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DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 171, 172, 173, 174, and 179

[Docket No. PHMSA-2012-0082 (HM-251)]

RIN 2137-AE91

Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The Pipeline and Hazardous Materials Safety Administration (PHMSA or we), in coordination with the Federal Railroad Administration (FRA), is proposing: (1) new operational requirements for certain trains transporting a large volume of Class 3 flammable liquids; (2) improvements in tank car standards; and (3) revision of the general requirements for offerors to ensure proper classification and characterization of mined gases and liquids. These proposed requirements are designed to lessen the frequency and consequences of train accidents/incidents (train accidents) involving certain trains transporting a large volume of flammable liquids. The growing reliance on trains to transport large volumes of flammable liquids poses a significant risk to life, property, and the environment. These significant risks have been highlighted by the recent instances of trains carrying crude oil that derailed in Casselton, North Dakota; Aliceville, Alabama; and Lac-Mégantic, Quebec, Canada. The proposed changes also address National Transportation Safety Board (NTSB) safety recommendations on the accurate classification and characterization of such commodities, enhanced tank car construction, and rail routing.

DATES: Comments must be received by [INSERT DATE 60 DAYS FROM PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may submit comments identified by the docket number (Docket No. PHMSA-2012-0082 (HM-251)) and any relevant petition number by any of the following methods:

- Federal eRulemaking Portal: http://www.regulations.gov Follow the instructions for submitting comments.
- Fax: 1-202-493-2251.
- Mail: Docket Management System; U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, Routing Symbol M–30, 1200 New Jersey Avenue, SE., Washington, DC 20590.
- Hand Delivery: To the Docket Management System; Room W12–140 on the ground floor of the West Building, 1200 New Jersey Avenue, SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: All submissions must include the agency name and docket number for this notice at the beginning of the comment. To avoid duplication, please use only one of these four methods. All comments received will be posted without change to http://www.regulations.gov and will include any personal information you provide. All comments received will be posted without change to the Federal Docket Management System (FDMS), including any personal information.

Docket: For access to the dockets to read background documents or comments received, go to http://www.regulations.gov or DOT's Docket Operations Office located at U.S.

Department of Transportation, West Building, Ground Floor, Room W12–140, Routing Symbol M–30, 1200 New Jersey Avenue, S.E., Washington, DC 20590.

Privacy Act: Anyone is able to search the electronic form of all comments received into any of our dockets by the name of the individual submitting the comments (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement at: http://www.dot.gov/privacy.

FOR FURTHER INFORMATION CONTACT: Ben Supko or Michael Stevens, (202) 366-8553, Standards and Rulemaking Division, Pipeline and Hazardous Materials Safety Administration or Karl Alexy, (202) 493-6245, Office of Safety Assurance and Compliance, Federal Railroad Administration, 1200 New Jersey Ave., SE., Washington, DC 20590-0001.

SUPPLEMENTARY INFORMATION:

FREQUENTLY USED ABBREVIATIONS AND SHORTENED TERMS

AAR	Association of American Railroads
ANPRM	Advance notice of proposed rulemaking or PHMSA's ANPRM published September 6, 2013 in this rulemaking, depending on context
App.	Appendix
CFR	Code of Federal Regulations
CPC	Casualty Prevention Circular
Crude oil	Petroleum crude oil
DHS	U.S. Department of Homeland Security
DOT	U.S. Department of Transportation
DP	Distributed power, an alternative brake signal propagation system
ECP brakes	Electronically controlled pneumatic brakes, an alternative brake signal propagation system
EO 28	FRA Emergency Order No. 28 (78 FR 54849; August 7, 2013)
EOT device	Two Way End-of-train device
FR	Federal Register
FRA	Federal Railroad Administration
GRL	Gross Rail Load
HHFT	High-Hazard Flammable Train
HMT	Hazardous Materials Table at 49 CFR 172.101
HMR	Hazardous Materials Regulations at 49 CFR Parts 171-180
LPG	Liquefied petroleum gas
NAR	Non-accident release, the unintentional release of a hazardous material while in

	transportation, including loading and unloading while in railroad possession, that is not caused by a derailment, collision, or other rail-related accident
NPRM	Notice of proposed rulemaking
NTSB	National Transportation Safety Board
OTMA	One-time movement approval
PG	Packing Group (see 49 CFR § 171.8)
PIH	Poison Inhalation Hazard
RIA	Regulatory impact analysis
RSAC	Railroad Safety Advisory Committee
RSPA	Research and Special Programs Administration, the predecessor of PHMSA
SERCs	State Emergency Response Commissions
T87.6 Task Force	A task force of the AAR Tank Car Committee
TIH	Toxic inhalation hazard or Toxic-by-Inhalation
TTC	Tank Car Committee
TSA	Transportation Security Administration
U.S.C.	United States Code

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I. Executive Summary

Expansion in United States (U.S.) energy production has led to significant challenges in the transportation system. Expansion in oil production has led to increasing volumes of product transported to refineries. Traditionally, pipelines and oceangoing tankers have delivered the vast majority of crude oil to U.S. refineries, accounting for approximately 93 percent of total receipts (in barrels) in 2012. Although other modes of transportation—rail, barge, and truck—have accounted for a relatively minor portion of crude oil shipments, volumes have been rising very rapidly. With a growing domestic supply, rail transportation, in particular, has emerged as a flexible alternative to transportation by pipeline or vessel. The volume of crude oil carried by rail increased 423 percent between 2011 and 2012.[1,2] Volumes continued to increase in 2013, as the number of rail carloads of crude oil surpassed 400,000.[3] U.S. ethanol production has also increased considerably during the last 10 years and has generated similar growth in the

[1] See U.S. Rail Transportation of Crude Oil: Background and Issues for Congress; http://fas.org/sgp/crs/misc/R43390.pdf
[2] See also "Refinery receipts of crude oil by rail, truck, and barge continue to increase" http://www.eia.gov/todayinenergy/detail.cfm?id=12131
[3] http://www.stb.dot.gov/stb/industry/econ_waybill.html

transportation of ethanol by rail.[4] The increase in shipments of large quantities of flammable liquids by rail has led to an increase in the number of train accidents, posing a significant safety and environmental concern.

In this NPRM, PHMSA is proposing revisions to the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) that establish requirements for "high-hazard flammable train" (HHFT). This proposed rule defines a HHFT as a train comprised of 20 or more carloads of a Class 3 flammable liquid and ensures that the rail requirements are more closely aligned with the risks posed by the operation of these trains. As discussed further in this preamble and in our analysis, this rule primarily impacts unit train shipments of ethanol and crude oil; because ethanol and crude oil are most frequently transported in high volume shipments, typically in trains with 20 or more cars of those commodities. Currently, as shipped, crude oil and ethanol are typically classified as Class 3 flammable liquids. The primary intent of this rulemaking is to propose revisions to the HMR that update and clarify the regulations to prevent and mitigate the consequences of a train accident involving flammable liquids, should one occur.Table 1 identifies those affected by this NPRM and describes the regulatory changes.

Table 1: Affected Entities and Requirements

Proposed Requirement	Affected Entity
Better classification and characterization of mined gases and liquids. • Written sampling and testing program for all mined gases and liquids, such as crude oil, to address: (1) frequency of sampling and testing; (2) sampling at various points along the supply chain; (3) sampling methods that ensure a representative sample of the entire mixture; (4) testing methods to enable complete analysis, classification, and characterization of material; (5) statistical justification for sample frequencies; and, (6) duplicate samples for quality assurance. Require offerer to certify that program is in place, document the testing and sampling program, and make program information available to DOT personnel, upon request.	Offerors / Shippers of all mined gases and liquids

[4] Association of American Railroads. 2013. Railroads and Ethanol. Available online at https://www.aar.org/keyissues/Documents/Background-Papers/Railroads%20and%20Ethanol.pdf

Rail routing risk assessment. • Requires carriers to perform a routing analysis that considers 27 safety and security factors. The carrier must select a route based on findings of the route analysis. These planning requirements are prescribed in § 172.820 and would be expanded to apply to HHFTs. Notification to SERCs. • Require trains containing one million gallons of Bakken crude oil to notify State Emergency Response Commissions (SERCs) or other appropriate state delegated entity about the operation of these trains through their States. Reduced operating speeds. • Restrict all HHFTs to 50-mph in all areas • PHMSA is requesting comment on three speed restriction options for HHFTs that contain any tank cars not meeting the enhanced tank car standards proposed by this rule: (1) a 40-mph maximum speed restriction in all areas (2) a 40-mph speed restriction in high threat urban areas[5]; and, (3) a 40-mph speed restriction in areas with a 100K+ population. • PHMSA is also requesting comment on a 30-mph speed restriction for HHFTs that do not comply with enhanced braking requirements. Enhanced braking. • Require all HHFTs be equipped with alternative brake signal propagation systems. Depending on the outcome of the tank car standard proposal and implementation timing, all HHFTs would be operated with either electronic controlled pneumatic brakes (ECP), a two-way end of train device (EOT), or distributed power (DP).	Rail Carriers, Emergency Responders
Enhanced standards for both new and existing tank cars. • Require new tank cars constructed after October 1, 2015 (that are used to transport flammable liquids as part of a HHFT) to meet criteria for a selected option, including specific design requirements or performance criteria (e.g., thermal, top fittings, and bottom outlet protection; tank head and shell puncture resistance). PHMSA is requesting comment on the following three options for the DOT Specification 117: 1. FRA and PHMSA Designed Car, or equivalent 2. AAR 2014 Tank Car,[6] or equivalent 3. Jacketed CPC-1232[7], or equivalent • Require existing tank cars that are used to transport flammable liquids as part of a HHFT, to be retrofitted to meet the selected option for performance requirements, except for top fittings protection. Those not retrofitted would be retired, repurposed, or operated under speed restrictions for up to five years, based on packing group assignment of the lading.	Tank Car Manufacturers, Tank Car Owners, Shippers and Rail Carriers

Table 2 further summarizes the three options for the DOT Specification 117. As noted in

[5] As defined in 49 CFR 1580.3 – High Threat Urban Area (HTUA) means an area comprising one or more cities and surrounding areas including a 10-mile buffer zone, as listed in appendix A to Part 1580 of the 49 CFR.

[6] On March 9, 2011 AAR submitted petition for rulemaking P-1577, which was discussed in the ANPRM. In response to the ANPRM, on November 15, 2013, AAR and ASLRAA submitted as a comment recommendations for tank car standards that are enhanced beyond the design in P-1577. For the purposes of this rulemaking this tank car will be referred to as the "AAR 2014 tank car." See http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0090.

[7] In 2011, the AAR issued Casualty Prevention Circular (CPC) 1232, which outlines industry requirements for additional safety equipment on certain DOT Specification 111 tanks ordered after October 1, 2011, and intended for use in ethanol and crude oil service.

Table 1, PHMSA proposes to require one of these options for new tank cars constructed after October 1, 2015, if those tank cars are used as part of HHFT. In addition, for all three Options, PHMSA proposes the following timelines for tank cars used as part of HHFT: (1) for Packing Group I, DOT Specification 111 tank cars are not authorized after October 1, 2017; (2) for Packing Group II, DOT Specification 111 tank cars are not authorized after October 1, 2018; and (3) for Packing Group III, DOT Specification 111 tank cars are not authorized after October 1, 2020.

Table 2: Safety Features by Tank Car Option

Tank Car	Bottom Outlet Handle	GRL (lbs)	Head Shield Type	Pressure Relief Valve	Shell Thickness	Jacket	Tank Material*	Top Fittings Protection**	Thermal Protection System	Braking
Option 1: PHMSA and FRA Designed Tank Car	Bottom outlet handle removed or designed to prevent unintended actuation during a train accident	286k	Full-height, 1/2 inch thick head shield	Reclosing pressure relief device	9/16 inch Minimum	Minimum 11-gauge jacket constructed from A1011 steel or equivalent. The jacket must be weather-tight	TC-128 Grade B, normalized steel	TIH Top fittings protection system and nozzle capable of sustaining, without failure, a rollover accident at a speed of 9 mph	Thermal protection system in accordance with § 179.18	ECP brakes
Option 2: AAR 2014 Tank Car	Bottom outlet handle removed or designed to prevent unintended actuation during a train accident	286k	Full-height, 1/2 inch thick head shield	Reclosing pressure relief device	9/16 inch Minimum	Minimum 11-gauge jacket constructed from A1011 steel or equivalent. The jacket must be weather-tight	TC-128 Grade B, normalized steel	Equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1	Thermal protection system in accordance with § 179.18	In trains with DP or EOT devices
Option 3: Enhanced CPC 1232 Tank Car	Bottom outlet handle removed or designed to prevent unintended actuation during a train accident	286k	Full Height 1/2 inch thick head shield	Reclosing pressure relief device	7/16 inch-Minimum	Minimum 11-gauge jacket constructed from A1011 steel or equivalent. The jacket must be weather-tight	TC-128 Grade B, normalized steel	Equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1	Thermal protection system in accordance with § 179.18	In trains with DP or EOT devices

DOT 111A100 W1 Specification (Currently Authorized)	Bottom Outlets are Optional	263K	Optional; Bare Tanks half height; Jacket Tanks full height	Reclosing pressure relief valve	7/16 inch-Minimum	Jackets are optional	TC-128 Grade B, normalized steel*	Not required, but when Equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1	Optional	Not required

* For the purposes of this figure, TC-128 Grade B normalized steel is used to provide a consistent comparison to the proposed options. Section 179.200-7 provides alternative materials which are authorized for the DOT Specification 111.

** Please note that the PHMSA does not propose to require additional top fittings protection for retrofits, because the costs are not supported by corresponding benefits. Newly constructed cars, however, are required to have additional top fittings protection. Except for additional top fittings protection, the requirements for newly constructed tank cars and retrofits are the same.

The transportation of large volumes of flammable liquids poses a risk to life, property, and the environment. The volume of flammable liquids shipped by rail and in HHFTs has been increasing rapidly since 2006, representing a growing risk. Therefore, we are reevaluating the structure of the HMR as they pertain to rail transportation. Approximately 68 percent of the flammable liquids transported by rail are comprised of crude oil or ethanol. The U.S. is now the global leader in crude oil production growth. According to the rail industry, in 2009, there were 10,800 carloads of crude oil originations transported by Class I railroads, and in 2013, there were over 400,000 carloads of crude oil originations by Class I railroads, or 37 times as many in the U.S.[8] Crude oil production from the Bakken region of the Williston Basin is now over one million barrels per day.[9]

U.S. ethanol production has increased considerably during the last 10 years and has generated similar growth in the transportation of ethanol by rail, according to a recent white paper by the Association of American Railroads (AAR).[10] In 2008 there were around 292,000

[8] Association of American Railroads. 2013. Moving Crude by Rail. December. Available online at: https://www.aar.org/keyissues/Documents/Background-Papers/Crude-oil-by-rail.pdf

[9] Information regarding oil and gas production is available at the following URL: http://www.eia.gov/petroleum/drilling/#tabs-summary-2

[10] Association of American Railroads. 2013. Railroads and Ethanol. Available online at

rail carloads of ethanol. In 2011, that number increased over 40 percent, to 409,000.[11] Not surprisingly, this growth in rail traffic has been accompanied by an increase in the number of rail derailments and accidents involving ethanol.

As the number of shipments of crude oil in HHFTs has increased, the number of mainline train accidents involving crude oil has increased from zero in 2010 to five in 2013 and thus far five in 2014.[12] This increase comes at a time when, across the entire rail network, the number of train accidents and hazardous materials releases are decreasing; while total shipment volume has increased, the total number of train accidents has declined by 43 percent since 2003, and accidents involving a hazardous materials release has declined by 16 percent since 2003.[13] The projected continued growth of domestic crude oil production, and the growing number of train accidents involving crude oil, PHMSA concludes that the potential for future severe train accidents involving crude oil in HHFTs has increased substantially. Such an increase raises the likelihood of higher-consequence train accidents.

Recent accidents highlight the potentially severe consequences of accidents involving HHFTs carrying crude oil. On December 30, 2013, a train transporting grain derailed onto another track into the path of a train transporting crude oil, which had too little time to stop before it collided with the grain train, and then itself derailed and unintentionally released product, which ignited near Casselton, North Dakota, prompting authorities to issue a voluntary evacuation of the city and surrounding area. On November 8, 2013, a train transporting crude oil to the Gulf Coast from North Dakota derailed in Aliceville, Alabama, spilling crude oil in nearby wetlands ignited. On July 6, 2013, a catastrophic railroad accident occurred in Lac-Mégantic,

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https://www.aar.org/keyissues/Documents/Background-Papers/Railroad-Ethanol.pdf

[11] http://www.stb.dot.gov/stb/industry/econ_waybill.html

[12] Source: PHMSA Hazmat Inelegance Portal (HIP), February 2014.

[13] Data from compiled by FRA's Office of Safety Analysis.

Quebec, Canada, when an unsecured and unattended freight train transporting crude oil rolled down a descending grade and subsequently derailed, resulting in the unintentional release of lading from multiple tank cars. The subsequent fires and explosions, along with other effects of the accident, resulted in the deaths of 47 individuals. In addition, the derailment caused extensive damage to the town center, a release of hazardous materials resulting in a massive environmental impact that will require substantial clean-up costs, and the evacuation of approximately 2,000 people from the surrounding area.

Accidents involving HHFTs transporting ethanol can also cause severe damage. On August 5, 2012, a train derailed 18 of 106 cars, 17 of which were carrying ethanol, near Plevna, MT. Twelve of the 17 cars released lading and began to burn, causing two grass fires, a highway near the site to be closed, and over $1 million in damages. On October 7, 2011, a train derailed 26 loaded freight cars (including 10 loaded with ethanol) approximately one-half mile east of Tiskilwa, IL. The release of ethanol and resulting fire initiated an evacuation of about 500 residents within a ½-mile radius of the accident scene, and resulted in damages over $1.8 million. On June 19, 2009, near Rockford, IL, a train derailed 19 cars, all of which contained ethanol, and 13 of the derailed cars caught fire. The derailment destroyed a section of single main track and an entire highway-rail grade crossing. As a result of the fire that erupted after the derailment, a passenger in one of the stopped cars was fatally injured, two passengers in the same car received serious injuries, and five occupants of other cars waiting at the highway/rail crossing were injured. Two responding firefighters also sustained minor injuries. The release of ethanol and resulting fire initiated a mandatory evacuation of about 2,000 residents within a ½-mile radius of the accident scene and damages of approximately $1.7 million. The EPA estimated that 60,000 gallons of ethanol spilled into an unnamed stream, which flowed near the

Rock and Kishwaukee Rivers.

The following table highlights the risk of HHFTs by summarizing the impacts of selected major train accidents involving trains of Class 3 flammable liquid.

Table 3: Major Crude Oil/Ethanol Train Accidents in the U.S. (2006-2014)

Location	Date (MM/YY)	Number of Tank Cars Derailed	Number of Crude oil/ethanol cars penetrated	Speed at Derailment in Miles per Hour (mph)	Material and Type of Train	Product Loss (Gallons of Crude or Ethanol)	Fire	Type of Train Accident or Cause of Train Accident
LaSalle, CO	05/14	5	1	9	Crude Oil (unit)	5,000	No	To Be Determined (TBD)
Lynchburg, VA	04/14	17	2	23	Crude Oil (unit)	30,000	Yes	TBD
Vandergrift, PA	02/14	21	4	31	Crude Oil	10,000	No	TBD
New Augusta, MS	01/14	26	25	45	Crude Oil	90,000	No	TBD
Casselton, ND	12/13	20	18	42	Crude Oil (unit)	476,436	Yes	Collision
Aliceville, AL	11/13	26	25	39	Crude Oil (unit)	630,000	Yes	TBD
Plevna, MT	08/12	17	12	25	Ethanol	245,336	Yes	TBD
Columbus, OH	07/12	3	3	23	Ethanol	53,347	Yes	TBD--NTSB Investigation
Tiskilwa, IL	10/11	10	10	34	Ethanol	143,534	Yes	TBD--NTSB Investigation
Arcadia, OH	02/11	31	31	46	Ethanol (unit)	834,840	Yes	Rail Defect
Rockford/ Cherry Valley, IL	06/09	19	13	19	Ethanol (unit)	232,963	Yes	Washout
Painesville, OH	10/07	7	5	48	Ethanol	76,153	Yes	Rail Defect
New Brighton, PA	10/06	23	20	37	Ethanol (unit)	485,278	Yes	Rail Defect

Note 1. The term "unit" as used in this chart means that the train was made up only of cars carrying that single commodity, as well as any required non-hazardous buffer cars and the locomotives.
Note 2. All accidents listed in the table involved HHFTs.
Note 3. All crude oil or crude oil/LPG accidents involved a train transporting over 1 million gallons of oil.

While not all accidents involving crude oil and ethanol release as much product or have as significant consequences as those shown in this table, these accidents indicate the potential harm from future releases. Table 4 provides a brief summary of the justifications for each provision in this NPRM, and how each provision will address the safety risks described previously.

Table 4: Rulemaking Provisions and Safety Justifications	
Provision	**Justification**
Rail Routing	PHMSA is proposing routing requirements to reduce the risk of a train accident. This proposal requires railroads to balance the risk factors to identify the route that poses the lower risk. As such, they may, in certain cases, choose a route that eliminates exposure in areas with high population densities but poses a risk for more frequent events in areas with very low densities. In other cases the risk of derailment may be so low along a section of track that, even though it runs through a densely populated area, it poses the lowest total risk when severity and likelihood are considered.
Classification of Mined Gas and Liquid	PHMSA is proposing to require a sampling and testing program for mined gas and liquid, such as crude oil. PHMSA expects the proposed requirements would reduce the expected non-catastrophic damages and ensure that materials are properly classified in accordance with the HMR.
Notification to SERCs	PHMSA is proposing to codify the May 7, 2014, DOT issued an Emergency Restriction/Prohibition Order in Docket No. DOT-OST-2014-0067 (EO or Order). Recent accidents have demonstrated the need for action in the form of additional communication between railroads and emergency responders to ensure that the emergency responders are aware of train movements carrying large quantities of crude oil through their communities.
Speed Restrictions	PHSMA is proposing to restrict the speed of HHFTs. Speed is a factor that may contribute to derailments. Speed can influence the probability of an accident, as lower speeds may allow for a brake application to stop the train before a collision. Speed also increases the kinetic energy of a train, resulting in a greater possibility of the tank cars being punctured in the event of a derailment. The proposed restrictions will reduce the frequency and severity of train accidents.
Braking	To reduce the number of cars and energy associated with train accidents, PHMSA is proposing to require alternative brake signal propagation systems: distributed power (DP), or two-way end of train devices (EOT); for tank car Option 1, electronic controlled pneumatic brakes (ECP)
Tank Car Specifications	PHMSA is proposing a new DOT Specification 117 tank car to address the risks associated with the rail transportation of ethanol and crude oil and the risks posed by HHFTs. All tank car Options for the DOT Specification 117 incorporate several enhancements to increase puncture resistance;

	provide thermal protection to survive a 100-minute pool fire; and protect top fitting (new construction only) and bottom outlets during a derailment. Under all Options, the proposed system of design enhancements would reduce the consequences of a derailment of tank cars carrying crude oil or ethanol. There would be fewer car punctures, fewer releases from the service equipment (top and bottom fittings), and delayed release of flammable liquid from the tank cars through the pressure relief devices.

