0.8950	0.8950	105J600W	Full-Height	1.2429	1.2429	0.80
Allyl Alcohol	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8951	0.8951	0.67
Ammonia, Anhydrous	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	1.0300	0.89	0.69
Bromine	105A300W	No	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.68
Chlorine	105J500W	No	0.7870	0.7870	105J600W	Full-Height	1.1360	0.9810	0.69
Chloropicrin	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.56
Chlorosulfonic Acid	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.56
Dimethyl Sulfate	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.8179	0.57
Dinitrogen Tetroxide	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.81798	0.57
Ethyl Chloroformate	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.8179	0.57
Ethylene Oxide	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8951	0.8951	0.67
Hexachlorocyclopentadiene	105S300W	No	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.68
Hydrogen Chloride, Refrig. Liquid	105J600W	Full-Height	*	*	105J600W	Full-Height	*	*	**
Hydrogen Cyanide, Stabilized	105A500W	No	0.8950	0.8950	105J600W	Full-Height	1.2429	1.2429	0.80
Hydrogen Flouride, Anhydrous	112A340W	No	0.7040	0.7040	105J500W	Full-Height	0.8951	0.8951	0.63
Hydrogen Sulfide	105J600W	No	*	*	105J600W	Full-Height	*	*	**
Methyl Bromide	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.56
Methyl Mercaptan	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8951	0.8951	0.67
Nitrosyl Chloride	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.8179	0.57
Phosphorus Trichloride	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.8179	0.57
Sulfur Dioxide	105J300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8179	0.8179	0.57
Sulfur Trioxide, Stabilized	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.56
Sulfuric Acid, Fuming	105S300W	Full-Height	0.5980	0.5980	105J500W	Full-Height	0.8125	0.8125	0.51
Titanium Tetrachloride	105S300W	Full-Height	0.5625	0.5625	105J500W	Full-Height	0.8125	0.8125	0.56