The consequences of train accidents and increase in the rail transportation of flammable liquids highlight the need to review existing regulations and industry practices related to such transportation. PHMSA and FRA are focused on reducing the risks posed by HHFTs and are taking action to prevent accidents from occurring and to mitigate the consequences when accidents do occur. PHMSA and FRA's actions to date demonstrate their focus on reducing risk associated with the rail transportation of large quantities of flammable liquids. PHMSA and FRA actions include: (1) issuing FRA's Emergency Order No. 28 (EO 28) (78 FR 48218) published on August 7, 2013 stressing train securement; (2) issuing two Joint Safety Advisories published on August 7, 2013 (78 FR 48224) and November 20, 2013 (78 FR 69745) stressing the importance of security planning and proper characterization and classification of crude oil; (3) initiating a comprehensive review of operational factors that impact the transportation of hazardous materials by rail in a public meeting held on August 27-28, 2013 (78 FR 42998); (4) referring safety issues related to EO 28 and the and August 7, 2013 Joint Safety Advisory to FRA's Railroad Safety Advisory Committee (RSAC); (5) issuing an emergency order on February 25, 2014, which was revised and amended on March 6, 2014 requiring that all rail shipments of crude oil that is properly classed as a flammable liquid in Packing Group (PG) III material be treated as a PG I or II material;[14] (6) issuing an emergency order on May 7, 2014,

[14] See Docket No. DOT-OST-2014-0025. See also http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Amended_Emergency_Order_030614.pdf

requiring all railroads that operate trains containing one million gallons of Bakken crude oil to notify SERCs about the operation of these trains through their States;[15] (7) issuing a Safety Advisory on May 7, 2014, urging carriers transporting Bakken crude oil by rail to select and use tank cars of the highest integrity to transport the material;[16] and (8) publishing the September 6, 2013, advance notice of proposed rulemaking (ANPRM) responding to eight petitions for rulemaking and four NTSB Safety Recommendations related to the transportation of hazardous materials by rail (78 FR 54849).

In addition to these eight actions, PHMSA issued a Safety Alert on January 2, 2014, warning of potential crude oil variability and emphasizing the proper and sufficient testing to ensure accurate characterization and classification. The Safety Alert expressed PHMSA's concern that unprocessed crude oil may affect the integrity of packaging or present additional hazards related to corrosivity, sulfur content, and dissolved gas content.[17] To address these risks, this NPRM is proposing additional requirements for a sampling plan that would include proper characterization, classification, and selection of a hazardous material's Packing Group. Further, the NPRM is proposing to expand the routing requirements under subpart I of part 172 of the HMR to include HHFTs. Through its speed, tank car, braking, and notification requirements, this NPRM is intended to take a comprehensive approach to the risks of HHFTs.

PHMSA has prepared and placed in the docket a Regulatory Impact Analysis (RIA) addressing the economic impact of this proposed rule. Table 5 shows the costs and benefits by

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15 http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_D9E224C13963CAF0AE4F15A8B3C4465BAEAF0100/filename/Final_EO_on_Transport_of_Bakken_Crude_Oi_05_07_2014.pdf

16 http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_9084EF057B3D4E74A2DEB5CC86006951BE1D0200/filename/Final_FRA_PHMSA_Safety_Advisory_tank_cars_May_2014.pdf

17 See http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_111F295A99DD05D9B698AE8968F7C1742DC70000/filename/1_2_14%20Rail_Safety_Alert.pdf

affected section and rule provision over a 20 year period, discounted at a 7% rate. Please note that because there is overlap in the risk reduction achieved between some of the proposed requirements listed in Table 5, the total benefits and costs of the provisions cannot be accurately calculated by summing the benefits and costs of each proposed provision. For example, the benefits for tank car Option 1, the PHMSA and FRA Designed Car, include benefits that are also presented as part of the benefits for the proposed "Braking" requirements at 49 CFR 174.130. Table 6 shows an explanation of the comprehensive benefits and costs (i.e., the combined effects of individual provisions), and the estimated benefits, costs, and net benefits of each proposed scenario.

Please also note that, given the uncertainty associated with the risks of crude oil and ethanol shipments, Table 5 contains a range of benefits estimates. The low end of the range of estimated benefits estimates risk from 2015 to 2034 based on the U.S. safety record for crude oil and ethanol from 2006 to 2013, adjusting for the projected increase in shipment volume over the next 20 years. Absent this proposed rule, we predict about 15 mainline derailments for 2015, falling to a prediction of about 5 mainline derailments annually by 2034. The high end of the range of estimated benefits includes the same estimate of 5 to 15 annual mainline derailments predicted, based on the U.S. safety record, plus an estimate that the U.S. would experience an additional 10 additional safety events of higher consequence—nine of which would have environmental damages and monetized injury and fatality costs exceeding $1.15 billion per event and one of which would have environmental damages and monetized injury and fatality costs exceeding $5.75 billion—over the next 20 years.

Table 5 : 20 Year Costs and Benefits by Stand-Alone Proposed Regulatory Amendments 2015-2034[18]

[18] All costs and benefits are in millions, and are discounted to present value using a 7 percent rate.

Affected Section[19]	Provision	Benefits (7%)	Costs (7%)
49 CFR 172.820	**Rail Routing+**	Cost effective if routing were to reduce risk of an incident by .19%	$5.5 million
49 CFR 173.41	**Classification of Mined Gas and Liquid**	Cost effective if this requirement reduces risk by 0.75%	$16.2 million
49 CFR 174.310	**Notification to SERCs**	Qualitative	$0
	Speed Restriction: Option 1: 40 mph speed limit all areas*	$202 million – $645 million	$2,871 million
	Speed Restriction: Option 2: 40 mph 100k people*	$40.4 million – $484 million	$260 million
	Speed Restriction: Option 3: 40 mph in HTUAs*	$14.1 million- $42.5 million	$27.4 million
	Braking: Electronic Pneumatic Control with DP or EOT#	$791 million - $1,844 million	$517.1 million
49 CFR Part 179	**Option 1: PHMSA and FRA designed car**	$899 million -$3,511 million	$3,032 million
	Option 2: AAR 2014 Tank Car	$670.4 million – $2,628 million	$2,590 million
	Option 3: Jacketed CPC-1232 (new const.)	$432.5 million – $1,701 million	$2,479 million

Note: "*" indicates voluntary compliance regarding crude oil trains in high-threat urban areas (HTUA)
"+" indicates voluntary actions that will be taken by shippers and railroads
"#" indicates that only tank car Option 1, the PHMSA and FRA designed car, has a requirement for ECP brakes. However, all HHFTs would be required to have DP or two-way EOT, regardless of which tank car Option is selected at the final rule stage.

Table 6 presents the costs and benefits of the various combinations of proposed tank car and speed restriction provisions.

Table 6: 20 Year Benefits and Costs of Proposal Combinations of Proposed Regulatory Amendments 2015-2034[20]

Proposal	Benefit Range (Millions)	Cost (Millions)
PHMSA and FRA Design Standard + 40 MPH System Wide	$1,569 - $4,750	$6,023
PHMSA and FRA Design Standard + 40 MPH in 100K	$1,413 - $4,162	$3,412
PHMSA and FRA Design Standard + 40 MPH in HTUA	$1,388 - $4,067	$3,179
AAR 2014 Standard + 40 MPH System Wide	$878 - $3,308	$5,581
AAR 2014 Standard + 40 MPH in 100K	$712 - $2,683	$2,970
AAR 2014 Standard + 40 MPH in HTUA	$685 - $2,582	$2,738
CPC 1232 Standard + 40 MPH System Wide	$648 - $2,442	$5,470
CPC 1232 Standard + 40 MPH in 100K	$476 - $1,793	$2,858
CPC 1232 Standard + 40 MPH in HTUA	$448 - $1,687	$2,626

II. Overview of Current Regulations Relevant to this Proposal

[19] All affected sections of the Code of Federal Regulations (CFR) are in Title 49.
[20] All costs and benefits are in millions, and are discounted to present value using a 7 percent rate.

Federal hazardous materials transportation law (Federal hazmat law; 49 U.S.C. 5101-5128) authorizes the Secretary of Transportation (Secretary) to "prescribe regulations for the safe transportation, including security, of hazardous material in intrastate, interstate, and foreign commerce." The Secretary has delegated this authority to PHMSA. 49 CFR 1.97(b). PHMSA is responsible for overseeing a hazardous materials safety program that minimizes the risks to life and property inherent in transportation in commerce. The HMR provide safety and security requirements for shipments valued at more than $1.4 trillion annually.[21] The HMR are designed to achieve three goals: (1) to ensure that hazardous materials are packaged and handled safely and securely during transportation; (2) to provide effective communication to transportation workers and emergency responders of the hazards of the materials being transported; and (3) to minimize the consequences of an incident should one occur. The hazardous material regulatory system is a risk management system that is prevention-oriented and focused on identifying a safety or security hazard, thus reducing the probability and quantity of a hazardous material release.

Under the HMR, hazardous materials are categorized by analysis and experience into hazard classes and packing groups based upon the risks that they present during transportation. The HMR specify appropriate packaging and handling requirements for hazardous materials based on such classification, and require an offeror to communicate the material's hazards through the use of shipping papers, package marking and labeling, and vehicle placarding. The HMR also require offerors to provide emergency response information applicable to the specific hazard or hazards of the material being transported. Further, the HMR mandate training for persons who prepare hazardous materials for shipment or who transport hazardous materials in

[21] 2007 Commodity Flow Survey, Research and Innovative Technology Administration, Bureau of Transportation Statistics.

commerce and require the development and implementation of plans to address security risks related to the transportation of certain types and quantities of hazardous materials in commerce, including additional planning requirements for transportation by rail (e.g., the routing of the material).

The HMR also include operational requirements applicable to each mode of transportation. The Secretary has authority over all areas of railroad transportation safety (Federal railroad safety laws, principally 49 U.S.C. chapters 201-213), and delegates this authority to FRA. 49 CFR 1.89. FRA inspects and audits railroads, tank car facilities, and offerors for compliance with both FRA and PHMSA regulations. FRA also has an extensive, well-established research and development program to enhance all elements of railroad safety including hazardous materials transportation.

As a result of the shared role in the safe and secure transportation of hazardous materials by rail, PHMSA and FRA work very closely when considering regulatory changes. Regarding rail safety and security, PHMSA and FRA take a system-wide, comprehensive approach consistent with the risks posed by the bulk transport of hazardous materials by rail. To address our concerns regarding the risks associated with mined liquids and gases (like crude oil), and HHFTs, we are focusing on three areas: (1) proper classification and characterization; (2) operational controls to lessen the likelihood and consequences of accidents; and (3) improvements to tank car integrity. This approach is designed to minimize the occurrence of train accidents and mitigate the damage caused should an accident occur.

As described throughout this NPRM, PHMSA and FRA have relied on a variety of regulatory and non-regulatory methods to address concerns regarding HHFTs. These efforts have included issuing guidance, initiating rulemakings, participating in transportation safety

committees, holding public meetings with the regulated community and other stakeholders, enhancing enforcement efforts, reaching out to the public, and addressing tank car integrity and freight rail safety in general. All of these efforts have been consistent with our system safety approach. We are confident that collectively these actions have provided and will continue to provide valuable rail safety enhancements, information and guidance to the regulated community, and improve overall safety for the public.

This overview section provides a general discussion of the current regulations that affect the safety of HHFTs. These issues include: (1) proper classification and characterization of the hazardous materials offered for transportation; (2) packagings authorized for the materials transported in HHFTs; (3) the role of track integrity in preventing train accidents; (4) oil spill response plans; and (5) routing of trains based on an assessment of the safety and security risks along routes.

A. Classification and Characterization of Mined Liquids and Gases

The proper classification and characterization of a hazardous material is a key requirement under the HMR, as it dictates which other requirements apply, such as specific operational controls and proper packaging selection. Classification is simply ensuring the proper hazard class and packing group (if applicable) are assigned to a particular material. Characterization is a complete description of the properties of a material during the transportation cycle. Characterization includes the identification of the effects a material has on both the reliability and safety of the packaging that contains it. Proper classification and characterization is especially important when dealing with a material such as mined liquids and gases, including crude oil, as these materials' properties are variable. Crude oil's properties are not easily understood and the characterization may vary considerably based on time, location,

method of extraction, temperature at time of extraction or processing, and the type and extent of processing of the material. In contrast, the classification and characterization of manufactured products is generally well understood and consistent.

Under § 173.22 of the HMR, it is the offeror's responsibility to properly "class and describe the hazardous material in accordance with parts 172 and 173 of the HMR." When a single material meets more than one hazard class, it must be classed based on the hazard precedence table in § 173.2a. Once an offeror determines the hazard class of a material, the offeror must then select the most appropriate proper shipping name from the § 172.101 Hazardous Materials Table (HMT).

In the case of crude oil, relevant properties to properly classify a flammable liquid include: flash point, and boiling point (See section 173.120). The HMR does not specifically provide requirements for characterization tests however; relevant properties that may affect the characterization of crude oil include corrosivity, vapor pressure, specific gravity at loading and reference temperatures, and the presence and concentration of specific compounds such as sulfur. Characterization of certain properties enables an offeror to select the most appropriate shipping name, and identify key packaging considerations. Based on the shipping name the HMT provides the list of packagings authorized for use by the HMR. As indicated in § 173.24(e), even though certain packagings are authorized, it is the responsibility of the offeror to ensure that such packagings are compatible with their lading. Such information and determination of the authorized packaging also ensure that the appropriate outage is maintained in accordance with § 173.24(a).

Crude oil transported by rail is often derived from different sources and is then blended, complicating proper classification and characterization of the material. PHMSA and FRA audits

of crude oil loading facilities, prior to the issuance of the February 26, 2014 Emergency Restriction/Prohibition Order, indicate that the classification of crude oil being transported by rail was often based solely on a generic Safety Data Sheet (SDS). The data on these sheets only provide a material classification and a range of material properties. This SDS information is typically provided by the consignee (the person to whom the shipment is to be delivered) to the offeror. In these instances, it is possible no validation of the crude oil properties took place. Further, FRA's audits indicate that SDS information is often not gleaned from any recently conducted analyses or from analyses of the many different sources (wells) of the crude oil.

Improper classification and characterization can also impact operational requirements under the HMR. Offerors and carriers must ensure that outage is considered when loading a tank car. Section 173.24b(a) of the HMR prescribes the minimum tank car outage for hazardous materials at one percent at a reference temperature that is based on the existence of tank car insulation. A crude oil offeror must know the specific gravity of the hazardous material at the reference temperature as well as the temperature and specific gravity of the material at that temperature when loaded. This information is then used to calculate the total quantity that can be safely loaded into the car to comply with the one percent outage requirement. If the outage is not properly calculated because the material's specific gravity is unknown (or is provided as a range), the tank car could be loaded such that if the temperature increases during transportation, the tank will become shell-full, increasing the likelihood of a leak from the valve fittings or manway, and increase risk during a train accident.

Since 2004, approximately 10 percent of the one-time movement approval (OTMA) requests that FRA has received under the requirements of 49 CFR 174.50 have been submitted to move overloaded tank cars. Of these requests, 33 percent were tank cars containing flammable

liquids. FRA notes that tank cars overloaded by weight are typically identified when the tank cars go over a weigh-in-motion scale at a railroad's classification yard. As previously indicated, crude oil and ethanol are typically moved in HHFTs, and the cars in these trains are generally moved as a single block in a "through" priority or "key train."[22] As a result, the train is not broken up in a classification yard for individual car routing purposes, and cars do not typically pass over weigh-in-motion scales in classification yards. Therefore, it is unlikely that FRA would receive many OTMA requests for overloaded tank cars containing crude oil, suggesting that there is a potential of underreporting. Overloads of general service flammable liquid tank cars should not be confused with any excess capacity issues. We do not have information that shippers are filling the excess capacity available to them.

Moreover, crude oil accounted for the most non-accident releases (NARs)[23] by commodity in 2012, nearly doubling the next highest commodity (alcohols not otherwise specified, which accounts for a comparable annual volume transported by rail). FRA's data indicate that 98 percent of the NARs involved loaded tank cars. Product releases through the top valves and fittings of tank cars when the hazardous material expands during transportation. This suggests that loading facilities may not know the specific gravity of the hazardous materials loaded into railroad tank cars, resulting in a lack of sufficient outage.

Commenters to the ANPRM noted incidents involving damage to tank cars in crude oil

[22] On August 5, 2013, AAR published Circular No. OT-55-N. This document supersedes OT-55-M, issued October 1, 2012. The definition of a "key train" was revised to include "20 car loads or portable tank loads of any combination of hazardous material." Therefore, the maximum speed of these trains is limited to 50 MPH. The document is available in the public docket for this proceeding and at the following URL: http://www.aar.com/CPC-1258%20OT-55-N%208-5-13.pdf

[23] According to the AAR, a non-accident release (NAR) is the unintentional release of a hazardous material while in transportation, including loading and unloading while in railroad possession, which is not caused by a derailment, collision, or other rail-related accident. NARs consist of leaks, splashes, and other releases from improperly secured or defective valves, fittings, and tank shells and also include venting of non-atmospheric gases from safety release devices.

service in the form of severe corrosion of the internal surface of the tank, manway covers, and valves and fittings. A possible cause is contamination of the crude oil by materials used in the fracturing process that are corrosive to the tank car tank and service equipment. Therefore, when crude oil is loaded into tank cars, it is critical that the existence and concentration of specific elements or compounds be identified, along with the corrosivity of the materials to the tank cars and service equipment. Proper identification also enables an offeror, in coordination with the tank car owner, to determine if there is a need for an interior coating or lining, alternative materials of construction for valves and fittings, and performance requirements for fluid sealing elements, such as gaskets and o-rings. These steps will help ensure the reliability of the tank car until the next qualification event.

For the reasons outlined above, proper classification and characterization of hazardous materials is critical to ensuring that materials are packaged and transported safely. The HMR do not prescribe a specific test frequency for classification and characterization of hazardous materials. However, as provided in § 173.22, the regulations clearly intend for the frequency and type of testing to be based on an offeror's knowledge of the hazardous material, with specific consideration given to the volume of hazardous material shipped, the variety of the sources of the hazardous material, and the processes used to generate the hazardous material. Once an offeror has classified and characterized the material; selected the appropriate packaging; loaded the packaging; and marked, labeled, and placarded in accordance with the HMR, the offeror must "certify" the shipment.

Section 172.204 of the HMR currently requires the offeror of the hazardous material to "certify that the material is offered for transportation in accordance with this subchapter." Certification is a very important step in the transportation process. The certification indicates the

HMR was followed and that all requirements have been met. The shipper's certification must include either of the following statements:

> This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.
>
> or—
>
> I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

As such, ultimately, the offeror is responsible for certifying a correct classification, and while the HMR do not specifically prescribe a frequency for classification, it requires an offeror to consider each hazard class in accordance with the defined HMR test protocol. As previously discussed, improper classification and characterization can have serious ramifications that could impact transportation safety.

On January 23, 2014, in response to its investigation of the Lac-Mégantic accident, the NTSB issued three recommendations to PHMSA and FRA. Safety Recommendation R-14-6 requested that PHMSA require shippers to sufficiently test and document the physical and chemical characteristics of hazardous materials to ensure the proper classification, packaging, and record-keeping of products offered in transportation. These and other NTSB Safety Recommendation and the corresponding PHMSA responses are discussed in further detail in Section C of the background portion of this document.

B. Packaging

For each proper shipping name, bulk packaging requirements are provided in Column (8C) of the HMT. For most flammable liquids, the authorized packaging requirements for a PG I material are provided in § 173.243 and for PGs II and III in § 173.242. The following table is provided as a general guide for the packaging options for rail transport provided by the HMR for a flammable and combustible liquids.

Table 7: Tank Car Options[24]		
Flammable Liquid, PG I	**Flammable Liquid, PG II and III**	**Combustible Liquid**
DOT 103	DOT 103	DOT 103
DOT 104	DOT 104	DOT 104
DOT 105	DOT 105	DOT 105
DOT 109	DOT 109	DOT 109
DOT 111	DOT 111	DOT 111
DOT 112	DOT 112	DOT 112
DOT 114	DOT 114	DOT 114
DOT 115	DOT 115	DOT 115
DOT 120	DOT 120	DOT 120
	AAR 206W	AAR 206W
		AAR 203W
		AAR 211W

Note 1 Sections 173.241, 173.242, and 173.243 authorize the use of the above tank cars.
Note 2. DOT 103, 104,105, 109, 112, 114, and 120 tank cars are pressure tank cars (HMR; Part 179, Subpart C).
Note 3. DOT 111 and 115 tank cars are non-pressure tank cars (HMR; Part 179, Subpart D).
Note 4. AAR 203W, AAR 206W, and AAR 211W tank cars are non-DOT specification tank cars that meet AAR standards. These tank cars are authorized under § 173.241 of the HMR (see Special Provision B1, as applicable).
Note 5. DOT 114 and DOT 120 pressure cars are permitted to have bottom outlets and, generally, would be compatible with the DOT 111.

The offeror must select a packaging that is suitable for the properties of the material and based on the packaging authorizations provided by the HMR. With regard to package selection, the HMR require in § 173.24(b) that each package used for the transportation of hazardous

[24] Additional information on tank car specifications is available at the following URL: http://www.bnsfhazmat.com/refdocs/1326686674.pdf

materials be "designed, constructed, maintained, filled, its contents so limited, and closed, so that under conditions normally incident to transportation…there will be no identifiable (without the use of instruments) release of hazardous materials to the environment [and]… the effectiveness of the package will not be substantially reduced." Under this requirement, offerors must consider how the properties of the material (which can vary depending on temperature and pressure) will affect the packaging.

The DOT Specification 111 tank car is one of several cars authorized by the HMR for the rail transportation of many hazardous materials, including ethanol, crude oil and other flammable liquids. For summary of the design requirements of the DOT Specification 111 tank car see table 2 in the executive summary. Provided in table 8 below, are estimates of the types of tank car tanks and corresponding services.

Table 8: Estimates for current fleet of rail tank cars[25]

Tank Car Category	Population
Total # of Tank Cars	334, 869
Total # of DOT 111	272,119
Total # of DOT 111 in Flammable Liquid Service	80,500
Total # of CPC 1232 in Flammable Liquid Service	17,300
Total # of Tank Cars hauling Crude Oil	42,550
Total # of Tank Cars Hauling Ethanol	29,780
CPC 1232 (Jacketed) in Crude Oil Service	4,850
CPC 1232 (Jacketed) in Ethanol Service	0
CPC 1232 (Non-Jacketed) in Crude Oil Service	9,400
CPC 1232 (Non-Jacketed) in Ethanol Service	480
DOT 111 (Jacketed) in Crude Oil Service	5,500
DOT 111 (Jacketed) in Ethanol Service	100
DOT 111 (Non-Jacketed) in Crude Oil Service	22,800

[25] Source: RSI presentation at the NTSB rail safety forum April 22, 2014, update provided on June 18, 2014.

DOT 111 (Non-Jacketed) in Ethanol Service	29,200

Rising demand for rail carriage of crude oil[26] and ethanol[27] increases the risk of train accidents involving those materials. Major train accidents often result in the release of hazardous materials. These events pose a significant danger to the public and the environment. FRA closely monitors train accidents involving hazardous materials and documents the damage sustained by all cars involved in the accident.

In published findings from the June 19, 2009, incident in Cherry Valley, Illinois, the NTSB indicated that the DOT Specification 111 tank car can almost always be expected to breach in the event of a train accident resulting in car-to-car impacts or pileups.[28] In addition, PHMSA received numerous petitions encouraging rulemaking and both FRA and PHMSA received letters from members of Congress in both parties urging prompt, responsive actions from the Department. The Association of American Railroads (AAR) created the T87.6 Task Force to consider several enhancements to the DOT Specification 111 tank car design and rail carrier operations to enhance rail transportation safety. Simultaneously, FRA conducted research on long-standing safety concerns regarding the survivability of the DOT Specification 111 tank cars designed to current HMR standards and used for the transportation of ethanol and crude oil, focusing on issues such as puncture resistance and top fittings protection. The research indicated

[26] In 2013 there were approximately 400,000 originations of tank car loads of crude oil. In 2012, there were nearly 234,000 originations. In 2011 there were nearly 66,000 originations. In 2008 there were just 9,500 originations. Association of American Railroads, *Moving Crude Petroleum by Rail*, https://www.aar.org/keyissues/Documents/Background-Papers/Crude-oil-by-rail.pdf (December 2013).

[27] In 2011 there were nearly 341,000 originations of tank car loads of ethanol, up from 325,000 in 2010. In 2000 there were just 40,000 originations. Association of American Railroads, *Railroads and Ethanol*, https://www.aar.org/keyissues/Documents/Background-Papers/Railroad-Ethanol.pdf (April 2013).

[28] National Transportation Safety Board, *Railroad Accident Report - Derailment of CN Freight Train U70691-18 With Subsequent Hazardous Materials Release and Fire*, http://www.ntsb.gov/doclib/reports/2012/RAR1201.pdf (February 2012)

that special consideration is necessary for the transportation of ethanol and crude oil in DOT Specification 111 tank cars, especially in HHFTs.

In addition, PHMSA and FRA reviewed the regulatory history pertaining to flammable liquids transported in tank cars. Prior to 1990, the distinction between authorized packaging, for flammable liquids in particular, was described in far more detail in § 173.119. Section 173.119 indicated that the packaging requirements for flammable liquids are based on a combination of flash point, boiling point, and vapor pressure. The regulations provided a point at which a flammable liquid had to be transported in a tank car suitable for compressed gases, commonly referred to as a "pressure car" (e.g., DOT Specifications 105, 112, 114 tank cars).

On December 21, 1990, the Research and Special Programs Administration (RSPA), PHMSA's predecessor agency, published a final rule (Docket HM-181; 55 FR 52402), that comprehensively revised the HMR with regard to hazard communication, classification, and packaging requirements based on the United Nations (UN) Recommendations on the Transport of Dangerous Goods (UN Recommendations). Under Docket HM-181, RSPA aimed to simplify and streamline the HMR by aligning with international standards and implementing performance-oriented packaging standards. As previously stated, § 173.119 specified that the packaging requirements for flammable liquids are based on a combination of flash point, boiling point, and vapor pressure. Section 173.119(f) specified that flammable liquids with a vapor pressure more than 27 pounds per square inch absolute (psia) but less than 40 psia at 100°F (at 40 psia, the material met the definition of a compressed gas), were only authorized for transportation in certain pressure cars. The older regulations recognized that flammable liquids exhibiting high vapor pressures, such as those liquids with dissolved gases, posed significant risks and required a more robust packaging.

The packaging authorizations are currently indicated in the HMT and part 173, subpart F. DOT Specification 111 tank cars are authorized for low, medium and high-hazard liquids and solids (equivalent to Packing Groups III, II, I, respectively). Packing groups are designed to assign a degree of danger presented within a particular hazard class. Packing Group I poses the highest danger ("great danger") and Packing Group III the lowest ("minor danger").[29] In addition, the general packaging requirements prescribed in § 173.24 provide additional consideration for selecting the most appropriate packaging from the list of authorized packaging identified in column (8) of the HMT.

In 2011, the AAR issued Casualty Prevention Circular (CPC) 1232, which outlines industry requirements for certain DOT Specification 111 tanks ordered after October 1, 2011, intended for use in ethanol and crude oil service (construction approved by FRA on January 25, 2011 – see the Background below for information regarding a detailed description of PHMSA and FRA actions to allow construction under CPC-1232). Key tank car requirements contained in CPC-1232 include the following:

- PG I and II material tank cars to be constructed to AAR Standard 286; AAR Manual of Standards and Recommended Practices, Section C, Car Construction Fundamentals and Details, Standard S-286, Free/Unrestricted Interchange for 286,000 lb. Gross Rail Load (GRL) Cars (AAR Standard 286);
- Head and shell thickness must be 1/2 inch for TC-128B non jacketed cars and 7/16 inch for jacketed cars;
- Shells of non-jacketed tank cars constructed of A5l6-70 must be 9/16 inch thick;

[29] Packing groups, in addition in indicating risk of the material, can trigger levels of varying requirements. For example packing groups can indicate differing levels of testing requirements for a non-bulk packaging such or the need for additional operational requirements such as security planning requirements.

- Shells of jacketed tank cars constructed of A5l6-70 must be 1/2 inch thick;
- New cars must be equipped with at least 1/2 inch half-head shields;
- Heads and the shells must be constructed of normalized steel;
- Top fittings must be protected by a protective structure as tall as the tallest fitting; and
- A reclosing pressure relief valve must be installed.

The CPC-1232 requirements are intended to improve the crashworthiness of the tank cars and include a thicker shell, head protection, top fittings protection, and relief valves with a greater flow capacity.

C. Track Integrity and the Safety of Freight Railroad Operations

Train accidents are often the culmination of a sequence of events that are influenced by a variety of factors and conditions. Broken rails or welds, track geometry, and human factors such as improper use of switches are leading causes of derailments. For example, one study found that broken rails or welds resulted in approximately 670 derailments between 2001 and 2010, which far exceed the average of 89 derailments for all other causes. [30] Rail defects have caused major accidents involving HHFTs, including accidents New Brighton, PA and Arcadia, OH.

PHMSA and FRA have a shared responsibility for regulating the transportation of hazardous materials by rail and take a system-wide, comprehensive approach to the risks posed by the bulk transport of hazardous materials by rail. This approach includes both preventative and mitigating measures. In this rulemaking PHMSA is proposing amendments to directly address the safe transportation of HHFTs. The focus of this NPRM is on mitigating the damages of train accidents, but the speed restriction, braking system and routing provisions could also prevent train accidents. This NPRM does not directly address regulations governing the

[30] See "Analysis of Causes of Major Train Derailment and Their Effect on Accident Rates" http://ict.illinois.edu/railroad/CEE/pdf/Journal%20Papers/2012/Liu%20et%20al%202012.pdf.

inspection and maintenance of track. PHMSA and FRA find that existing regulations and on-going rulemaking efforts—together with this NPRM's proposals for speed, braking, and routing—sufficiently address safety issues involving rail defects and human factors. Specifically, the expansion of routing analysis to include HHFTs would require consideration of the 27 safety and security factors (See table 10). These factors include track type, class, and maintenance schedule (which would address rail defects) as well as training and skill level of crews (which would address human factors).

Pursuant to its statutory authority, FRA promulgates railroad safety regulations (49 CFR subtitle B, chapter II (parts 200-299)) and orders, enforces those regulations and orders as well as the HMR and the Federal railroad safety laws, and conducts a comprehensive railroad safety program. FRA's regulations promulgated for the safety of railroad operations involving the movement of freight address: (1) railroad track; (2) signal and train control systems; (3) operating practices; (4) railroad communications; (5) rolling stock; (6) rear-end marking devices; (7) safety glazing; (8) railroad accident/incident reporting; (9) locational requirements for the dispatch of U.S. rail operations; (10) safety integration plans governing railroad consolidations, mergers, and acquisitions of control; (11) alcohol and drug testing; (12) locomotive engineer and conductor certification; (13) workplace safety; (14) highway-rail grade crossing safety; and other subjects.

The FRA has many initiatives underway to address freight rail safety. Key regulatory actions are outlined below:

- Risk Reduction Program (2130-AC11)–FRA is developing an NPRM that will consider appropriate contents for Risk Reduction Programs by Class I freight railroads and how they should be implemented and reviewed by FRA. A Risk Reduction Program is a

structured program with proactive processes and procedures developed and implemented by a railroad to identify hazards and to mitigate, if not eliminate, the risks associated with those hazards on its system. A Risk Reduction Program encourages a railroad and its employees to work together to proactively identify hazards and to jointly determine what action to take to mitigate or eliminate the associated risks. The ANPRM was published on December 8, 2010, and the comment period ended on February 7, 2011.

- Track Safety Standards: Improving Rail Integrity (2130-AC28)–FRA published this rule on January 24, 2014 (79 FR 4234). FRA's final rule prescribes specific requirements for effective rail inspection frequencies, rail flaw remedial actions, minimum operator qualifications, and requirements for rail inspection records. The bulk of this regulation codified the industry's current good practices. In addition, it removes the regulatory requirements concerning joint bar fracture reporting. Section 403(c) of the Rail Safety Improvement Act of 2008 (RSIA) (Pub. L. 110–432, 122 Stat. 4848 (October 16, 2008)) (49 U.S.C. 20142 note)) mandated that FRA review its existing regulations to determine if regulatory amendments should be developed that would revise, for example, rail inspection frequencies and methods and rail defect remedial actions and consider rail inspection processes and technologies. The final rule became effective on March 25, 2014. PHMSA and FRA seek public comment on the extent to which additional changes to track integrity regulations are justified for HHFT routes. When commenting, please include a specific proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.
- Positive Train Control (PTC) (multiple rulemakings)–PTC is a processor-based/communication-based train control system designed to prevent train accidents.

The RSIA mandates that PTC be implemented across a significant portion of the Nation's rail system by December 31, 2015. See 49 U.S.C. 20157. PTC may be voluntarily developed and implemented by a railroad following the requirements of 49 CFR Part 236, Subpart H, Standards for Processor-Based Signal and Train Control Systems; or, may be, as mandated by the RSIA, developed and implemented by a railroad following the requirements of 49 CFR Part 236, Subpart I, Positive Train Control Systems. With limited exceptions and exclusions, PTC is required to be installed and implemented on Class I railroad main lines (i.e., lines with over 5 million gross tons annually) over which any poisonous- or toxic-by-inhalation (PIH/TIH) hazardous materials are transported; and, on any railroad's main lines over which regularly scheduled passenger intercity or commuter operations are conducted. It is currently estimated this will equate to approximately 70,000 miles of track and will involve approximately 20,000 locomotives. PTC technology is capable of automatically controlling train speeds and movements should a train operator fail to take appropriate action for the conditions at hand. For example, PTC can force a train to a stop before it passes a signal displaying a stop indication, or before diverging on a switch improperly lined, thereby averting a potential collision. PTC systems required to comply with the requirements of Subpart I must reliably and functionally prevent:

- Train-to-train collisions;
- Overspeed derailments;
- Incursion into an established work zone; and
- Movement through a main line switch in the improper position.

D. Oil Spill Response Plans

PHMSA's regulations (49 CFR Part 130) prescribe prevention, containment and response planning requirements of the Department of Transportation applicable to transportation of oil[31] by motor vehicles and rolling stock. The purpose of a response plan is to ensure that personnel are trained and available and equipment is in place to respond to an oil spill, and that procedures are established before a spill occurs, so that required notifications and appropriate response actions will follow quickly when there is a spill. We believe that most, if not all, of the rail community transporting oil, including crude oil transported as a hazardous material, is subject to the basic response plan requirement of 49 CFR 130.31(a) based on the understanding that most, if not all, rail tank cars being used to transport crude oil have a capacity greater than 3,500 gallons. However, a comprehensive response plan for shipment of oil is only required when the oil is in a quantity greater than 42,000 gallons per package. Tank cars of this size are not used to transport oil. As a result, the railroads do not file a comprehensive oil response plan. A comparison of a basic and comprehensive plan can be seen below in Table 9. The shaded rows of the table indicate requirements that are not part of the basic plan but would be included in the comprehensive plan.

Table 9: Comparison of Basic and Comprehensive Spill Plans by Requirement

Category	Requirement	Type of Plan	
		Basic	Comprehensive
Preparation	Sets forth the manner of response to a discharge.	Yes	Yes
Preparation	Accounts for the maximum potential discharge of the packaging.	Yes	Yes
Personnel / Equipment	Identifies private personnel and equipment available for response.	Yes	Yes
Personnel / Coordination	Identifies appropriate persons and agencies (including telephone numbers) to be contacted, including the NRC.	Yes	Yes
Documentation	Is kept on file at the principal place of business and at the dispatcher's office.	Yes	Yes
Coordination	Reflects the requirements of the National Contingency	No	Yes

[31] For purposes of 49 CFR Part 130, *oil* means oil of any kind or in any form, including, but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with the wastes other than dredged spoil. 49 CFR 130.5. This includes non-petroleum oil such as animal fat, vegetable oil, or other non-petroleum oil.

	Plan (40 CFR Part 300) and Area Contingency Plans.		
Personnel / Coordination	Identified the qualified individual with full authority to implement removal actions, and requires immediate communications between the individual and the appropriate Federal official and the persons providing spill response personnel and equipment.	No	Yes
Personnel / Equipment / Coordination	Identifies and ensures by contract or other means the availability of private personnel, and the equipment necessary to remove, to the maximum extent practicable, a worst-case discharge (including that resulting from fire or explosion) and to mitigate or prevent a substantial threat of such a discharge.	No	Yes
Training	Describes the training, equipment, testing, periodic unannounced drills, and response actions of personnel, to be carried out under the plan to ensure safety and to mitigate or prevent discharge or the substantial threat of such a discharge.	No	Yes
Documentation	Is submitted (and resubmitted in the event of a significant change), to the Administrator of FRA.	No	Yes

E. Rail Routing

For some time, there has been considerable public and Congressional interest in the safe and secure rail routing of security-sensitive hazardous materials (such as chlorine and anhydrous ammonia). The Implementing Recommendations of the 9/11 Commission Act of 2007 directed the Secretary, in consultation with the Secretary of Homeland Security, to publish a rule governing the rail routing of security-sensitive hazardous materials. On December 21, 2006, PHMSA, in coordination with FRA and the Transportation Security Administration (TSA) of the U.S. Department of Homeland Security (DHS), published an NPRM under Docket HM-232E (71 FR 76834), which proposed to revise the current requirements in the HMR applicable to the safe and secure transportation of hazardous materials by rail. Specifically, we proposed to require rail carriers to compile annual data on specified shipments of hazardous materials, use the data to analyze safety and security risks along rail routes where those materials are transported, assess alternative routing options, and make routing decisions based on those assessments.

In that NPRM, we solicited comments on whether the proposed requirements should also

apply to flammable gases, flammable liquids, or other materials that could be weaponized, as well as hazardous materials that could cause serious environmental damage if released into rivers or lakes. Commenters who addressed this issue indicated that rail shipments of Division 1.1, 1.2, and 1.3 explosives; PIH materials; and highway-route controlled quantities of radioactive materials pose significant rail safety and security risks warranting the enhanced security measures proposed in the NPRM and adopted in a November 26, 2008 final rule (73 FR 20752). Commenters generally did not support enhanced security measures for a broader list of materials than were proposed in the NPRM.

The City of Las Vegas, Nevada, did support expanding the list of materials for which enhanced security measures are required to include flammable liquids; flammable gases; certain oxidizers; certain organic peroxides; and 5,000 pounds or greater of pyrophoric materials. While DOT and DHS agreed that these materials pose certain safety and security risks in rail transportation, the risks were not as great as those posed by the explosive, PIH, and radioactive materials specified in the NPRM, and PHMSA was not persuaded that they warranted the additional safety and security measures. PHMSA did note, however, that DOT, in consultation with DHS, would continue to evaluate the transportation safety and security risks posed by all types of hazardous materials and the effectiveness of our regulations in addressing those risks and would consider revising specific requirements as necessary.

The 2008 final rule requires rail carriers to select a practicable route posing the least overall safety and security risk to transport security-sensitive hazardous materials (73 FR 72182). The final rule implemented regulations requiring rail carriers to compile annual data on certain shipments of explosive, toxic by inhalation, and radioactive materials; use the data to analyze safety and security risks along rail routes where those materials are transported; assess

alternative routing options; and make routing decisions based on those assessments. In accordance with § 172.820(e), the carrier must select the route posing the least overall safety and security risk. The carrier must retain in writing all route review and selection decision documentation. Additionally, the rail carrier must identify a point of contact on routing issues involving the movement of covered materials and provide the contact information to the following:

1. State and/or regional Fusion Centers that have been established to coordinate with state, local, and tribal officials on security issues and which are located within the area encompassed by the rail carrier's rail system;[32] and
2. State, local, and tribal officials in jurisdictions that may be affected by a rail carrier's routing decisions and who have contacted the carrier regarding routing decisions.

Rail carriers must assess available routes using, at a minimum, the 27 factors listed in Appendix D to Part 172 of the HMR to determine the safest, most secure routes for security-sensitive hazardous materials.

Table 10: Factors to be considered in the performance of this safety and security risk analysis		
Volume of hazardous material transported	Rail traffic density	Trip length for route
Presence and characteristics of railroad facilities	Track type, class, and maintenance schedule	Track grade and curvature
Presence or absence of signals and train control systems along the route ("dark" versus signaled territory)	Presence or absence of wayside hazard detectors	Number and types of grade crossings
Single versus double track territory	Frequency and location of track turnouts	Proximity to iconic targets
Environmentally sensitive or significant areas	Population density along the route	Venues along the route (stations, events, places of congregation)
Emergency response capability along the route	Areas of high consequence along the route, including high consequence targets	Presence of passenger traffic along route (shared track)

[32] http://www.dhs.gov/fusion-center-locations-and-contact-information

Speed of train operations	Proximity to en-route storage or repair facilities	Known threats, including any threat scenarios provided by the DHS or the DOT for carrier use in the development of the route assessment
Measures in place to address apparent safety and security risks	Availability of practicable alternative routes	Past accidents
Overall times in transit	Training and skill level of crews	Impact on rail network traffic and congestion

These factors address safety and security issues, such as the condition of the track and supporting infrastructure; the presence or absence of signals; past incidents; population density along the route; environmentally-sensitive or significant areas; venues along the route (stations, events, places of congregation); emergency response capability along the route; measures and countermeasures already in place to address apparent safety and security risks; and proximity to iconic targets. The HMR require carriers to make conscientious efforts to develop logical and defendable systems using these factors.

FRA enforces the routing requirements in the HMR and is authorized, after consulting with PHMSA, TSA, and the Surface Transportation Board, to require a railroad to use an alternative route other than the route selected by the railroad if it is determined that the railroad's route selection documentation and underlying analysis are deficient and fail to establish that the route chosen poses the least overall safety and security risk based on the information available (49 CFR 209.501).

On January 23, 2014, in response to its investigation of the Lac-Mégantic accident, the NTSB issued three recommendations to both PHMSA and FRA. Recommendation R-14-4 requested PHMSA work with FRA to expand hazardous materials route planning and selection requirements for railroads to include key trains transporting flammable liquids as defined by the AAR Circular No. OT-55-N and, where technically feasible, require rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas.

III. Recent Actions Addressing HHFT Risk

PHMSA and FRA have used a variety of regulatory and non-regulatory methods to address the risks of the bulk transport of flammable liquids, including crude oil and ethanol, by rail in HHFTs. These efforts include issuing guidance, conducting rulemakings, participating in rail safety committees, holding public meetings with the regulated community, enhancing enforcement efforts, and reaching out to the public. All of these efforts are consistent with our system-wide approach. We are confident these actions provide valuable information and guidance to the regulated community and enhance public safety. In the following, we discuss in detail these efforts and the NTSB recommendations related to HHFTs.

A. Regulatory Actions

On May 14, 2010, PHMSA published a final rule under Docket HM-233A (75 FR 27205) that amended the HMR by incorporating provisions contained in certain widely used or longstanding special permits having an established safety record. As part of this rulemaking, PHMSA authorized certain rail tank cars, transporting hazardous materials, to exceed the gross weight on rail limitation of 263,000 pounds (263,000 lb. GRL) upon approval of FRA.

On January 25, 2011, FRA published a Federal Register notice of FRA's approval (76 FR 4250) pursuant to PHMSA's May 14, 2010 final rule. The notice established detailed conditions for the manufacturing and operation of certain tank cars in hazardous materials service, including the DOT-111, that weigh between 263,000 and 286,000 pounds. Taken as a whole, the PHMSA rulemaking and the FRA notice serves as the mechanism for tank car manufacturers to build a 286,000-pound tank car. As such, rail car manufacturers currently have the authority to manufacture the enhanced DOT Specification 111 tank car (e.g., CPC-1232 tank car outlined in "II. Overview of Current Regulations Relevant to this Proposal") under the conditions outlined,

in the January 25, 2011 notice.

The notice grants a blanket approval for tank cars to carry up to 286,000 lb. GRL, when carrying non-PIH materials, subject to certain requirements. FRA divided these additional requirements into the following three categories:

1. Existing tank cars that were authorized under a PHMSA special permit for greater than 263,000 lb. GRL, FRA's approval requires the following:
    a. Compliance with various terms of the existing special permits;
    b. Tank cars constructed, rebuilt, or modified to meet AAR Standard S-259[33] must be operated only in controlled interchange;
    c. Tank cars constructed, rebuilt, or modified to meet AAR Standard S-286 may operate in unrestricted interchange; and
    d. Tank car owners must determine which standard applies, ensure tank cars are marked appropriately, and maintain and file associated records.
2. Tank cars that have been built, rebuilt, or otherwise modified pursuant to AAR Standards S-259 or S-286 for greater than 263,000 pounds gross weight on rail, but are not authorized under a PHMSA special permit, FRA's approval requires the following:
    a. Tank cars constructed, rebuilt, or modified to meet AAR Standard S-259 must be operated only in controlled interchange;
    b. Tank cars constructed, rebuilt, or modified to meet AAR Standard S-286 may operate in unrestricted interchange;
    c. Tank cars must satisfy design specifications listed in the notice, including

[33] Both S-259 and S-286 are mechanical (underframes, trucks, wheels, axles, brake system, draft system, a car body fatigue) design requirements for operation of tank cars at a gross rail load of 286,000 pounds. S-259 preceded S-286.

materials of construction, thickness, and jacketing; and

d. Tank car owners must determine which standard and additional specification requirements apply, ensure tank cars are marked appropriately, and maintain and file associated records.

3. New tank cars, manufactured after the notice was published, to carry more than 263,000 pounds gross weight on rail, FRA's approval requires the following:

   a. Tank cars must be constructed in accordance with AAR Standard S-286; and

   b. Tank cars must satisfy design specifications listed in the notice, including puncture resistance and service equipment.

Any manufacturer choosing to design a car that does not meet the conditions of FRA's 2011 approval must request a new approval from FRA in accordance with § 179.13 of the HMR.

Following the publication of the PHMSA rule and the subsequent FRA approval notice, PHMSA received a petition for rulemaking (P-1577) from the AAR on March 9, 2011, requesting changes to PHMSA's specifications for tank cars (namely the DOT Specification 111 tank car) used to transport PG I and II materials. DOT recognized the improvements of the P-1577 tank car relative to the DOT Specification 111 tank car, but challenged the industry to consider additional improvements in puncture resistance, thermal protection, top fitting protection, bottom outlet protection, and braking, as well as railroad operations. As a result, the AAR Tank Car Committee (TCC) constituted the T87.6 Task Force. The task force was charged with (1) reevaluating the standards in P-1577 and considering additional design enhancements for tank cars used to transport crude oil, ethanol and ethanol/gasoline mixtures as well as (2) considering operating requirements to reduce the risk of train accidents involving tank cars carrying crude oil classified as PG I and II, and ethanol.

FRA chaired this task force and expected the activity would lead to a more comprehensive approach than requested by P-1577. The task force promised to address the root cause, severity, and consequences of train accidents, and its recommendations were finalized on March 1, 2012. The T87.6 Task Force recommended requirements for a pressure relief device with a start of discharge setting of 75 psig, and a minimum flow capacity of 27,000 SCFM.

The task force did not address many of the recommendations provided by FRA, including the following:

Tank car design and use:

- Thermal protection to address breaches attributable to exposure to fire conditions;
- Roll-over protection to prevent damage to top and bottom fittings and limit stresses transferred from the protection device to the tank shell;
- Hinged and bolted manways to address a common cause of leakage during accidents and Non-Accident Releases (NARs);
- Bottom outlet valve elimination; and
- Increasing outage from 1 percent to 2 percent to improve puncture resistance.

Rail Carrier Operations:

- Rail integrity (e.g., broken rails or welds, misaligned track, obstructions, track geometry, etc.) to reduce the number and severity of train accidents;
- Alternative brake signal propagation systems ECP, DP, and two-way EOT device to reduce the number of cars and energy associated with train accidents;
- Speed restrictions for key trains containing 20 or more loaded tank cars (on August 5, 2013, AAR issued Circular No. OT-55-N addressing this issue); and
- Emergency response to mitigate the risks faced by response and salvage personnel, the

impact on the environment, and delays to traffic on the line.

After considering the disparity between the various stakeholders and the lack of actionable items by the task force, PHMSA and FRA initiated the development of an ANPRM to consider revisions to the HMR by improving the crashworthiness of railroad tank cars and improve operations. The ANPRM would respond to petitions for rulemaking submitted by industry and safety recommendations issued by the NTSB. Between April 2012 and October 2012, PHMSA received an additional three petitions (P-1587, P-1595 and P-1612) and one modification of a petition (P-1612) on rail safety issues. The additional petitions were submitted by concerned communities and various industry associations requesting further modification to the tank car standards.

On September 6, 2013, PHMSA published the ANPRM (78 FR 54849) seeking public comments on whether issues raised in eight petitions[34] and four NTSB Safety Recommendations would enhance safety, revise, and clarify the HMR with regard to rail transport. Specifically, we requested comments on important amendments that would do the following: (1) enhance the standards for DOT Specification 111 tank cars used to transport PG I and II flammable liquids; (2) explore the feasibility of additional operational requirements to enhance the safe transportation of Packing Group I and II flammable liquids; (3) afford FRA greater discretion to authorize the movement of non-conforming tank cars; (4) correct regulations that allow an unsafe condition associated with pressure relief valves (PRV) on rail cars transporting carbon dioxide, refrigerated liquid; (5) revise outdated regulations applicable to the repair and maintenance of DOT Specification 110, DOT Specification 106, and ICC 27 tank car tanks (ton tanks); and (6) except rupture discs from removal if the inspection itself would damage, change,

[34] In addition to the four tank car related petitions, PHMSA also received four additional petitions relating to rail operational requirements which were contained in the September 2013 ANPRM.

or alter the intended operation of the device.

On November 5, 2013, PHMSA published a 30-day extension of the comment period for the ANPRM (78 FR 66326). We received a request to extend the comment period to 90 days from the Sierra Club on behalf of Climate Parents, Columbia Riverkeeper, ForestEthics, Friends of Earth, Natural Resources Defense Council, Oil Change International, San Francisco Baykeeper, Spokane Riverkeeper, Washington Environmental Council, and the Waterkeeper Alliance. The request indicated that the primary basis for extension was to allow the public a meaningful review of these proposed changes in rail safety requirements, especially regarding tank cars transporting crude oil and tar sands, while highlighting several recent tank car train accidents. The request also indicated that the government shutdown in October 2013 prevented communication with DOT staff for review of the technical proposals during the initial 60-day comment period. Although PHMSA normally considers an initial 60-day comment period sufficient time to review and respond to rulemaking proposals, due to PHMSA's desire to collect meaningful input from a number of potentially affected stakeholders, PHMSA extended the comment period by 30 days.

Comments submitted in response to the ANPRM indicate that public interest in the issues raised by the ANPRM is significant. PHMSA received over 100 individual submissions of comments, including the signatures of over 152,000 stakeholders, expressing views regarding tank car and operational standards for flammable liquids. The comments were from local communities, cities, and towns; rail carriers; offerors; suppliers of equipment; tank car manufacturers; environmental groups; NTSB; and the U.S. Congress. PHMSA reviewed the public comments and used the information gathered to aid in the development of this proposed rule.

B. Emergency Orders and Non-Regulatory Actions

In addition to the rulemaking activity described above, FRA took action, in the form of an emergency order, following the Lac-Mégantic derailment. On August 7, 2013, FRA published EO 28 (78 FR 48218) to address safety issues related to securement of certain hazardous materials trains; specifically, trains with—

(1) Five or more tank carloads of any one or any combination of materials poisonous by inhalation as defined in Title 49 CFR 171.8, and including anhydrous ammonia (UN1005) and ammonia solutions (UN3318); or

(2) 20 rail carloads or intermodal portable tank loads of any one or any combination of materials listed in (1) above, or, any Division 2.1 flammable gas, Class 3 flammable liquid or combustible liquid, Class 1.1 or 1.2 explosive,[35] or hazardous substance listed in 49 CFR 173.31(f)(2).

EO 28 prohibits railroads from leaving trains or vehicles transporting the specified quantities of the specified types of hazardous materials unattended on mainline track or siding outside of a yard or terminal unless the railroad adopts and complies with a plan that provides sufficient justification for leaving them unattended under specific circumstances and locations. The order also requires railroads to develop specific processes for securing, communicating, and documenting the securement of unattended trains and vehicles subject to the Order, including locking the controlling locomotive cab door or removing the reverser and setting a sufficient number of hand brakes before leaving the equipment unattended. In addition, the order requires railroads to review, verify, and adjust as necessary existing requirements and instructions related to the number of hand brakes to be set on unattended trains; conduct train securement job

[35] Should have read "Division" instead of "Class."

briefings among crewmembers and employees; and develop procedures to ensure qualified employees inspect equipment for proper securement after emergency response actions that involve the equipment.

The quantities of specific hazardous materials addressed in EO 28 were further addressed under the AAR Circular No. OT-55-N, Recommended Railroad Operating Practices for Transportation of Hazardous Materials, effective August 5, 2013.[36] AAR Circular No. OT-55-N supersedes AAR Circular No. OT-55-M, issued October 1, 2012. In OT-55-N, AAR revised the definition of "key train" in two specific areas.

(1) The definition of "key train" was revised from "five tank carloads of Poison or Toxic Inhalation Hazard (PIH or TIH) (Hazard Zone A, B, C, or D), anhydrous ammonia (UN1005), or ammonia solutions (UN3318)" to one tank carload.

(2) The "key train" definition was amended by adding "20 carloads or portable tank loads of any combination of hazardous material."

Any train that meets the "key train" definition is limited to a 50-mph speed restriction under AAR Circular No. OT-55-N. In addition, any route defined by a railroad as a key route shall meet certain standards described in OT-55-N, including the following:

- Wayside defective wheel bearing detectors at a maximum of 40 miles apart, or an equivalent level of protection;
- Main track on key routes should be inspected by rail defect detection and track geometry inspection cars or by any equivalent level of inspection at least twice each year;
- Sidings on key routes should be inspected at least once a year, and main track and sidings

[36] The document is available in the public docket for this proceeding and at the following URL: http://www.aar.com/CPC-1258%20OT-55-N%208-5-13.pdf

should have periodic track inspections to identify cracks or breaks in joint bars; and

- Track used for meeting and passing key trains should be FRA Class 2 track or higher.

As previously discussed, EO 28 prohibits railroads from leaving trains or vehicles transporting the specified hazardous materials unattended on mainline track or siding outside of a yard or terminal unless the railroad adopts and complies with a plan that provides sufficient justification for leaving them unattended under specific circumstances and locations.

EO 28 was supplemented with a PHMSA and FRA joint safety advisory published the same day (78 FR 48224). The joint safety advisory addressed causes of the Lac-Mégantic derailment, provided DOT safety and security recommendations, and announced PHMSA and FRA participation in an Emergency RSAC meeting to address rail safety concerns.

On August 27-28, 2013, PHMSA and FRA held a public meeting to review the requirements in the HMR applicable to rail operations (78 FR 42998). PHMSA and FRA conducted this meeting as part of a comprehensive review of operational factors that impact the safety of the transportation of hazardous materials by rail. This meeting provided the opportunity for public input on a wide range of rail safety requirements including operational rail requirements. PHMSA and FRA reviewed the transcript and public comments, all of which support a comprehensive review of these requirements. Additional information gathered from the public meeting, particularly regarding the modernization of Part 174 of the HMR, will be addressed in a future rulemaking.

On August 29, 2013, FRA convened an emergency meeting to initiate a series of RSAC working groups to discuss and work through specific tasks resulting from the Lac-Mégantic derailment. RSAC members discussed the formulation of task statements regarding appropriate train crew size, hazard classes, and quantities of hazardous materials that should trigger

additional operating procedures, including attendance and securement requirements. On April 9, 2014 RSAC approved by a majority vote the Hazardous Materials Working Group's consensus recommendations.[37] Table 11 provides the RSAC recommendations

Table 11: RSAC Consensus Recommendations from the Hazardous Materials Issues Working Group	
Subject	**Recommendation**
Definition of residue	Propose to amend the definition of Residue as follows: *Residue* means the hazardous material remaining in a packaging, including a tank car, after its contents have been unloaded to the maximum extent practicable and before the packaging is either refilled or cleaned of hazardous material and purged to remove any hazardous vapors. The extent practicable means an unloading facility has unloaded a bulk package using properly functioning service equipment and plant process equipment.
Guidance document language for securement of tank cars on private track.	Proposed wording for a recommended practice document. Securement and security of loaded hazardous materials cars on private track: "It has come to FRA's attention that cuts of loaded hazardous materials cars are being stored on track that is exclusively leased, and meets the definition of private track, but that may not be adjacent to a shipper or consignee facility. These stored cars are of great concern to the general public living in nearby communities. The cars are being stored in other locations simply for available space reasons – there isn't available storage space closer to a consignee facility. If the cars are stored on track that meets the definition of "private track" they are considered to be no longer in transportation, and the hazardous materials regulations do not apply. Nonetheless, FRA strongly recommends the following as best practices that may enhance the safety and security of stored hazardous materials cars." "FRA recommends that companies (party in control of private track as defined in §171.8) review the private track locations where cuts of hazardous materials cars (20 or more cars) are regularly stored to determine the following:

[37] https://rsac.fra.dot.gov/meetings/Railroad%20Safety%20Advisory%20Committee%20Hazardous%20Materials%20Issues%20Recommendation%20VOTE.pdf

	1. Whether additional attendance, monitoring, or other security measures may be appropriate; 2. Whether an adequate and appropriate number of handbrakes are set on the cuts of cars that will ensure that there is no unintended movement of the cars; 3. Whether all of the hazard communication information (placards, emergency response information) be maintained as they would if the cars were in transportation, and that this information may be available to emergency responders if requested."
PHMSA re-engage their regulatory authority over certain aspects of loading, unloading and storage of tank cars containing hazardous materials.	In 2003, the Research and Special Programs Administration (RSPA), the predecessor agency to PHMSA, clarified its regulatory jurisdiction over the loading, unloading, and storage of hazardous materials. 68 Fed. Reg. 61906 (October 30, 2003). The intent was to clarify where transportation began and ended, and thus, where PHMSA jurisdiction began and ended. In the rail mode, certain aspects of the storage, loading, and unloading of hazardous materials to and from rail tank cars were no longer regulated, and those requirements were removed from the CFR. The thought was that the loading, unloading, and storage were more appropriately workplace issues better addressed by an agency such as OSHA. PHMSA continued to regulate certain "pre-transportation functions" that it believed were clearly tied to transportation safety, such as the securement of closures on rail tank cars after loading but before offering the package to a carrier. This proposal is not intended to change the current regulation of OSHA over workplace safety issues related to loading, unloading, and storage of railroad tank cars. As certain industries that ship hazardous materials by rail have evolved, and as some loading, unloading, storage, and transportation practices have changed, DOT believes it may be appropriate to re-engage on these subjects. DOT believes that there may be aspects of these procedures that directly affect transportation safety, and that it would be appropriate for to regulate them.
Align definition of Appendix A train with "Key Train" from OT-55-N	Appendix A to Emergency Order 28 Any train transporting: 1. one or more tank car loads of materials poisonous by inhalation as defined in 49 CFR 171.8, and including

	anhydrous ammonia (UN 1005) and ammonia solutions (UN 3318); or 2. 20 or more rail car loads or intermodal portable tank loads of any material listed in (1) above, or bulk car loads Division 2.1 flammable gases, Class 3 flammable liquids, or hazardous substances listed in 49 CFR 173.31(f)(2); or rail car loads of packages of Division 1.1 or 1.2 explosives.

PHMSA solicits information and comment on any alternate approaches that may be contained in or considered as part of any recommendation from the RSAC to FRA regarding the proposals in this NPRM.

FRA and PHMSA are active participants and observers of the AAR Tank Car Committee. This committee is comprised of the AAR, railroads, tank car owners, manufacturers, and shippers, with active participation from U.S. and Canadian regulators. The AAR Tank Car Committee works together to develop technical standards for how tank cars, including those used to transport hazardous materials, are designed and constructed. PHMSA also participates as a working member in API's Classification and Loading of Crude Oil Standard Development Working Group.

On November 20, 2013, PHMSA and FRA issued a follow-up Joint Safety Advisory to reinforce the importance of proper characterization, classification, and selection of a packing group for Class 3 (flammable liquid) materials, and the corresponding regulations for safety and security planning. The Advisory reinforced the Department's position that we expect rail offerors and rail carriers to revise their safety and security plans required by the HMR, including the required risk assessments, to address the safety and security issues identified in FRA's Emergency Order No. 28 and the August 7, 2013, joint Safety Advisory (78 FR 69745). The Advisory was supplemented with enhanced enforcement operations by FRA to ensure compliance with the applicable requirements.

On January 2, 2014, PHMSA issued a Safety Alert warning of crude oil variability and emphasized proper and sufficient testing to ensure accurate characterization and classification of this hazardous material. Proper characterization and classification of a hazardous material are integral for the HMR to accomplish its safety purpose. Characterization and classification ultimately determine the appropriate and permitted packagings for a given hazardous material. This alert addressed the initial findings of Operation Classification, a compliance initiative involving unannounced inspections and testing of crude oil samples to verify that offerors of the materials have properly classified and described the hazardous materials. The alert expressed PHMSA's concern that unprocessed crude oil may affect the integrity of the packaging or present additional hazards, related to corrosivity, sulfur content, and dissolved gas content. It also noted that preliminary testing, focused on the classification and packing group assignments that have been selected and certified by offerors of crude oil and PHMSA, had found it necessary to expand the scope of their sampling and analyses to measure other factors that would affect the proper characterization and classification of the materials.

PHMSA and FRA launched Operation Classification in August 2013 to verify that crude oil is being properly classified in accordance with Federal regulations. Activities included unannounced inspections, data collection and sampling at strategic terminal and loading locations for crude oil. PHMSA investigators tested samples from various points along the crude oil transportation chain; from cargo tanks that deliver crude oil to rail loading facilities, from storage tanks at the facilities, and from pipelines connecting storage tanks to rail cars that would move the crude across the country. On February 4, 2014, PHMSA announced the first results from Operation Classification, which indicated that some crude oil taken from cargo tanks en route to rail loading facilities was not properly classified. Based on some of the test results, 11

of the 18 samples taken from cargo tanks delivering crude oil to the rail loading facilities were assigned to packing groups that incorrectly indicated a lower risk than what was actually being transported. PHMSA issued three Notices of Probable Violations to the companies involved as a result, proposing civil penalties totaling $93,000. Operation Classification is part of a larger Department-wide effort named Operation Safe Delivery. Operation Safe Delivery is an effort to ensure the safe transportation of crude oil moving by rail using a comprehensive approach, including prevention, mitigation and response.

On January 9, 2014, the Secretary issued a "Call to Action," to actively engage all the stakeholders in the crude oil industry, including CEOs of member companies of the American Petroleum Institute and CEOs of the railroads. In a meeting held on January 16, 2014, the Secretary and the Administrators of PHMSA and FRA requested that offerors and carriers identify prevention and mitigation strategies that can be implemented quickly.

Specifically, the Call to Action discussed issues including proper classification and characterization of hazardous materials, operational controls and track maintenance that could prevent accidents, and tank car integrity improvements that could mitigate the effect of accidents should one occur. The meeting was an open and constructive dialogue on how, collaboratively, industry and government can make America's railways safer.

As a result of this meeting, the rail and crude oil industries agreed to voluntarily consider or implement potential improvements including speed restrictions in high consequence areas, alternative routing, the use of distributive power to improve braking, and improvements in emergency response preparedness and training. On January 22, 2014 the Secretary sent a letter to the attendees recapping the meeting and stressing the importance of this issue.[38]

[38] See Call to Action Follow-up letter

The rail and crude oil industries committed to consider and address several issues and, within 30 days, provide details regarding the specific actions that shippers and carriers will take immediately to improve safety in the transportation of petroleum crude oil. Specifically, the AAR agreed to consider, and provide additional details about, the following:

- The use of existing Federal protocols for routing hazardous materials, such as Toxic-by-Inhalation hazardous materials (TIH), for petroleum crude oil unit train shipments;
- The use of speed restrictions where appropriate on crude oil unit trains traveling through high consequence areas;
- The use of distributed power on unit petroleum crude oil trains; and
- Increasing and improving track, mechanical, and other rail safety inspections.

The API recommended and agreed to consider the following:

- Share expertise and testing information with DOT, notably PHMSA, regarding the characteristics of petroleum crude oil in the Bakken region;
- Work on identifying best practices to ensure that appropriate and comprehensive testing and classification of petroleum crude oil being transported by rail is performed; and
- Collaborate with PHMSA on improving its analysis of petroleum crude oil characteristics.

Both AAR and API agreed to consider the following:

- Improve emergency responder capabilities and training to address petroleum crude oil train accidents; and

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http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/Letter_from_Secretary_Foxx_Follow_up_to_January_16.pdf

- Recommission the AAR's Rail Tank Car Standards Committee to reach consensus on additional changes proposed to the AAR rail tank car standard CPC 1232s, to be considered by DOT, as appropriate, in the rulemaking process.

On January 17, 2014, PHMSA launched a Web page entitled Operation Safe Delivery: Enhancing the Safe Transport of Flammable Liquids.[39] This site describes the Department's efforts to enhance the safe transport of flammable liquids by rail and acts as a valuable resource for shippers and transporters of those materials. The site will be continuously updated to provide progress reports on industry commitments as part of the Call to Action and additional Departmental activities related to the rail safety initiative. The page also displays PHMSA's rail safety action plan. The site has already received considerable traffic, and seems to be an educational resource for the regulated community.

On February 21, 2014, in response to the Secretary's Call to Action:

API committed to the following:

1. To assemble top experts to develop a comprehensive industry standard for testing, characterizing, classifying, and loading and unloading crude oil in rail tank cars. API is moving as quickly as possible with the goal of publishing this standard in six months. Its standards process is open, transparent and accredited by the American National Standards Institute, the same organization that accredits similar programs at several U.S. national laboratories. All stakeholders are invited to participate, including PHMSA.
2. Work with PHMSA, the railroad industry, and emergency responders to enhance emergency response communications and training. API recently joined Transportation Community Awareness and Emergency Response, known as TRANSCAER[R], which is a voluntary national outreach effort that assists communities in preparing for and responding to incidents.
   API continues to work with PHMSA and other representatives from the Department of Transportation to share information and expertise on crude oil characteristics. They have also offered to help PHMSA review the data collected through Operation Classification.

[39] http://www.phmsa.dot.gov/hazmat/osd/calltoaction

3. API continues to work with the railroad industry, railcar manufacturers, and other stakeholders to address tank car design. Their industry has been building next generation tank cars since 2011 that exceed federal standards. These new cars make up nearly 40 percent of the crude oil tank car fleet and will be 60 percent by the end of 2015. They are currently engaged in a holistic and data-driven examination to determine whether additional design changes would measurably improve safety without inadvertently shifting risk to other areas.

AAR and its member railroads committed to the following:

1. By no later than July 1, 2014, railroads will apply any protocols developed by the rail industry to comply with the existing route analysis requirements of 49 C.F.R.§ 172.820(c)- (f) and (i) to the movement of trains transporting 20 or more loaded railroad tank cars containing petroleum crude oil (Key Crude Oil Train).
2. Rail carriers will continue to adhere to a speed restriction of 50 mph for any Key Crude Oil Trains. By no later than July 1, 2014, railroads will adhere to a speed restriction of 40 mph for any Key Crude Oil Train with at least one 'DOT Specification 111' tank car loaded with crude oil or one non-DOT specification tank car loaded with crude oil while that train travels within the limits of any high-threat urban area as defined by 49 C.F.R. § 1580.3. For purposes of AAR's commitments, 'DOT Specification 111' tank cars are those cars that meet DOT Specification 111 standards but do not meet the requirements of CPC-1232 or any new standards adopted by DOT after the date of this letter.
3. By April, 2014, railroads will equip all Key Crude Oil Trains, operating on main track with either distributed power locomotives or an operative two-way telemetry end of train device as defined by 49 C.F.R. § 232.5.
4. Effective March 25,2014, railroads will perform at least one additional internal rail inspection than is required by 49 C.F.R. § 213.237 (c) each calendar year on main line routes it owns or has been assigned responsibility for maintaining under 49 CFR § 213.5 over which Key Crude Oil Trains are operated. Railroads will also conduct at least two track geometry inspections each calendar year on main line routes it owns or is responsible for maintaining under 49 CFR § 213.5 over which Key Crude Oil Trains are operated.
5. By no later than July 1, 2014, railroads will commence installation and will complete such installations as soon as practicable, of wayside defective bearing detectors at least every 40 miles along main line routes it owns or has been assigned responsibility or maintaining under 49 CFR § 213.5 over which Key Crude Oil Trains are operated, unless track configuration or other safety considerations dictate otherwise.

6. AAR and the railroads will create an inventory of emergency response resources along routes over which Key Crude Oil Trains operate for responding to the release of large amounts of petroleum crude oil in the event of an incident. This inventory will include locations for the staging of emergency response equipment and, where appropriate, contacts for the notification of communities. Upon completion of the inventory, the railroads will provide DOT with access to information regarding the inventory and will make relevant information from the inventory available to appropriate emergency responders upon request.
7. Railroads will commit in the aggregate a total of approximately $5 million to develop and provide a hazardous material transportation training curriculum applicable to petroleum crude oil transport for emergency responders and to fund a portion of the cost of this training through the end of 2014. One part of the curriculum will be for local emergency responders in the field; and more comprehensive training will be conducted at the Transportation Technology Center, Inc., (TTCI) training facility in Pueblo, Colorado. AAR will work with emergency responders in developing, by July 1, 2014, the training program that meets the needs of emergency responders.
8. Railroads will continue to work with communities through which Key Crude Oil Trains move to address on a location-specific basis concerns that the communities may raise regarding the transportation of petroleum crude oil through those communities and take such action as the railroads deem appropriate.

<u>The American Short Line and Regional Railroad Association (ASLRRA) offered the following</u>:

1. ASLRRA will recommend to its members that unit trains of crude oil (20 cars or more) operate at a top speed of no more than 25 mph on all routes.
2. ASLRRA will work with its member railroads and the Class I railroads to develop a program of best practices to assure a seamless system of timely and effective emergency response to crude oil spills no matter where on the national rail system an incident may occur
3. ASLRRA will recommend that its member railroads sign master service agreements with qualified environmental cleanup providers to ensure prompt and effective remediation in all areas subjected to unintentional discharge of crude oil. In addition, ASLRRA will work with the AAR and Class I railroads to eliminate any gaps in coordination or response systems when both large and small railroads are involved.
4. ASLRRA will support and encourage the development of new tank car standards including but not limited to adoption of the 9/16 inch tank car wall that will meet the needs of all stakeholders and enhance the safety of the transportation of crude oil by rail.
5. Contingent upon securing a six to twelve month pilot-project grant from the FRA, the ASLRRA plans to expedite the most significant project in its 100 year history to reduce the risks of accidents, incidents, and regulatory

noncompliance in the small railroad industry. If grant funding is provided, ASLRRA will create the Short Line Safety Institute which will:

a. Work jointly with the FRA to develop and implement a pilot safety inspection and evaluation project for short line railroads.
b. Work with the FRA Office of Research and Development Human Factors Division (1) to create an assessment process to evaluate the current safety and compliance attainment levels on small railroads, (2) to contract and train expert qualified inspectors, and (3) to develop training, assessment and reporting document systems.
c. Work with FRA to create benchmarks and objectives to measure the progress and effectiveness of the Short Line Safety Institute safety inspection programs.
d. Begin with a focus on the transportation of crude oil by small railroads and thereafter expand to the transportation of all commodities for Class III railroads.

<u>The Railway Supply Institute Committee on Tank Cars (RSICTC), although not part of the Call to Action plan, committed to the following</u>:

In response to the Secretary's Call to Action, RSICTC states:

> Although RSICTC was not included in the January 16, 2014 meeting, the issue of tank car safety cannot be resolved without input from the owners and manufacturers of the tank cars. The RSICTC members and other AAR task force stakeholders have met repeatedly to review this issue with only limited forward progress. As key stakeholders, RSICTC members have reviewed the follow-up letter, and reached consensus on a set of guiding principles to respond to your request. On February 5, 2014, the RSICTC wrote AAR to provide a written copy of these principles in advance of the first meeting of the reconvened AAR Tank Car Committee Task Force T87.6 ('T87.6 Task Force').

RSICTC continued:

> In order to provide a timely response to your January 22, 2014 follow-up letter, we recommend the reconvened T87.6 Task Force focus on and adopt the following principles, for ultimate submission to the Pipeline and Hazardous Materials Safety Administration ("PHMSA"), which represent the consensus of the tank car manufacturing and leasing industry:
>
> 1. Newly ordered tank cars, ordered after a date certain agreed upon by PHMSA and the industry, to be used to transport crude oil or ethanol must have a jacket, full height head shield and thermal protection.
> 2. Tank cars built to the CPC-1232 standard (both jacketed and non-jacketed) will be allowed to remain in unrestricted service for their full statutory life, with possible modification to those existing tank cars limited to pressure relief valves and bottom outlet valve handles, based on future regulatory requirements or industry standards.

3. Legacy tank cars (non-CPC-1232 compliant) used for Class 3, PG III materials will be allowed to remain in unrestricted service for their full statutory life, with possible modification to those existing tank cars limited to pressure relief valves and bottom outlet valve handles, based on future regulatory requirements or industry standards.
4. Until such a time when standards applicable to legacy tank cars are developed, non-CPC-1232 compliant tank cars may not be newly assigned into crude oil or ethanol service.
5. Modification requirements for legacy tank cars used for Class 3, PG I and II service (including crude oil and ethanol) need to be developed based on the nature of the risks associated with various products.
6. Priority should be placed on modifying legacy tank cars used for crude oil and ethanol. Timelines for modifying legacy tank cars used for other Class 3, PG I and II service should be based on a risk assessment.
7. It is possible that some types of crude oil may require packaging in a DOT tank car class other than a DOT Specification 111 and RSI wishes to participate in that evaluation process.

The voluntary actions taken by industry as a result of the Call to Action are necessary steps to improve safety. In this NPRM we are proposing to adopt and expand on the key voluntary actions taken with regard to speed restrictions, braking, and routing for HHFTs, in addition to, classification verification requirements.

On February 25, 2014, DOT issued an Emergency Restriction/Prohibition Order requiring those who offer crude oil for transportation by rail to ensure that the product is properly tested and classified in accordance with Federal safety regulations, which was superseded by a revised and amended Order on March 6, 2014, clarifying the requirement.[40] The March 6th Amended Emergency Restriction/Prohibition Order requires that all rail shipments of crude oil that is properly classed as a flammable liquid in Packing Group (PG) III material be treated as a PG I or II material, until further notice. The Amended Emergency Order also authorized PG III materials to be described as PG III for the purposes of hazard communication.

[40] See Docket No. DOT-OST-2014-0025. See also http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Amended_Emergency_Order_030614.pdf

On May 7, 2014, DOT published another Emergency Restriction/Prohibition Order requiring all railroads that operate trains containing one million gallons of Bakken crude oil to notify SERCs about the operation of these trains through their States.[41] Specifically, this notification should identify each county, or a particular state or commonwealth's equivalent jurisdiction (e.g., Louisiana parishes, Alaska boroughs, Virginia independent cities), in the state through which the trains will operate. On the same day, FRA and PHMSA issued a safety advisory recommending that offerors and carriers of Bakken crude oil use tank car designs with the highest level of integrity available in their fleets.[42]

C. NTSB Safety Recommendations

As previously discussed, in addition to the efforts of PHMSA and FRA, the NTSB has taken a very active role in addressing the risks posed by the transportation of large quantities of flammable liquids by rail. On January 23, 2014 the NTSB issued to PHMSA Safety Recommendations R-14-4 through R-14-6. These recommendations are derived from the NTSB's participation in the Transportation Safety Board of Canada's (TSB) investigation of the July 6, 2013 Lac-Mégantic derailment. In the letter, NTSB urges PHMSA and FRA to take action to address routing, oil spill response plans, and identification and classification of flammable liquids by rail. In these recommendations, the NTSB recognizes that rail shipments of flammable liquids have sharply increased in recent years as the United States experiences unprecedented growth in oil production. The letter is available for review in the public docket for this rulemaking.

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41 http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_D9E224C13963CAF0AE4F15A8B3C4465BAEAF0100/filename/Final_EO_on_Transport_of_Bakken_Crude_Oi_05_07_2014.pdf

42 http://www.phmsa.dot.gov/pv_obj_cache/pv_obj_id_9084EF057B3D4E74A2DEB5CC86006951BE1D0200/filename/Final_FRA_PHMSA_Safety_Advisory_tank_cars_May_2014.pdf

As noted below, NTSB has issued recommendation R-14-5, for PHMSA to revise spill response planning thresholds contained in Title 49 Code of Federal Regulations Part 130 to require comprehensive response plans to effectively provide for the carriers' ability to respond to worst-case discharges resulting from accidents involving unit trains or blocks of tank cars transporting oil and petroleum products. PHMSA is not addressing this recommendation through this NPRM. However, we are concurrently issuing an Advance Notice of Proposed Rulemaking in PHMSA Docket Number PHMSA-2014-0105 to gather more information on this topic from railroads, first responders, state and local jurisdictions, and all other interested parties.

Previously, on March 2, 2012, the NTSB issued Railroad Accident Report RAR-12-01, available for review in the public docket for this rulemaking. In that report, NTSB determined that one of the probable causes of the June 19, 2009 train accident in Cherry Valley, Illinois, in which several derailed cars released ethanol and caught fire, fatally injuring a passenger in a stopped automobile at the grade crossing where the derailment occurred and seriously injuring two other passengers in the automobile, was the washout of the track structure at the grade crossing and failure to notify the train crew of the known washout. NTSB also determined that inadequate design features of a DOT Specification 111 rail tank car made it susceptible to damage and catastrophic loss of hazardous material during the train accident and, thus, contributed to the severity of the incident. On March 2, 2012, the NTSB issued Safety Recommendations R-12-5 thru R-12-8, which recommended that PHMSA take action to enhance newly manufactured and existing tank cars used for the transportation for ethanol and crude oil in PG I and II. (Safety Recommendation R-12-8 was closed by the NTSB on September 20, 2012).[43] In addition, NTSB reiterated Safety Recommendation R-07-4 and urged PHMSA to

[43] See: http://www.phmsa.dot.gov/staticfiles/PHMSA/DownloadableFiles/Files/NTSB%20Files/R-12-8-Acceptable-

require that railroads immediately provide to emergency responders accurate, real-time information regarding the identity and location of all hazardous materials on a train.

These accidents demonstrate that major loss of life, property damage, and environmental consequences can occur when large volumes of crude oil or other flammable liquids are transported in a HHFT involved in an accident. Table 12 provides a summary of the NTSB Safety Recommendations and identifies the effect of this action on those recommendations:

Table 12: Rail-related NTSB Safety Recommendations

NTSB Recommendation	Summary	Addressed in this Rule?
R-07-4	Recommends that PHMSA, with the assistance of FRA, require that railroads immediately provide to emergency responders accurate, real-time information regarding the identity and location of all hazardous materials on a train.	No
R-12-5	Recommends that PHMSA require all newly-manufactured and existing general service tank cars authorized for transportation of denatured fuel ethanol and crude oil in PGs I and II have enhanced tank head and shell puncture resistance systems and top fittings protection that exceed existing design requirements for DOT Specification 111 tank cars.	Yes
R-12-6	Recommends that PHMSA require all bottom outlet valves used on newly-manufactured and existing non-pressure tank cars are designed to remain closed during accidents in which the valve and operating handle are subjected to impact forces.	Yes
R-12-7	Recommends that PHMSA require all newly-manufactured and existing tank cars authorized for transportation of hazardous materials have center sill or draft sill attachment designs that conform to the revised AAR design requirements adopted as a result of Safety Recommendation R-12-9.	No*
R-12-8	Recommends that PHMSA inform pipeline operators about the circumstances of the accident and advise them of the need to inspect pipeline facilities after notification of accidents occurring in railroad rights-of-way.	Closed**
R-14-1	Recommends that FRA work with PHMSA to expand hazardous materials route planning and selection requirements for railroads under the HMR to include key trains transporting flammable liquids as defined by the Association of American Railroads Circular No. OT-55-N and, where technically feasible, require rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas.	Yes

Response.pdf

R-14-2	Recommends that FRA develop a program to audit response plans for rail carriers of petroleum products to ensure that adequate provisions are in place to respond to and remove a worst-case discharge to the maximum extent practicable and to mitigate or prevent a substantial threat of a worst-case discharge.	No***
R-14-3	Recommends that FRA audit shippers and rail carriers of crude oil to ensure they are using appropriate hazardous materials shipping classifications, have developed transportation safety and security plans, and have made adequate provision for safety and security.	Yes
R-14-4	Recommends that PHMSA work with FRA to expand hazardous materials route planning and selection requirements for railroads under Title 49 Code of Federal Regulations 172.820 to include key trains transporting flammable liquids as defined by the AAR Circular No. OT-55-N and, where technically feasible, require rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas.	Yes
R-14-5	Recommends that PHMSA revise the spill response planning thresholds contained in Title 49 Code of Federal Regulations Part 130 to require comprehensive response plans to effectively provide for the carriers' ability to respond to worst-case discharges resulting from accidents involving unit trains or blocks of tank cars transporting oil and petroleum products.	No***
R-14-6	Recommends that PHMSA require shippers to sufficiently test and document the physical and chemical characteristics of hazardous materials to ensure the proper classification, packaging, and record-keeping of products offered in transportation.	Yes

* Under R-12-9, NTSB recommends that AAR:
Review the design requirements in the AAR Manual of Standards and Recommended Practices C-III, "Specifications for Tank Cars for Attaching Center Sills or Draft Sills," and revise those requirements as needed to ensure that appropriate distances between the welds attaching the draft sill to the reinforcement pads and the welds attaching the reinforcement pads to the tank are maintained in all directions in accidents, including the longitudinal direction. These design requirements have not yet been finalized by the AAR.

** On July 31, 2012, PHMSA published in the Federal Register (77 FR 45417) an advisory bulletin to all pipeline operators alerting them to the circumstances of the Cherry Valley derailment and reminding them of the importance of assuring that pipeline facilities have not been damaged either during a railroad accident or other event occurring in the right-of-way. This recommendation was closed by NTSB on September 20, 2012. This action is accessible at the following URL: http://phmsa.dot.gov/pipeline/regs/ntsb/closed

*** PHMSA in consultation with FRA is concurrently publishing an ANPRM (Docket Number PHMSA-2014-0105) that will address these recommendations.

IV. Comments on the ANPRM

A. Commenter Key. As of June 2014, Table 13 provides a list of comments posted to the docket.

Table 13: Commenter Key	
(017) Allen Maty	(018) Emanuel Guerreiro

(019) Brant Olson	(021) Eugene Matzan/Commercial Wheel System
(022) City of Loves Park	(023) Senator Charles Schumer
(024) Village Board of Iverness, IL	(025) City of Wood Dale, IL
(026) Barrington Township, IL	(027) Village of Mt. Prospect, IL
(028) Carol Stream, IL	(029) Village of Schiller Park, IL
(030) City of Plano, IL	(031) City of Frankfort, IL
(032) Village of Hainesville, IL	(033) City of Crest City Council, IL
(034) Village of Vernon Hills,	(035) Village of Glendale Heights
(036) Village of South Barrington, IL	(037) Volpe National Transportation Systems Center (Volpe), Research and Innovative Technology Administration, DOT
(038) Volpe National Transportation Systems Center (Volpe)	(039) Village of Gilberts, IL
(040) Village of Wadsworth, IL	(041) City of Braidwood, IL
(042) Bartlett Fire Protection District, IL	(043) Rolling Meadows, IL
(044) Compressed Gas Association (CGA): P-1519	(045) City of Warrenville, IL
(046) City of Highland Park, IL	Village of Oswego, IL
(048) Anonymous	(049) Trudy McDaniel
(050) Village of Mokena, IL	(052) Village of North Aurora, IL
(053) Metro West Council of Government, Aurora, IL	(054) Village of Elburn, IL
(055) Village of Hampshire, IL	(056) Village of Wayne, IL
(057) Village of Green Oaks, IL	(058) Village of Western Springs, IL
(059) Village of Hinckley, IL	(060) Village of Diamond, IL
(061) Village of Lake Barrington, IL	(062) Vermont League of Cities and Towns, Montpelier, Vermont
(063) City of Prospect, IL	(064) Fred Millar
(065) Megan Joyce	(066) Christopher Lish
(067) Village of Kaneville, IL	(068) Village of North Barrington, IL
(069) Village of Tower Lakes, IL	(070) Barrington Area Council of Governments (BACOG), Barrington, IL
(072) Rail Users Network (RUN)	(074) Village of Deer Park, IL
(075) Robert Hodge	(076) Skagit Audubon, Mount Vernon, WA
(077) Sheet Metal, Air, Rail, Transportation Union (SMART)	(078) Anonymous
(079) Growth Energy, Washington, DC	(080) Village of Burlington, IL
(081) City of St. Charles, IL	(082) Village of Hoffman Estates, IL
(083) Village of Hawthorn Woods, IL	(084) Village of Hanover Park, IL`
(085) Village of Maple Park, Kane and Dekalb Counties, IL	(086) City of Carbondale, IL
(087) Village of Campton Hills, IL	(089) CREDO Action (CREDO)
(090) Association of American Railroads (AAR) and the American Short Line and Regional Railroad Association (ASLRRA)	(091) James Jackson

(092) Eldon Jacobson	(093) The Regional Answer to Canadian National (TRAC)
(094) Eva Lee	(095) Cuba Township, IL
(096) Village of Chicago Ridge, IL	(098) Railway Supply Institute (RSI)
(099) Solvay USA (Solvay)	(100) U.S. Chemical Safety Board (USCSB)
(101) Sierra Club: 23,200 commenters	(102) Mary Ruth Holder
(103) Michael Bailey	(104) Phyllis Dolph
(105) Nathan Luke	(106) Russell Pesko
(107) Michael Reich	(108) David C. Breidenbach
(109) The Fertilizer Institute (TFI)	(110) Village of Barrington, IL and the TRAC Coalition
(111) David C. Breidenbach	(112) Montana Department of Environmental Quality (MTDEQ)
(113) City of Lake Forest, IL	(114) Maine Municipal Association, Augusta, ME (MMA)
(115) City of Northlake, IL	(116) Village of Minoa, NY
(117) City of Coon Rapids, MN	(118) Village of Grayslake, IL
(119) Eastman Chemical Company (ECC)	(120) City of Fort Collins, CO
(121) CREDO Action (CREDO; replaces 089): 66,064 commenters	(122) Oil Change International (OCI): 8,727 commenters
(123) The Chlorine Institute (CI)	(124) Renewable Fuels Association (RFA)
(125) Village of Berkeley, IL	(126) Watco Companies L.L.C. (Watco)
(127) The National Industrial Transportation League (NITL)	(128) Institute of Makers of Explosives (IME)
(129) Hess Corporation (Hess)	(130) North American Freight Car Association (NAFCA)
(131) New Progressive Alliance (NPA)	(132) The Greenbrier Companies, Inc. (Greenbrier)
(133) The Railway Supply Institute Committee on Tank Cars (RSICTC)	(134) GLNX Corporation (GLNX)
(135.1) Dow Chemical Company (Dow)	(135.2) Dow Chemical Company and Union Pacific Railroad (DCCUPR)
(136) American Chemistry Council (ACC)	(137) Dangerous Goods Advisory Council (DGAC)
(138) Forest Ethics: 1,489 commenters	(139) American Petroleum Institute (API)
(140) National Transportation Safety Board (NTSB)	(141) Petroleum Association of Wyoming (PAW)
(142) Anonymous	(143) Rein Attemann
(144) Natural Resources Defense Council (NRDC)	(145) Lloyd Burton, PHD
(146) City of Madison, WI	(147) City of Northlake, IL
(148) Shell Chemical LP (Shell)	(149) The Accurate Tank Advisor (ATA)
(150) Senator Charles E. Schumer	(151) Call to Action Meeting Documentation
(152) City of Elmhurst, IL	(153) The Sierra Club: 52,615 commenters
(154) Leif Jorgensen	(155) U.S. DOT/PHMSA Meeting Record
(156) Railway Supply Institute Comments	(157) BNSF Meeting Record

(158) Department of Law City of Chicago	(159) City of Chicago Comments
(160) Irv Balto Comments	(161) Irv Balto Comments
(162) EO 12866 Meeting w/API 05.19.14	(163) Meeting w/ American Chemistry Council 05.12.14
(164) Meeting w/ Growth Energy and RFA 05.12.14	(165) Meeting w/ North Dakota Petroleum Council 05.12.14
(166) Meeting w/ Quantum Energy 05.21.14	(176) Meeting w/ Statoil 05.12.14

B. Summary of Comments Relevant to the Proposed Amendments in this NPRM

In response to the September 6, 2013 ANPRM, PHMSA received 113 comments representing over 152,000 signatories related to the eight petitions for rulemaking and four NTSB recommendations referenced in the ANPRM and applicable to the transportation of hazardous materials in commerce. PHMSA solicited public comment on whether the potential amendments would enhance safety and clarify the HMR with regard to rail transport. Specifically, these potential amendments, if adopted, would do the following: (1) relax regulatory requirements to afford FRA greater discretion to authorize the movement of non-conforming tank cars; (2) impose additional requirements that would correct an unsafe condition associated with pressure relief valves (PRV) on rail cars transporting carbon dioxide, refrigerated liquid; (3) relax regulatory requirements applicable to the repair and maintenance of DOT Specification 110, DOT Specification 106, and ICC 27 tank car tanks (ton tanks); (4) relax regulatory requirement for the removal of rupture discs for inspection if the removal process would damage, change, or alter the intended operation of the device; and (5) impose additional requirements that would enhance the standards for DOT Specification 111 tank cars used to transport PG I and II hazardous materials. This NPRM addresses the four petitions for rulemaking that are related to the DOT Specification 111 tank car (P-1577, P-1587, P-1595, and P-1612). The NTSB recommendations directly relate to the enhancement of DOT Specification 111 tank cars.

We received comment submissions from local communities, cities, and towns; rail carriers; offerors; suppliers of equipment; tank car manufacturers; environmental groups; NTSB; and members of the U.S. Congress. The comments provide many potential solutions to the risks associated with HHFTs. A common theme among the commenters is that they support changes that will prevent another catastrophic train accident. Table 14 provides a brief summary based on key concerns of groups of commenters:

Table 14: General Overview of Comments Received on the HM-251 ANPRM

Group of Commenters	Number of Comments	Comment Summary
Local communities, cities, towns	61 municipal and state government entities	Provided overwhelming support for: • Higher integrity tank car construction standards; • Revised operational procedures; and • Standards applicable to newly constructed and existing DOT 111 tank cars transporting any Packing Group I and II materials
Concerned public	223 individual commenters	Provided overwhelming support for: • Petition P-1587 (Barrington, IL); and • NTSB Safety Recommendations that requires higher integrity construction and operational standards for new and existing DOT-111 tank cars
Rail carriers	AAR, American Short Line and Regional Railroad Association, GNLX Corporation	In their comments AAR and ASLRRA proposed additional enhancements to its original petition for rulemaking (P-1577) such as: • Mandating the jacketed version of the specifications discussed in the petition for flammable liquids; • For flammable liquids, requiring high-flow capacity pressure relief devices; • Requiring thermal blankets or thermal coatings when constructing or modifying tank cars used to transport all packing group I and II materials and flammable liquids in packing group III; and • The employment of designs that ensure bottom outlet valves will remain closed when the operating handles are subject to impact forces
Offerors	Multiple	Commenters solicit PHMSA and FRA to: • Address accident root causes and to keep tank cars on the track; • Conduct suggested initiatives, including improvements in inspection and track maintenance protocols; • Utilize available technology to assist in reducing human error (e.g., Positive Train Control); and • Improve communication systems for rail operations
Tank Car manufacturers	Watco, Railway Supply Institute, SMART, Greenbrier Companies, North American Freight Car Association	The consensus among manufacturers of tank cars is as follows: • The increase of tank shell thickness and application of tank head protection will substantially improve the puncture resistance of DOT-111 tank cars and provide better protection in the event of a derailment; • Improved puncture resistance will result in less product release and, thus, smaller fires in the event of a train accident; • The P-1577 (Petition) tank car's enhancements include a pressure

		relief device with a higher exit flow and lower trigger point. This change to the pressure relief device will improve the potential for this equipment to operate as intended in a fire situation; and • Enhancement is consistent with the T87.6 Task Force's recommendation. If any fire exposure should occur, the enhanced pressure relief system will serve to reduce the probability of a high-energy release event • Tank car requirements for new cars should be more extensive than the retrofit requirements for existing cars
Environmental groups	Over 152,000 signatories	Support of NTSB Safety Recommendations by: • Expressing concern over the responsibility of local governments having to provide emergency response units to manage the impact of derailments in communities across the country; and • Expressing concern over the significant costs to society associated with clean-up and environmental remediation
NTSB		Urges PHMSA to: • Take immediate action to require a safer package for transporting flammable hazardous materials by rail; and • Take regulatory action that applies to new construction and the existing tank car fleet • With FRA, take action to address routing, oil spill response plans, and identification and classification of flammable liquids by rail.
Congressional interest	13 U.S. House and Senate members	Urges PHMSA to: • Take immediate action to require a safer package for transporting flammable hazardous materials by rail.

The most frequent comments received in response to the ANPRM follow. These issues included operational controls that could be implemented to address rail safety issues and how the existing fleet of cars would be affected in the event of the adoption of a new tank car standard (e.g., retrofitting). These specific issues and some of the comments received are summarized below.

Operational issues– RSICTC commented that, "[t]he 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." Similarly, equipment suppliers encouraged FRA to publish its final rule on rail integrity. Further, the API states in its comments that, "broken rails or welds caused more major

derailments than any other factor. According to task force 87.6, broken rails or welds resulted in approximately 670 derailments between 2001 and 2010." Further, it states, "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."

Retrofits – While the P-1577 tank car enhancements will significantly improve safety for newly manufactured tank cars, RSICTC strongly urges PHMSA to promulgate a separate rulemaking for existing tank cars that is uniquely tailored to the needs of the existing DOT-111 tank car fleet. Further, it states, "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 also submits that PHMSA adopt a ten-year program allowing compliance to be achieved in phases through modification, re-purposing or retirement of unmodified tank cars in Class 3, PG I and II flammable liquid service. Tank car modifications supported by RSICTC include adding head shields, protecting top and bottom fittings and adding pressure release valves or enhancing existing pressure release valves. Greenbrier, a tank car manufacturer, commented that, "the most vital of these modifications is addition of a trapezoidal or conforming half-height head shield to prevent penetration of tank cars by loose rails. Together with the top and bottom fittings protections and enhanced release valves, the improvements can significantly limit the likelihood of breaching the tank car." Further, Greenbrier is of the opinion that the ten-year timeline suggested by RSICTC is excessive and unmodified tank cars could and should be removed from hazardous materials service much sooner. API and other commenters state in their comments that they are strongly opposed to mandating any retrofits beyond the

higher-flow pressure relief device recommended by the T87.6 Task Force for thermal protection due to the lack of economic and logistical feasibility.

V. Discussion of Comments and Section-by-Section Review

The vast majority of commenters request prompt action by PHMSA to address the risk associated with HHFTs. PHMSA agrees that in light of the recent accidents involving HHFTs prompt action must be taken to address these trains. Therefore, we limit our discussion of the comments received in response to the ANPRM to those issues related to HHFTs. The remaining comments to the ANPRM and our August 27-28, 2013 public meeting will be addressed in a future rulemaking. Comments are available in the public docket for this NPRM, viewable at http://www.regulations.gov or DOT's Docket Operations Office (see ADDRESSES section above).

A. High-Hazard Flammable Train

In the ANPRM we asked several questions regarding AAR Circular No. OT-55-N. Specifically, we asked if it adequately addressed the concerns of the T87.6 Task Force, especially regarding speed restrictions. We also asked if we should incorporate the "key train" requirements contained in AAR Circular No. OT-55-N into the HMR, or if it should be expanded to include trains with fewer than 20 cars.

Several commenters indicate that additional operational requirements should be based upon the definition for a "key train" as provided by AAR Circular No. OT-55-N. In addition, NTSB Recommendation R-14-4 states,

> Work with the Federal Railroad Administration to expand hazardous materials route planning and selection requirements for railroads under Title 49 Code of Federal Regulations 172.820 to include key trains transporting flammable liquids as defined by the Association of American Railroads Circular No. OT-55-N and, where technically feasible, require rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas.

Based on the Appendix A to Emergency Order No. 28 and the revised definition of a "key train" under AAR Circular No. OT-55-N, PHMSA is proposing to add a definition of "high-hazard flammable train" to § 171.8. Under the proposed definition, the term would mean a single train containing 20 or more tank carloads of Class 3 (flammable liquid) material.

Section 173.120 of the HMR defines a flammable liquid as a liquid having a flash point of not more than 60 °C (140 °F), or any material in a liquid phase with a flash point at or above 37.8 °C (100 °F) that is intentionally heated and offered for transportation or transported at or above its flash point in a bulk packaging, with certain exceptions. For transportation purposes, examples of commodities that typically meet this definition are acetone, crude oil, ethanol gasoline, and ethyl methyl ketone. A Class 3 (flammable liquid) material is further assigned to Packing Group I, II, or III, based on its degree of danger, that is, great, medium, or minor, respectively.

Because crude oil is a mined liquid, its flash point and initial boiling point are variable and, as such, can be assigned to Packing Groups I, II, or III. Because ethanol is not a mined liquid, its initial boiling point and flash point are known (78 °C and 9 °C respectively). Thus, ethanol is assigned to Packing Group II. That said, our analysis finds that only crude oil and ethanol shipments would be affected by the limitations of this rule as they are the only known Class 3 (flammable liquid) materials transported in trains consisting of 20 cars or more.

While both the Appendix A to Emergency Order No. 28 and the revised definition of a "key train" under AAR Circular No. OT-55-N include Division 2.1 (flammable gas) material and combustible liquids, PHMSA is not proposing to include them in the definition of "high-hazard flammable train" in this NPRM. By doing so, the existing fleet of DOT Specification 111 tank cars can be repurposed and continue to be used for flammable liquids when <u>not</u> being transported

in a HHFT and combustible liquids which pose a lower risk than other flammable liquids. PHMSA and FRA seek comment on the definition of a “high-hazard flammable train”, PHMSA and FRA seek public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. PHMSA expects that the definition of HHFT would change the operating practices and tank car packaging primarily for trains that carry crude oil and ethanol. To what extent would definition of HHFT affect the operating practices and tank car packaging trains carrying other Class 3 flammable liquids?
2. Within the definition of HHFT, to what extent would adding or removing hazardous materials or packing groups within a hazardous material class affect the benefits and costs of this rule? In particular, what are the benefits and costs of including Division 2.1 (flammable gas) material and combustible liquids within the definition of HHFT?|
3. To what extent do the covered hazardous materials, including crude oil and ethanol, have differing risks when they are in HHFTs?

As described in the Overview section of this preamble, above, we believe that most, if not all, of the rail community transporting oil, including crude oil transported as a hazardous material, is subject to the basic response plan requirement of 49 CFR 130.31(a), based on the understanding that most, if not all, rail tank cars being used to transport crude oil have a capacity greater than 3,500 gallons. However, a comprehensive response plan for shipment of oil is only required when the oil is in a quantity greater than 42,000 gallons per package. Accordingly, the number of railroads required to have a comprehensive response plan is much less, or possibly

non-existent, because a very limited number of rail tank cars in use would be able to transport a volume of 42,000 gallons in a single package.[44]

Based on this difference in plans and the recent occurrence of high-profile accidents involving crude oil, the NTSB and TSB have recommended in Safety Recommendation R-14-5 that the Department and PHMSA reconsider the threshold quantity for requiring the development of a comprehensive response plan for the shipment of oil.

While PHMSA will not be specifically addressing Oil Spill Response Plans in this rulemaking, we will be addressing this topic in this advance notice of proposed rulemaking under docket number PHMSA-2014-0105 (RIN 2137–AF08). In this ANPRM we will be seeking comment on the Oil Spill Prevention and Response Plans as they relate to the rail transport of large quantities of oil. Specifically, we seek comment on threshold quantity for a comprehensive plan to § 130.31 and other issues related to the Oil Spill Prevention and Response Plans as they relate to rail transport.

B. Notification to State Emergency Response Commissions of Petroleum Crude Oil Train Transportation

As previously discussed, on May 7, 2014, DOT issued an Emergency Restriction/Prohibition Order in Docket No. DOT-OST-2014-0067 (Order).[45] That Order required each railroad transporting 1,000,000 gallons or more of Bakken crude oil in a single train in commerce within the U.S. provide certain information in writing to the SERC for each state in which it operates such a train. The notifications made under the Order must include

[44] The 2014 AAR's Universal Machine Language Equipment Register (UMLER) numbers showed 5 tank cars listed with a capacity equal to or greater than 42,000 gallons, and none of these cars were being used to transport oil or petroleum products.
[45] http://www.dot.gov/briefing-room/emergency-order .

estimated frequencies of affected trains transporting Bakken crude oil through each county in the state, the routes over which it is transported, a description of the petroleum crude oil and applicable emergency response information, and contact information for at least one responsible party at the host railroads. In addition, the Emergency Order requires that railroads provide copies of notifications made to each SERC to FRA upon request and, make updated notifications when Bakken crude oil traffic materially changes within a particular county or state (a change of 25 percent or greater from the estimate conveyed to a state in the current notification). DOT issued the Order under the Secretary's authority to abate imminent hazards at 49 U.S.C. 5121(d). The Order was issued in response to the crude oil railroad accidents previously described, and is in effect until DOT rescinds the Order. This proposal, if adopted in a final rule in this rulemaking proceeding, would supplant the requirements in the Order.

In this NPRM, PHMSA is proposing to codify and clarify the requirements of the Order in the HMR, and is requesting public comment on the various facets of this proposal. As previously discussed, the amount of crude oil shipments via railroad tank car is increasing rapidly. The transportation of any hazardous materials is inherently dangerous, and transporting crude oil can be dangerous if the crude oil is released into the environment because of its flammability. This risk of ignition is compounded in the context of rail transportation of crude oil. It is commonly shipped in HHFTs that may consist of over 100 loaded tank cars, and there appear to be uniquely hazardous characteristics of crude oil, as previously discussed in this preamble. With the rising demand for rail carriage of crude oil throughout the U.S., the risk of rail accidents and incidents increases with the increase in the volume and the length of haul of the crude oil shipped. Based on a waybill sample, the total distance field was used to estimate the average length of haul crude oil. PHMSA found that crude oil travels over 1,000 miles on

the rail network. As also previously discussed, there have been several significant train accidents in the U.S. and Canada over the last year resulting in deaths, injuries, property and environmental damage that involved crude oil shipments. These accidents have demonstrated the need for action in the form of additional communication between railroads and emergency responders to ensure that the emergency responders are aware of train movements carrying large quantities of crude oil through their communities.

For purposes of this NPRM, PHMSA is proposing regulatory text that would address the same trains as affected by the Emergency Order (i.e., trains transporting 1,000,000 gallons or more of Bakken crude oil). Considering the typical 30,000-gallon capacity railroad tank car used for the transport of crude oil, a 1,000,000-gallon threshold for a unit train would require notification to SERC's or other appropriate state delegated entities for unit trains composed of approximately 35 cars of crude oil.[46] For purposes of the Emergency Order, DOT assumed this was a reasonable threshold when considering that the major incidents described above all involved trains consisting of more than 70 railroad tank cars carrying petroleum crude oil, or well above the Order's threshold of 1,000,000 gallons or more of petroleum crude oil being transported in a single train. In setting this threshold quantity of 1,000,000 gallons in the Order, DOT also relied on a Federal Water Pollution Control Act mandate for regulations requiring a comprehensive spill response plan to be prepared by an owner or operator of an onshore facility.[47]

In the Order, DOT determined that SERCs were the most appropriate point of contact to

[46] This approximation assumes that the tank cars would not be entirely filled to capacity.
[47] See 40 CFR 112.20. The Federal Water Pollution Control Act, as amended by the Oil Pollution Act of 1990, directs the President, at section 311(j)(1)(C) (33 U.S.C. 1321(j)(1)(C)) and section 311(j)(5) (33 U.S.C. 1321(j)(5)), respectively, to issue regulations "establishing procedures, methods, and equipment and other requirements for equipment to prevent discharges of oil and hazardous substances from vessels and from onshore facilities and offshore facilities, and to contain such discharges."

convey written notifications regarding the transportation of trains transporting large quantities of Bakken crude oil. Each state is required to have a SERC under the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). 42 U.S.C. 11001(a). The EPCRA is intended to help local entities plan for emergencies involving hazardous substances.[48] Generally, SERCs are responsible for supervising and coordinating with the local emergency planning committees (LEPC) in states, and are best situated to convey information regarding hazardous materials shipments to LEPCs and state and local emergency response agencies.

After issuance of the Order, DOT received questions from railroads regarding whether Fusion Centers could be utilized to make the notifications required by the Emergency Order. Railroads share information with Fusion Centers under existing § 172.820 of the HMR, PHMSA's regulation governing additional planning requirements for transportation by rail of certain hazardous materials. DOT also received inquiries regarding the Order's implications for Tribal Emergency Response Commissions (TERCs). TERCs have the same responsibilities as SERCs, with the Chief Executive Office of the Tribe appointing the TERC.[49] In response, DOT issued a Frequently Asked Questions (FAQs) guidance document to address these inquiries.[50] In that FAQs document, DOT explained that if a State agrees that it would be advantageous for the information required by this Emergency Order to be shared with a Fusion Center or other State agency involved with emergency response planning and/or preparedness, as opposed to the SERC, a railroad may share the required information with that agency instead of the SERC. DOT also explained that railroads were not required to make notification under the Order to TERCs, but, rather, that DOT would be reaching out to Tribal leaders to inform them that

[48] http://www2.epa.gov/epcra .
[49] http://www2.epa.gov/sites/production/files/2013-08/documents/epcra_fact_sheet.pdf .
[50] http://www.fra.dot.gov/eLib/Details/L05237 .

TERCs could coordinate with the appropriate SERC in a state for access to data supplied under the Emergency Order.

After issuance of the Order, railroads were concerned that routing and traffic information required to be provided to SERCs regarding affected crude oil would be made public under individual states' open records laws. DOT has since engaged in discussions with railroads and states to address this concern. As explained in the FAQs document, DOT prefers that this information be kept confidential, and acknowledged that railroads may have an appropriate claim that this information constitutes confidential business information, but that such claims may differ by state depending on each state's applicable laws. DOT encouraged the railroads to work with states to find the most appropriate means for sharing this information (including Fusion Centers or other mechanisms that may have established confidentiality protocols). However, the EO and DOT's subsequent guidance did not require that states sign confidentiality agreements to receive this information, and DOT did not designate the information as Sensitive Security Information (SSI) under the procedures governing such at 49 CFR Part 15. PHMSA understands that despite confidentiality concerns, railroads are complying with the requirements of the Order and have provided the required information to States.

With regard to the identification of Bakken crude oil versus crude oil extracted from other geographic locations, DOT acknowledges that the HMR's current shipping paper requirements do not distinguish Bakken crude oil from crude oil sourced in other locations. This may present compliance and enforcement difficulties, particularly with regard to subsequent railroads transporting petroleum crude after interchange(s) with an originating or subsequent carrier. DOT explained in the FAQs document that railroads and offerors should work together to develop a means for identifying Bakken crude oil prior to transport, such as a Standard

Transportation Commodity Code number, that identifies the crude oil by its geographic source. DOT also stated that for purposes of compliance with the Emergency Order, crude oil tendered to railroads for transportation from any facility directly located within the Williston Basin (North Dakota, South Dakota, and Montana in the United States, or Saskatchewan or Manitoba in Canada) is Bakken crude oil. PHMSA notes it may be possible in any final rule action that this proposed new § 174.310 could be expanded to include threshold quantities of all petroleum crude oils or all HHFTs (versus only trains transporting threshold quantities of Bakken crude oil).

PHMSA therefore seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. Whether codifying the requirements of the Order in the HMR is the best approach for the notification requirements, and whether particular public safety improvements could be achieved by requiring the notifications be made by railroads directly to emergency responders, or to emergency responders as well as SERCs or other appropriate state delegated entities.
2. Whether the 1,000,000-gallon threshold is appropriate, or whether another threshold such as the 20-car HHFT threshold utilized in this NPRM's other proposals is more appropriate. If you believe that a threshold other than 1,000,000 gallons is appropriate, please provide any information on benefits or costs of the change, including for small railroads.
3. Comments regarding parallel notification requirements for any affected TERCs.

4. Comments regarding the other topics addressed in the FAQ's document. In particular, PHMSA seeks comments on the confidential treatment of data contained in the notifications to SERCs, and the adoption of a means for identifying Bakken crude oil prior to rail transportation.
5. Whether PHMSA should place restrictions in the HMR on the disclosure of the notification information provided to SERCs or to another state or local government entity.
6. Whether such information should be deemed SSI, and the reasons indicating why such a determination is appropriate, considering safety, security, and the public's interest in information.
7. What burden reduction would result from not having to distinguish the source of the crude oil? What increase in burden would result from the expanded applicability?

C. Rail Routing

We did not solicit comments on routing requirements for HHFTs in the September 6, 2013 ANPRM. However, many government agencies and citizens alike expressed concerns regarding the risks posed by such rail traffic through their communities. Further, the issue was raised during the RSAC hazardous materials working group meetings and the Secretary's Call to Action. As a result of those efforts, the industry has taken steps to extend the routing requirements in § 172.820 of the HMR to certain HHFTs transporting crude oil. AAR indicates that railroads will focus on the risks related to population density along routes by reducing train speed. Based on AAR's response to the Call to Action, railroads will operate trains at 40 mph by

July 1, 2014, for any HHFT with at least one non-CPC 1232 DOT Specification 111 tank car loaded with crude oil or one non-DOT specification tank car loaded with crude oil while that train travels within the limits of any high-threat urban area as defined by 49 CFR 1580.3.

We note that under AAR Circular No. OT-55-N, any train that meets the "key train" definition is subject to a 50-mph speed restriction. Further, any route defined by a railroad as a key route shall meet certain standards described in OT-55-N. Wayside defective wheel bearing detectors shall be placed at a maximum of 40 miles apart, or an equivalent level of protection may be installed based on improvements in technology. Main track on key routes shall be inspected by rail defect detection and track geometry inspection cars or by any equivalent level of inspection at least twice each year. Sidings on key routes shall be inspected at least once a year, and main track and sidings shall have periodic track inspections to identify cracks or breaks in joint bars. Further, any track used for meeting and passing key trains shall be FRA Class 2 track or higher. If a meet or pass must occur on less than Class 2 track due to an emergency, one of the trains shall be stopped before the other train passes. PHMSA and FRA request comments on the requirements of AAR Circular No. OT-55-N specifically in regard to track inspection. These comments may be considered for future regulatory action.

This NPRM proposes to modify § 172.820 to apply to any HHFT, as PHMSA proposes to define this term in § 171.8 (See discussion in HHFT section.). The routing requirements discussed in this NPRM reflect the practices recommended by the NTSB in recommendation R-14-4, and are in widespread use across the rail industry for security-sensitive hazardous materials (such as chlorine and anhydrous ammonia). As a result, rail carriers must assess available routes using, at a minimum, the 27 factors listed in Appendix D to Part 172 of the HMR to determine the safest, most secure routes for security-sensitive hazardous materials. See the Section (D)

"Overview of Current Regulations Relevant to this Proposal" of this preamble for more information on routing.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. To what extent would the routing requirements change the operational practices for small railroads, which PHMSA expects to have limited routing options? What are the benefits and costs of applying these requirements to small railroads?
2. How has the voluntary compliance with the routing requirements in response to the Call to Action changed the operational practices for crude oil shipments?

D. Classification and Characterization of Mined Liquids and Gases

As previously discussed, the proper classification and characterization of a hazardous material is critical under the HMR, as it dictates which additional requirements apply, such as the proper operational controls and proper packaging selection.

Under the HMR, it is critical that the offeror of a material ensure that a hazardous material has been classified and characterized correctly. The classification of a hazardous material triggers the corresponding packaging and hazard communication. Under § 173.22 of the HMR, it is the offeror's responsibility to properly "class and describe the hazardous material in accordance with parts 172 and 173 of this subchapter." When a single material meets more than one hazard class the shipping name must be selected based on the hazard precedence table in § 173.2a. Once an offeror has determined the hazard class of the material, the offeror must select the most appropriate proper shipping name from the HMT.

In the case of crude oil, relevant properties to properly classify a flammable liquid include: flash point, and boiling point (See section 173.120). The HMR do not specifically provide requirements for characterization tests however; relevant properties that may affect the characterization of crude oil include corrosivity, vapor pressure, specific gravity at loading and reference temperatures, and the presence and concentration of specific compounds such as sulfur. Characterization of certain properties enables an offeror to select the most appropriate shipping name, and identify key packaging considerations. Based on the shipping name the HMT provides the list of packagings authorized for use by the HMR. As indicated in § 173.24(e), even though certain packagings are authorized, it is the responsibility of the offeror to ensure that such packagings are compatible with their lading. Such information and determination of the authorized packaging also ensure that the appropriate outage is maintained in accordance with § 173.24(a).

In the September 6, 2013 ANPRM, we did not request comments on the classification of crude oil. Nonetheless, one commenter, David C. Breidenbach, provided several comments regarding the volatility of "gassy" crude oil. Mr. Breidenbach's comments suggested the need to conduct pre-movement sampling and safety certification, require pressurized DOT Specification 112 tank cars for certain PG I crude oil, and ensure that field operators adjust well head separators to remove gas and develop gas processing infrastructure.

Classification and characterization were raised during an RSAC hazardous materials working group meeting, in the Secretary's Call to Action, under Operation Classification, in the agencies' Joint Safety Advisories, and in the amended and restated March 6, 2014 DOT Emergency Order. PHMSA's January 2, 2014 Safety Alert warns of crude oil variability and emphasizes proper and sufficient testing to ensure accurate characterization and classification.

The Safety Alert expresses PHMSA's concern that unprocessed crude oil may affect the integrity of packaging or present additional hazards related to corrosivity, sulfur content, and dissolved gas content. Proper classification of crude oil has been a major focus of the PHMSA and FRA initiative referred to as Operation Classification and the Secretary's Call to Action. Further, the Department's February 25, 2014 Emergency Order, as revised on March 6, 2014, requires those who offer crude oil for transportation by rail to ensure that the product is properly tested and classified in accordance with Federal safety regulations. As a result of comments, concerns, and government and industry emphasis on proper classification, in this NPRM, PHMSA proposes changes to the HMR that clarify and enhance the current classification requirements for mined gases and liquids.

The HMR require both the proper classification of hazardous materials and the selection and use of proper packaging. Packaging groups are designed to assign a degree of danger presented within a particular hazard class. Packing Group I poses the highest danger ("great danger") and Packing Group III the lowest ("minor danger"). PHMSA is proposing to revise the bulk packaging sections §§ 173.241, 173.242, and 173.243 to provide the timeline for continued use of existing DOT Specification 111 tank cars in HHFT service in accordance with the following table:

Table 15: Timeline for continued use of DOT Specification 111 tank cars in HHFT service

Packing Group	*DOT 111 Not Authorized After*
I	October 1, 2017
II	October 1, 2018
III	October 1, 2020

Based on the RSI's presentation to the NTSB on tank car production capacity, it is anticipated that 33,800 tank cars could be manufactured per year. In addition, PHMSA assumes

that the current fleet size in HHFT service is 72,000. PHMSA used this data to provide a phase out period for DOT Specification 111 tank cars in certain HHFT service that would ensure that sufficient time was provided to avoid a fleet shortage in HHFT service. PHMSA requests comments on the proposed timelines for discontinuing use of DOT Specification 111 tank cars in HHFT service.

In Recommendation R-14-6 the NTSB recognized the importance of sufficient testing and documentation of the physical and chemical characteristics of hazardous materials to ensure the proper classification, packaging, and record-keeping of products offered in transportation. We agree with NTSB. Classification decisions are essential for the selection of proper equipment (tank, service equipment, interior lining or coating) and the use, maintenance, and qualification of the equipment when shipping hazardous materials. Proper classification is also essential for accommodating the risk-based implementation schedule for increased tank car requirements described below. The statement on a shipping paper is the offeror's certification that a hazardous material is properly classified, described, packaged, marked and labeled, and in proper condition for transportation according to applicable DOT regulations. Packaging decisions are based on the information provided by the offeror. Incorrect classification and characterization of hazardous material may lead to failures throughout the transportation system.

Examples where improper information from an offeror may result in unsafe transportation conditions are found throughout the HMR.

- Section 180.509(i) requires an owner of the interior lining or coating of a tank car transporting a material that is corrosive or reactive to the tank to ensure an inspection adequate to detect defects or other conditions that could reduce the design level of reliability and safety of the tank.

- Section 180.509(i) also requires the owner of a tank car used to transport a hazardous material to ensure the lining conforms to §§ 173.24(b)(2) and (b)(3) of the HMR. Further, the owner "must use its knowledge of the service life of each coating or lining and commodity combination to establish an appropriate inspection interval for that coating or lining and commodity combination."
- Under § 180.509(k) an owner of service equipment "must analyze the service equipment inspection and test results for any given lading and, based on the analysis, adjust the inspection and test frequency to ensure that the design level of reliability and safety of the equipment is met."
- Appendix D to Part 180 identifies hazardous materials corrosive to tanks or service equipment, stating "While every effort was made to identify materials deemed corrosive to the tank or service equipment, owners and operators are cautioned that this list may not be inclusive." Tank car owners and operators are reminded of their duty to ensure that no in-service tank will deteriorate below the specified minimum thickness requirements in this subchapter. See § 180.509(f)(3).

The properties of mined gases and liquids, including crude oil, are variable based on time, method, and location of extraction. Whereas manufactured goods often undergo a strict quality assurance process to ensure characteristics are within defined parameters, mined gases and liquids do not. Unlike manufactured goods, organic materials from oil and gas production represent a unique challenge in regards to classification. Differences in the chemical makeup of the raw material can vary over time and geographical location. Typically, organic materials from oil and gas production at a well head are passed through a "separator" to remove the gas,

sediment, and water from the crude. As such, there are multiple hazardous materials that are commonly shipped from the well-site including: crude, natural gas condensate, and natural gas liquid.

Given this variability, there is a responsibility under § 173.22 of the HMR for an offeror to ensure the proper characterization and classification of their materials. Proposed § 173.41 would explicitly require a sampling and testing program for mined gases and liquids, including crude oil. Under proposed § 173.41(a), this program must address the following key elements that are designed to ensure proper classification and characterization of crude oil:

- Frequency of sampling and testing to account for appreciable variability of the material, including the time, temperature, means of extraction (including any use of a chemical)[51], and location of extraction;
- Sampling at various points along the supply chain to understand the variability of the material during transportation;
- Sampling methods that ensure a representative sample of the entire mixture, as packaged, is collected;
- Testing methods to enable complete analysis, classification, and characterization of the material under the HMR;
- Statistical justification for sample frequencies;
- Duplicate samples for quality assurance purposes; and
- Criteria for modifying the sampling and testing program.

The sampling and testing program should account for appreciable differences in the material as a result of time, temperature, etc., but need not measure ordinary and minor

[51] This accounting for the method of extraction would not require disclosure of confidential information.

differences in materials. If an offeror assigns all of its materials to the most stringent packing group classification, this may serve as one possible justification for a lower frequency of testing. The offeror would still need to justify less frequent testing of other properties such as corrosivity. Sampling along the length of the supply chain will be used to understand the processing and transportation effects but may be less frequent than final testing prior to rail car loading.

As a result of Secretary Foxx's call to Action, on February 21, 2014 the API agreed to pursue various actions including to work with PHMSA and other representatives from the Department of Transportation to share information and expertise on crude oil characteristics. API created a working group on entitled the "API Classification & Loading of Crude Oil Work Group." Within this working group were two task groups: "Crude Oil Classification Task Group" and the "Crude Oil Quantity & Quality Measurement Task Group."

A six month schedule was launched in early 2014, with working groups meeting every two weeks throughout the country. The goal of this group was to develop a consensus industry standard for crude oil testing, sampling and unloading. PHMSA personnel have been active participants in these meetings. In June 2014 the API working group finalized a draft standard "Recommend Practices 3000" (RP 3000). RP 3000 provides industry best practices, including those regarding testing and sampling methods. The draft standard is currently in the balloting process with API members and is on a path to finalization and thus in not considered in the rulemaking. PHMSA is encouraged by the development of such an industry standard and API's continued work in the standard and beyond to improve the accuracy of classification of materials and the overall safety or operational rail requirements. Once finalized PHMSA may consider adoption of such a standard and in addition those in the regulated community may petition for

the incorporation of such standard through the processes outlined in section 106.95 of the HMR.

Proposed § 173.41(b) would link the certification requirements, as prescribed in § 172.204, to the sampling and testing program. Specifically, by certifying the shipment in accordance with § 172.204, the offeror of the hazardous material is certifying compliance with the sampling and testing program for mined gases and liquids described above.

Based on comments to the ANPRM, we considered regulatory changes related to the vapor pressure of a flammable liquid. As mentioned in the Background section of this preamble, above, prior to 1990 the HMR clearly indicated that the packaging requirements for flammable liquids are based on a combination of flash point, boiling point, and vapor pressure. The regulations provided a point at which a flammable liquid had to be transported in a tank car suitable for compressed gases, commonly referred to as a "pressure car" (e.g., DOT Specifications 105, 112, 114, and 120 tank cars). Specifically, § 173.119(f) indicated that flammable liquids with a vapor pressure that exceeded 27 psia but less than 40 psia at 100°F (at 40 psia, the material met the definition of a compressed gas), were only authorized for transportation in one of the authorized pressure cars. The older regulations recognized that those flammable liquids that exhibited high vapor pressures, such as those liquids with dissolved gases, require additional care in packaging. We are not currently proposing any regulatory changes related to vapor pressure of a material. However, PHMSA seeks comments from the regulated community on the role of vapor pressure in the classification, characterization, and packaging selection process for a flammable liquid and whether regulatory changes to establish vapor pressure thresholds for packaging selection are necessary.

Proposed § 173.41(c) would require that the sampling and testing program be documented in writing and retained while it remains in effect. It should be noted the while the sampling and testing program is required be documented in writing and retained while it remains in effect we are not require a specified retention requirement for the actual testing records. We acknowledge testing results will be supplemental materials to support the requirements of the sampling and testing program. The proposed requirement specifies that the sampling and testing program must be reviewed and revised and/or updated as necessary to reflect changing circumstances. The most recent version of the sampling and testing program, or portions thereof, must be provided to the employees who are responsible for implementing it. When the sampling and testing program is updated or revised, all employees responsible for implementing it must be notified and all copies of the sampling and testing program must be maintained as of the date of the most recent revision. If a sampling and testing program is updated, revised or superseded, documentation of the program that was updated, revised, or superseded must be retained for 5 additional years.

Proposed § 173.41(d) would mandate that each person required to develop and implement a sampling and testing program must maintain a copy of the sampling and testing program documentation (or an electronic file thereof) that is accessible at, or through, its principal place of business and must make the documentation available upon request, at a reasonable time and location, to an authorized official of DOT.

It should be noted above in early 2014 API created a working group on entitled the "API Classification & Loading of Crude Oil Work Group." The goal of this group was to develop a consensus industry standard (RP 3000) that would address testing and sampling of crude oil. PHMSA personnel have been active participants in these meetings. PHMSA is encouraged

by the development of such an industry standard and API's continued work in the standard and beyond to improve the accuracy of classification of materials and the overall safety or operational rail requirements. Once finalized PHMSA may consider adoption of such a standard and in addition those in the regulated community may petition for the incorporation of the standard through the processes outlined in section 106.95 of the HMR.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1.) What are the differences in the process and costs for classification of mined gases compared to mined liquids such as crude oil?
2.) How much variability exists across a region due to location, time, temperature, or mining methods for gases and liquids?
3.) Would more or less specificity regarding the components of a sampling and testing program aid offerers of shipments to be in compliance with proposed § 173.41?
4.) Do the guidelines provides sufficient clarity to offerors to understand whether they are in compliance with these requirements?
5.) How could PHMSA provide flexibility and relax the sampling and testing requirements for offerors who voluntarily use the safest packaging and equipment replacement standards?

E. Additional Requirements for High-Hazard Flammable Trains

In the September 6, 2013 ANPRM we outlined the additional safety enhancements, which may include both rail car design and rail carrier operational changes that were considered

by the T87.6 Task Force, and we provided the public an opportunity to comment. Below are the key considerations of the task force from both a tank car design and operations standpoint.

Table 16: Key Considerations and Findings of the T87.6 Task Force
Tank car design
Thermal protection to address breaches attributable to exposure to fire conditions Findings – Modeling of tank cars exposed to pool fire conditions using a version of AFFTAC current at the time the TF was active, and using pure ethanol as a surrogate, indicate thermal protection and a jacket was not necessary for a tank car to survive 100 minutes in a pool fire. A pressure relieve valve with a flow capacity of 27,000 SCFM with a start to discharge pressure of 75 psig was needed to ensure the tank car survived 100 minutes.
Roll-over protection to prevent damage to top and bottom fittings and limit stresses transferred from the protection device to the tank shell Findings – research comparing the top fittings protection required for the CPC-1232 compliance car and the protection required in the HMR for certain tank cars based on dynamic loads was considered preliminary and not sufficient to base a recommendation.
Hinged and bolted manways to address a common cause of leakage during accidents and Non-Accident Releases (NARS); Findings - Representatives of the shipping community expressed the following concerns regarding the elimination of hinged and bolted manways. • The existing infrastructure at the loading and unloading facilities has been designed make use of the 20” manway. • Through the manway the facilities recover vapor, inspect the interior of the cars, obtain samples of heels in the tanks, insert a stinger used to dissipate energy of a fluid moving at a high flow rate, gauge the volume in the car during loading, access the car for periodic and ad hoc cleaning. In some cases all of the loading/unloading appurtenances have been incorporated onto a housing that fits over the manway. • If a bolted pressure plate like assembly is required the loaded volume may be determined using existing technology. The specific gravity of crude oil varies from 0.6 to 1.0 limiting the usefulness of a magnetic gauging device. Alternatives to hinged and bolted securement are currently under development and testing.
Bottom outlet valve (BOV) elimination; Findings - The working group concluded elimination of the allowance for BOVs is not a viable option in the near term. The Task Force then considered enhanced protection of the bottom outlet valve. Appendix E of the AAR’s Tank Car Specifications provides the standards for bottom discontinuity protection. In order to move forward with this concept, the design criteria will need to be developed. Time constraints prohibit this task force from advancing this concept. Also, inspection of the 10 cars involved in a recent derailment indicates the bottom outlet protection functions as designed and no valve were significantly damaged. AAR TCC created a docket T10.5 and a task force to evaluate bottom outlet performance. Task force T87.6 recommends that the TCC add development of design criteria for enhanced bottom outlet protection to the T10.5 charge. The following are other ideas being investigated by T10.5 that are germane to T87.6. • Shipment of the car without the BOV handle attached and development of a

standard/universal handle attachment. • Eliminate use of overly strong handle • Incorporating operating stops on valve bodies • The working group will also engage BOV manufacturers to determine if valve configurations or design be altered to prevent damage documented in recent derailments.
Increasing outage from 1 percent to 2 percent to improve puncture resistance. Increasing the minimum allowed outage was a difficult option to evaluate because the commodities are loaded below the reference temperature and the outage at the loading temperature is well above the regulatory minimum. It was reported Ethanol was loaded to an outage of approximately 4%. The American Petroleum Institute (API) surveyed a number of its members to learn the outage of ethanol as received. The outages ranged from 2.86% to 6.23%. To further evaluate the benefit of this option, the AFFTAC subgroup performed simulations to determine the benefit (to survivability in a pool fire) offered by increased outage. Based on the results of the simulation a tank car with 2% outage had an insignificant change in performance when exposed to a pool fire.
Rail Carrier Operations
Rail integrity (e.g., broken rails or welds, misaligned track, obstructions, track geometry, etc.) to reduce the number and severity of derailments; Findings - The Task Force urged groups charged with addressing track integrity issues to aggressively work toward a quick and meaningful resolution. In addition, the Task Force urged developers and suppliers of rail flaw detection technology to continue to make the advancement and production of the technologies a priority.
Alternative brake signal propagation systems ECP, DP, and two-way EOT to reduce the number of cars and energy associated with derailments; Findings - Based on the simulation results and analysis of the data it was concluded the alternatives considered provided marginal benefits. Moreover the identified obstacles to implementation represent a considerable time and cost investment and the predicted benefits would not be realized for months or years in the future. As such, this working group will not make a recommendation related to alternative brake signal propagation systems.
Speed restrictions for key trains containing 20 or more loaded tank cars (on August 5, 2013, AAR issued Circular No. OT-55-N addressing this issue); Findings - The working group recommended that OT-55 not be modified due to the adverse impact on cycle times and the resulting increase in the number of tank cars which would be required to transport these commodities in the same time frame. Most of the benefit of the reduced speed restriction is already in place, since five of the seven Class 1 railroads already handle unit trains of these commodities as key trains.
Emergency response to mitigate the risks faced by response and salvage personnel, the impact on the environment, and delays to traffic on the line. Findings - The Task Force supports the RFA's proposed recommendation and in turn, recommends the AAR request updates from the RFA regarding the availability of mobile stores of AR-AFFF.

As part of PHMSA and FRA's systematic approach to rail hazardous materials

transportation safety, in this NPRM, in addition to new tank car design standards, PHMSA is proposing operational requirements for HHFTs. Some of these operational requirements are consistent with the T87.6 Task Force and discussed in further detail below.

a. Speed Restriction

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

The laws of physics indicate that if an accident occurred at 40 mph instead of 50 we should expect a reduction of kinetic energy of 36%. After consultations with engineers and subject matter experts, we can assume that this would translate to the severity of an accident being reduced by 36%. A slower speed may allow a locomotive engineer to identify a safety problem ahead and stop the train before an accident occurs, which could lead to accident prevention. PHMSA only quantifies benefits in this proposed rule from mitigating the severity of accidents.. With respect to prevention, PHMSA notes that reduced speeds will reduce the risk of accidents on net, though some risks could increase under limited circumstances.

PHMSA and FRA used a ten mile speed differential in calculating an effectiveness rate for the 40 mph speed restriction options, which assumes that at the time of an accident trains would be going 10 mph slower if the speed restriction were at 40 mph rather than 50 mph. Braking is often applied before an accident occurs, and the speed differential at the time of an accident that results from trains operating at top speeds of 50 mph and 40 mph could be different than 10mph. Furthermore, in some cases, other restrictions on speed or congestion could affect speed at the time of the accident. PHMSA lacks a basis to modify the assumption that speeds

would be 10 mph different at the time of accidents and seeks comment on how we may better determine how speed restrictions would affect actual speed at the time of an accident.

A simulation program, Train Energy & Dynamics Simulator (TEDS) was used to study the dynamics and energy levels of trains under a variety of operational conditions. Specifically, TEDS was used to determine the stopping distance and the rate of dissipation of kinetic energy (KE) of a generic, 100 tank car train on level tangent track equipped with the candidate brake signal propagation systems. The simulations were used to determine the relative performance of the different systems. The model was validated using brake signal propagation data from Wabtec and data from a BNSF test performed in 2008.

This modeling tool was then used to determine the remaining energy to be dissipated and the speed at selected locations in the train when that tank car reached a defined point specified as the Point of Derailment (POD). By comparing the results for each technology, assumptions were made for the difference in number of cars reaching the point of derailment, remaining kinetic energy of all of the cars in the train at a set time interval, and conditional probability of release (CPR) of the train. This modeling supported the conclusion that a 10mph speed reduction would reduce the harm of a derailment by 36%.

PHMSA anticipates the reductions in the speed of trains that employ less safe tank cars will prevent fatalities and other injuries, and limit the amount of property damage done in an accident. PHMSA expects fewer safety benefits would be realized from a reduction in speed as the tank car fleet is enhanced as proposed in this NPRM.

As noted above, T87.6 Task Force considered this issue but did not recommend action, primarily because of the “adverse impact on cycle times and the resulting increase in the number of tank cars which would be required to transport these commodities in the same time frame.”

However, given the increasing risks of HHFTs, in the ANPRM we asked several questions regarding AAR Circular No. OT-55-N. Specifically, we asked if the Circular adequately addressed speed restrictions. The majority of the commenters indicated that the current voluntary 50-mph speed restriction is acceptable. Further, during the industry Call to Action, the rail and crude oil industries agreed to consider further voluntary improvements, including speed restrictions in high consequence areas, similar to the requirements that are established by the routing requirements in Part 172, Subpart I of the HMR. As a result of those efforts, AAR indicates that railroads began operating certain trains at 40 mph on July 1, 2014. This voluntary restriction applies to any HHFT with at least one non-CPC 1232 DOT Specification 111 tank car loaded with crude oil or one non-DOT specification tank car loaded with crude oil while that train travels within the limits of any high-threat urban area (HTUA) as defined by 49 CFR 1580.3.

In their comments, AAR and the ASLRRA stated,

> Following Lac-Mégantic, AAR's and ASLRRA's members reviewed their operating practices with respect to the transportation of hazardous materials. The decision was made to expand OT-55, the industry circular on recommended operating practices, to encompass all hazardous materials, including flammable liquids. OT-55's operating restrictions now apply to trains containing one car of a TIH material, spent nuclear fuel, or high-level radioactive waste or 20 cars of any combination of other hazardous materials. The 20-car threshold was chosen in recognition that in the context of Lac-Mégantic, the concern is over a pool fire involving multiple cars. In addition, crude oil and ethanol typically are shipped in unit trains.

Further, AAR and the ASLRRA stated,

> OT-55 has existed for two decades and has been adhered to by the railroad industry. There is no need to incorporate its provisions into the hazardous materials regulations. With respect to the 50-mph speed limit, that is the regulatory limit for TIH.[52] AAR and ASLRRA are unaware of any analysis justifying a lower speed limit and is concerned that a lower speed limit will have

[52] 49 CFR 174.86(b)

the counterproductive effect of causing shippers to divert freight to other transportation modes.

Proposed § 174.310(a)(4) would establish a 50-mph maximum speed restriction for HHFTs. It was suggested that there is no need to incorporate the speed restrictions of OT-55. OT-55 is a recommended practice and, as such, does not carry the weight of law. A subscribing railroad can, without concern of a penalty, move these trains at speeds exceeding the industry standard and as discussed previously, increase the energy and likelihood of catastrophic damage to tank cars involved in a train accident. Codifying this voluntary commitment will ensure that the benefits of these speed restrictions are realized indefinitely. Without codification of these requirements the speed restrictions could be subsequently lifted prematurely and increase risk. Additionally, in the event that a rail carrier cannot comply with the proposed braking requirements discussed in the Alternative Brake Propagation Systems section of this NPRM, the rail carrier would not be permitted to operate HHFTs at speeds exceeding 30-mph.

Finally, we are proposing three Options for a 40-mph speed restriction for any HHFT unless all tank cars containing flammable liquids meet or exceed the proposed performance standards for the DOT Specification 117 tank car. We request comments on which Option would have greatest net social benefits and whether the 40-mph speed restriction is necessary. Those 40-mph speed limit options are as follows:

Option 1: *40 mph speed limit all areas*

All HHFTs are limited to a maximum speed of 40 mph, unless all tank cars meet or exceed the proposed performance standards for the DOT Specification 117 tank car.

Option 2: *40 mph in areas with more than 100,000 people*

All HHFTs—unless all tank cars containing flammable liquids meet or exceed the proposed performance standards for the DOT Specification 117 tank car—are limited to a

maximum speed of 40 mph while operating in an area that has a population of more than 100,000 people, unless all tank cars meet or exceed the proposed performance standards for the DOT Specification 117 tank car. An area that has a population of more than 100,000 people would be defined using municipal borders, as determined by census population data. The 40 mph limitation to maximum speed would apply when any part of a HHFT is operating within that municipal border. PHMSA estimates that approximately 10% of the track miles for crude oil and ethanol traffic are traversed in cites with a population greater than 100,000 people. We seek comments on this assumption. Therefore, only 10% of the track miles would be impacted.

Option 3: *40 mph in HTUAs*

All HHFTs—unless all tank cars containing flammable liquids meet or exceed the proposed performance standards for the DOT Specification 117 tank car—are limited to a maximum speed of 40 mph while the train travels within the limits of HTUAs, unless all tank cars meet or exceed the proposed performance standards for the DOT Specification 117 tank car. PHMSA estimates that approximately 2% of the track miles for crude oil and ethanol traffic are traversed in HTUAs. We seek comments on this assumption. Therefore, only 2% of the track miles would be affected.

PHMSA has prepared and placed in the docket a RIA addressing the economic impact of this proposed rule. In the RIA we provide an analysis of speed restrictions, including the Options for the 40-mph speed limit. Our analysis has several limitations, which are listed in the RIA. The analysis extrapolates from the geometric characteristics of a single 124-mile subdivision, which may not be representative of crude and ethanol routes. In addition, we do not estimate any effects from speed reductions on other types of rail traffic throughout the rail network (e.g., passenger trains, intermodal freight, and general merchandise).

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. What would the effects be of a 40-mph speed limit for HHFTs on other traffic on the network, including passenger and intermodal traffic, under each of the three described Options?
2. PHMSA estimates the value of an hour of train delay to be $500. What are the costs per hour of delayed HHFT traffic, and what are the costs of delays for other types of traffic on the network?
3. PHMSA estimates that a 40-mph speed limit, from 50-mph, will reduce the severity of a HHFT accidents by 36 percent,[53] due to the reduction in kinetic energy by 36 percent. What other factors, in addition to kinetic energy changes, would refine the methodology for calculating potential risk reduction?
4. To what extent would a 40-mph speed limit in select areas cause rail traffic to be diverted to other lines, and what are the benefits and costs of this potential diversion?
5. To what extent would a 40-mph speed limit cause rail traffic, particularly intermodal traffic, to be diverted onto truck or other modes of transit as a result of rail delays, and what are the benefits and costs of this potential diversion?
6. How might the extrapolation from the 124-mile subdivision to the entire rail network produce over- or underestimates of the effects of speed restrictions for HHFT routes?
7. What other geographic delineations—in addition to HTUAs and cities with 100,000

[53] Kinetic energy varies directly with the square of speed (velocity).

people or more—should PHMSA consider as an Option for a 40-mph speed restriction in the absence of a proposed DOT 117 tank car?

8. How would the safety benefits of the proposed speed limits change if combined with the proposed braking systems?
9. What would be the benefits and costs of excluding existing Jacketed CPC-1232 cars from the proposed 40 mph speed restrictions, under each speed Option, if PHMSA selects a more stringent tank car specification than the Enhanced Jacketed CPC-1232?
10. What would be the benefits and costs of limiting the proposed 40 mph speed restrictions, under each Option, only to DOT 111 tank cars carrying a particular hazardous material (e.g., only crude oil)?

b. Alternative Brake Signal Propagation Systems

T87.6 Task Force did not recommend additional braking requirements, stating that based on the simulation results and analysis of the data it was concluded the additional alternatives considered provided marginal benefits. Moreover the identified obstacles to implementation represent a considerable time and cost investment and the predicted benefits would not be realized for months or years in the future. The group did acknowledge that an alternative signal transmission system, such as an intermediate EOT device, may be a promising option.

However, given the increasing risks of HHFTs, in the September 6, 2013 ANPRM we specifically requested comments pertaining to alternative brake signal propagation systems to reduce the number of cars and energy associated with derailments.

ECP (Electronic Controlled Pneumatic brake system) simultaneously sends a braking command to all cars in the train, reducing the time before a car's pneumatic brakes are engaged compared to conventional brakes. The system also permits the train crew to monitor the

effectiveness of the brakes on each individual car in the train and provides real-time information on the performance of the entire braking system of the train. ECP brake system technology also reduces the wear and tear on brake system components and can significantly reduce fuel consumption. All cars in a train must be equipped with ECP before a train can operate in ECP brake mode.

DP (Distributed Power) 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. A locomotive located 2/3 of the way through a train consist may be able to produce braking rates for the train that are close to those produced by ECP brakes. The braking rates, however, are more effective when derailments occur at the head of the train rather than closer to the back of the train. Further, T87.6 Task Force found that, in practice, rail carriers intentionally introduce a delay in emergency brake application that negatively affects the overall benefits from enhance signal transmission.

One commenter, API, indicates that DP serves as a means to increase the speed of application of the airbrakes as the braking signal would reach the cars throughout the train more rapidly. Further, API indicates that some railroads have already begun using DP and it serves as the fastest way to send braking signals to all of the cars. In addition, API indicates that accidents resulting from brake failure in one engine could be averted if another engine supports the air brakes on the entire train. API encourages PHMSA to evaluate DP and the development of a mid-train signaling device.

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. A two way EOT device is more effective than conventional brakes because the rear cars receive the brake command more quickly.

FRA conducted simulations to better understand the effect on energy dissipation and stopping distance of different brake signal propagation systems; conventional brakes, DP configurations, and ECP. The simulations were performed using the TEDS program, developed by Sharma & Associates to study the dynamics and energy levels under a variety of operating conditions. Derailments involving trains equipped with two way EOT devices were not specifically simulated. In simulated derailment speeds of 50 and 60 mph, at approximately the 9th car there is a divergence in the kinetic energy of individual railcars at the point of derailment between ECP, DP (EOT), and conventional brake systems. At those speeds, if a derailment occurs at the first car, changes in the brake signal propagation system will only be realized after the 10th car. At a derailment speed of 40 mph the divergence occurs at the 7th car. The following graphs show the reduction in kinetic energy as a function of train speed and a tank car's position in a train for each of the brake signal propagation systems described above.

Figures 1, 2, 3 and 4 below are based on the following assumptions:

- Each train includes three locomotives at 415,000 lbs., 100 cars at 263,000 lbs., train length 6,164 ft.
- DP has two locomotives at front and one at rear of train.
- DP 2/3 has two locomotives at front of the train, and one placed two thirds from the front.
- Dynamic brakes were assumed to be inactive for the purpose of the 18 percent

effectiveness rate of DP, thus it is a fair statement to say DP at the end of the train without the benefit of dynamic brakes is equivalent to EOT. Therefore, for the purposes of our analysis, we assumed EOT is as effective as DP when it is located at the end of the train.[54]

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

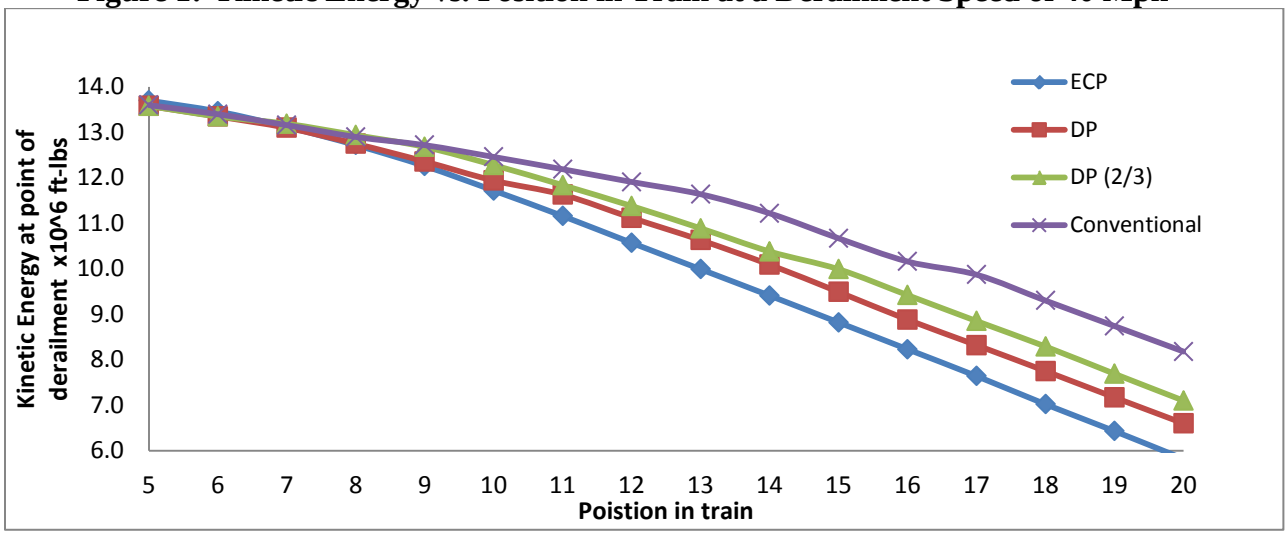
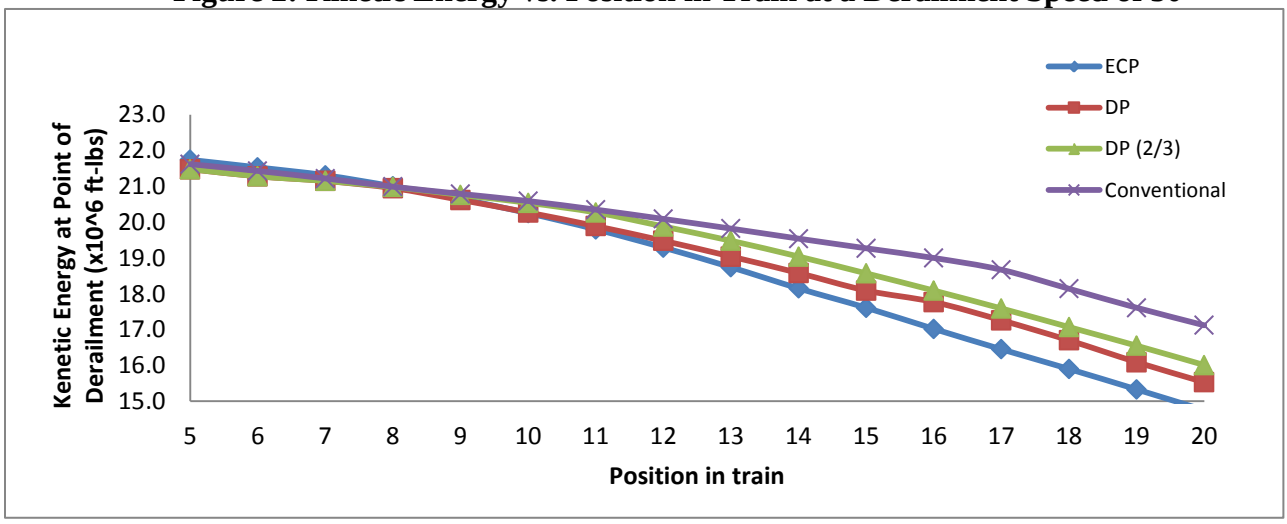
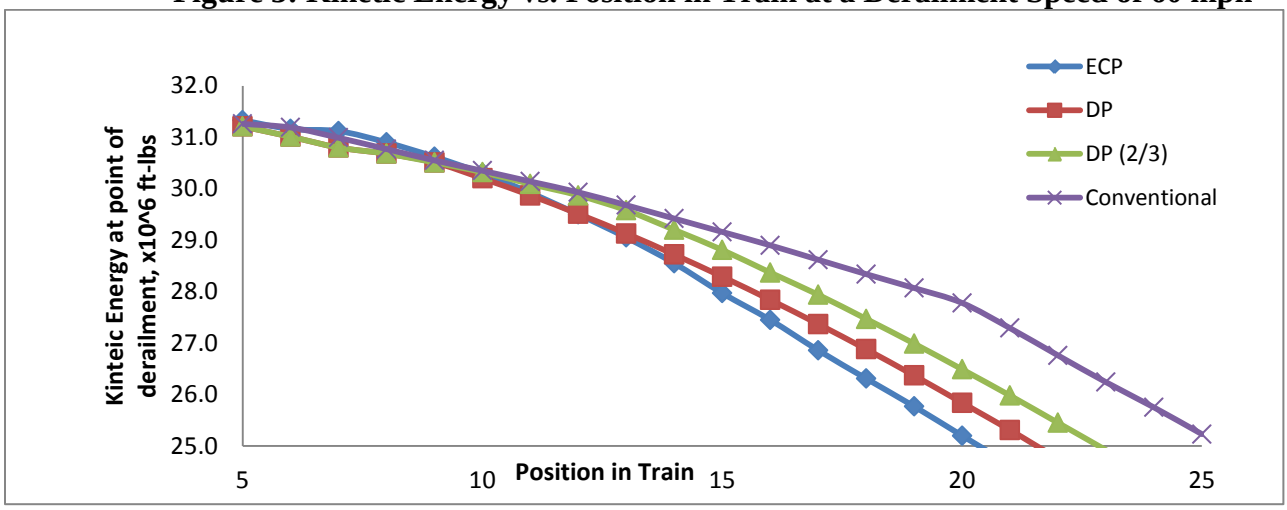


Figure 2: Kinetic Energy vs. Position in Train at a Derailment Speed of 50



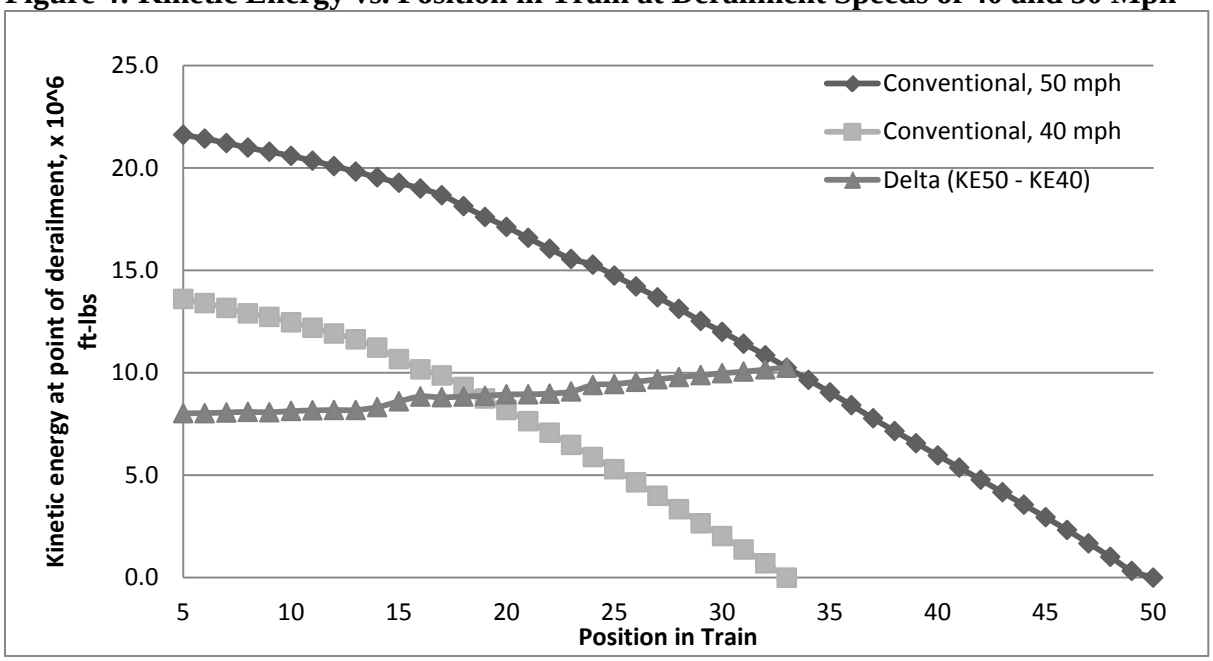
[54] The specifics of this model will be placed in the docket for this rulemaking upon completion. This assumption would tend to underestimate the benefits of ECP brakes, because it enhances the safety level of the estimated baseline.

Figure 3: Kinetic Energy vs. Position in Train at a Derailment Speed of 60 mph



The following graph provides the results of a comparison of the simulations of derailments at 40 and 50 mph. The data are the kinetic energy versus position in a train operating with conventional brakes. The trend line of the difference in energy per car is shown. The trend line is relatively flat, but the slope begins to increase slightly after the 15th car. This demonstrates that the slower the initial train speed, the greater the effect of braking on the ability of the train to dissipate energy.

Figure 4: Kinetic Energy vs. Position in Train at Derailment Speeds of 40 and 50 Mph



The results of these simulations suggest that alternative brake signal propagation systems decrease brake signal propagation time relative to the conventional brake system. Specifically, FRA simulations estimated that:

- Using its methodology to evaluate the probability of tank car puncture DOT calculated that a derailment involving a train made up of Option 1 tank cars (equipped with ECP brakes) will result in 36 percent fewer cars puncturing than the same train with conventional brakes. As such DOT estimates that ECP brakes would reduce the severity of a HHFT accident by an estimated 36 percent, compared to conventional brakes.
- Figures 1, 2 and 3 show that the ability for trains operating with two-way EOT device and DP brake systems to dissipate energy is between the abilities of those operating with ECP and conventional brake systems. Accordingly, DOT estimates that two-way EOT or DP would reduce the severity of a HHFT accident by 18 percent (half of the 36% estimated for ECP brakes), compared to conventional brakes.

Based on Sharma's modeling, the effectiveness of ECP was determined to be 36%, and DP was calculated (not simulated) to determine effectiveness of about 18 percent. However, as both DP and EOT effectiveness were calculated based on a number of factors and previous model runs, PHMSA and FRA will place a technical supplement into the rulemaking docket to provide greater detail on the inputs and assumptions underlying the model.

In this NPRM we are proposing to require each HHFT to be equipped with an enhanced brake signal propagation system. We are proposing an implementation schedule that minimizes the impacts on rail carriers. Specifically, subject to one exception, we are proposing to require the following:

- HHFTs to be equipped with a two-way EOT device as defined in 49 CFR 232.5, by

October 1, 2015.

- HHFTs to be equipped with a distributed power system as defined in 49 CFR 229.5 or an ECP brake system as defined in 49 CFR 232.5, by October 1, 2016.
- After October 1, 2015, a tank car manufactured in accordance with proposed § 179.202 for use in a HHFT must be equipped with ECP brakes.
- After October 1, 2015, HHFTs comprised entirely of tank cars manufactured in accordance with proposed § 179.202a and § 179.202b (for Tank Car Option 1. the PHMSA and FRA Designed Car, only), except for required buffer cars, must be operated in ECP brake mode as defined by 49 CFR 232.5.

To reduce the burden on small carriers that may not have the capital available to install new braking systems, we are proposing an exception. If a rail carrier does not comply with the proposed braking requirements above, the carrier may continue to operate HHFTs at speeds not to exceed 30 mph. We will continue to monitor braking performance and may consider other regulatory or non-regulatory actions in the future on restrictions for specific containers or trains.

An ECP brake system permits the train crew to monitor the effectiveness of the brakes on each individual car in the train and provides real-time information on the performance of the entire braking system of the train. ECP brake system technology also reduces the degradation on brake system components and can significantly reduce fuel consumption. Due to these added benefits, we believe that adding ECP brake technology to these captive fleet trains will have greater net social benefits than requiring only DP or EOT devices.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any

supporting evidence.

1. What is the annual capacity of tank car and locomotive manufacturing and retrofit facilities to install or implement ECP, DP, and EOT systems on the HHFT fleet? To what extent will implementation issues arise?
2. PHMSA estimates that ECP brakes cost $3,000 per new tank car, $5,000 per retrofitted tank car, and $79,000 per locomotive. To what extent do these estimates reflect the market prices for ECP?
3. PHMSA estimates that ECP brakes would reduce accident severity by 36 percent compared to conventional brakes with EOT devices and by 18 percent compared to locomotives with DP or another EOT device. To what extent do other simulation models, besides those used by FRA, or the results of ECP pilot programs validate these results?
4. PHMSA expects that all railroads already have two-way EOT devices, have DP, or operate at speeds lower than 30-mph, so PHMSA estimates no benefits or costs for the 30-mph limit in the absence of advanced braking systems. Do any railroads that operate at speeds greater than 30-mph also not have two-way EOT devices or DP?
5. How would the safety benefits of the proposed braking systems change if combined with the proposed speed limits and tank car standards?

F. New Tank Cars for High-Hazard Flammable Trains

In the September 6, 2013 ANPRM we requested comments pertaining to new construction requirements for DOT Specification 111 tank cars used in flammable liquid service. Though commenters differ on the applicability of a new construction requirement to all flammable liquids, all support prompt action to address new construction of tank cars.

In Recommendation R-12-5, NTSB recommends that we,

> Require that all newly-manufactured and existing general service tank cars authorized for transportation of denatured fuel ethanol and crude oil in PGs I and II have enhanced tank head and shell puncture resistance systems and top fittings protection that exceed existing design requirements for DOT Specification 111 tank cars.

Several commenters requested that PHMSA not adopt standards of construction for newly constructed tank cars beyond those of the CPC-1232. Additionally, most commenters, including API, were strongly against any retrofits of existing tank cars beyond minor modifications. For example, according to API,

> "There are approximately 15,000 cars built to the CPC-1232 standard currently in flammable liquid service. According to RSI, Approximately 36,000 more cars will be built to the CPC-1232 industry standard for crude oil service by December 2015. The industry has reached consensus on the P-1577 standard for tank cars in crude oil and ethanol service, and it is therefore important to issue regulations on these cars."

We address retrofits of existing cars in the next section. This section describes requirements for newly constructed tank cars used in HHFT

In this NPRM, we are proposing three Options for newly manufactured tank cars that will address the risks associated with the rail transportation of Class 3 flammable liquids in HHFTs. Tank cars built to the proposed new standard will be designated "DOT Specification 117." In addition, we are proposing a performance standard for the design and construction of tank cars equivalent to the DOT Specification 117. A tank car that meets the performance criteria will be assigned to "DOT Specification 117P." We propose to require new tank cars constructed after October 1, 2015 that are used to transport Class 3 flammable liquids in HHFT to meet the specification requirements for the DOT Specification 117 tank car or the proposed performance specifications. The proposed performance standard is intended to encourage innovation in the design of tank car, use of new materials, and incorporation of new appurtenances.

In addition, tank car manufacturers have the option to build a DOT Specification 117 tank car, as outlined in the proposed specification requirements. Both the prescribed specifications and the performance standard were developed to provide improved crashworthiness relative to the DOT Specification 111 tank car. In addition to proposing revisions to Part 179 of the HMR to include the DOT Specification 117 and 117P requirements, we are also proposing revisions to the bulk packaging authorizations in §§ 173.241, 173.242, and 173.243 to include the DOT Specification 117 and 117P tank car as an authorized packaging for those hazardous materials, as those sections are referenced in column (8C) of the HMT. We note that, as stated in the introductory text to §§ 173.241, 173.242, and 173.243, each person selecting a packaging must consider the requirements of subparts A and B of Part 173 of the HMR and any special provisions indicated in column (7) of the HMT.

Finally, we are proposing to incorporate by reference, in § 171.7, Appendix E 10.2.1 of the 2010 version of the AAR Manual of Standards and Recommended Practices, Section C—Part III, Specifications for Tank Cars, Specification M-1002, (AAR Specifications for Tank Cars). AAR frequently updates the AAR Specifications for Tank Cars. Appendix E provides requirements for top fittings for certain tank car Options provided below.

a. <u>DOT Specification 117 – Prescribed Car</u>

PHMSA is proposing several revisions to the HMR that would change the specification requirements for rail tank cars authorized to transport crude oil and ethanol. The changes would stipulate a new tank car performance specification—the DOT Specification 117 tank car—that would be phased in over time depending on the packing group of the flammable liquid. Revising or replacing the current standard for the DOT Specification 111 tank car is not a decision that DOT takes lightly. We seek to ensure that we select the car that will have the greatest net social

benefits, with benefits primarily generated from the mitigation of accident severity. We also aware of, and account for, the large economic effects associated with regulatory changes of this scale, as tank cars are a long-term investment. For these reasons, we are proposing three separate DOT Specification 117 Options and requesting comments. The tank car Options being considered in this NPRM are as follows:

Option 1: *PHMSA and FRA designed car*

Option 1 incorporates several enhancements designed to increase puncture resistance; provide thermal protection to survive a 100-minute pool fire; protect top fitting and bottom outlets during a derailment; and improve braking performance. Among the proposed tank car designs, Option 1 would minimize the consequences of a derailment of tank cars carrying crude oil or ethanol. There would be fewer car punctures, fewer releases from the service equipment (top and bottom fittings), and delayed release of flammable liquid from the tank cars through the pressure relief devices. The proposed enhancements are outlined in detail below:

Key features of this tank car Option include the following:

- 286,000 lb. GRL tank car that is designed and constructed in accordance with AAR Standard 286;
- Wall thickness after forming of the tank shell and heads must be a minimum of 9/16 inch constructed from TC-128 Grade B, normalized steel;
- Thermal protection system in accordance with § 179.18, including a reclosing pressure relief device;
- Minimum 11-gauge jacket constructed from A1011 steel or equivalent. The jacket must be weather-tight as required in § 179.200-4;
- Full-height, 1/2 inch thick head shield meeting the requirements of § 179.16(c)(1);

- Bottom outlet handle removed or designed to prevent unintended actuation during a train accident; and
- ECP brakes.

Under Option 1, the DOT Specification 117 tank car would be equipped with a top fittings protection system and nozzle capable of sustaining, without failure, a rollover accident at a speed of 9 mph, in which the rolling protective housing strikes a stationary surface assumed to be flat, level, and rigid and the speed is determined as a linear velocity, measured at the geometric center of the loaded tank car as a transverse vector.

For Option 1, PHMSA estimates that the roll-over protection and increased extra 1/8-inch of shell thickness would reduce crude oil and ethanol accident severity by 10 percent relative to a new tank car that would be constructed in the absence of this rule. Further, PHMSA estimates that ECP brakes would reduce accident severity by 36 percent compared to conventional brakes and 18 percent when compared to for EOT devices or DP. PHMSA estimates that the addition of ECP brakes, roll-over protection, and increased shell thickness would together add $5,000 to the cost of a new tank car that would be constructed in the absence of this rule.

Option 2: *AAR 2014 Recommended Car*

Option 2 is based on the AAR's recommended new tank car standard, approximately 5,000 of which have been ordered by BNSF Rail Corporation. On March 9, 2011 AAR submitted a petition for rulemaking P-1577, which was discussed in the ANPRM. In response to the ANPRM, on November 15, 2013, AAR and ASLRAA submitted as a comment[55] provide their recommendations for tank car standards that are enhanced beyond the design in P-1577. Notable upgrades from AAR's initial petition include increased shell thickness, jackets,

[55] See http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0090

thermal protection full-height head shields instead of half-height head shields for jacketed cars, top fittings protections, and bottom outlet handles that will not open in a derailment.

The Option 2 car has most of the same safety features as the Option 1 car, including the same increase in shell thickness, jacket requirement, thermal protection requirement, and head shield requirement, but it lacks rollover protection and the ECP brake equipment. Installation of ECP brake equipment largely makes up the cost differential between the Option 1 and 2 cars, and the differences in estimated effectiveness are also largely a result of ECP brakes. In essence, examining these cars side by side in the following analysis provides a de facto comparison of the costs and benefits of equipping high hazard flammable trains with ECP braking.

For Option 2, FRA estimates that the extra 1/8-inch of shell thickness would reduce crude oil and ethanol accident severity by 10 percent relative to the new car that would be constructed in the absence of this rule. PHMSA estimates that the increased thickness would add $2,000 to the cost of a new tank car that would be constructed in the absence of this rule.

Option 3: *Enhanced Jacketed CPC-1232*

Option 3 is an enhanced jacketed CPC-1232 tank car standard. This Option would modify the CPC-1232 standard by requiring improvements to the bottom outlet handle and pressure relief valve. It would also remove options (1) to build a car with weaker steel type but with added shell thickness or (2) to build a car with a thicker shell but no jacket. This standard is the car configuration PHMSA believes will be built for HHFT service in absence of regulation, based on commitments from one of the largest rail car manufacturers/leasers – Greenbrier, Inc. and the Railway Supply Institute.[56] This car is a substantial safety improvement over the current

[56] Greenbrier: http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0155
RSI: http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0156

DOT Specification 111 but does not achieve the same level of safety as the Option 1 or Option 2 cars. This tank car has a 7/16 inch shell, which is thinner than Option 1 or Option 2 tank cars. Similar to the Option 2 car, this car lacks rollover protection and ECP brake equipment. Because PHMSA assumes that Option 3 is the car that would be built in the absence of this rule, it estimates no costs or benefits from Option 3 for new cars.

All of the Options provided above are designed to address the survivability of the tank car and would mitigate the damages of rail accidents better than the current DOT Specification 111. Specifically, the tank car Options incorporate several enhancements to increase puncture resistance; provide thermal protection to survive a 100-minute pool fire; and protect top fitting and bottom outlets during a derailment. Under all Options, the proposed system of design enhancements would reduce the consequences of a derailment of tank cars carrying crude oil or ethanol. There would be fewer car punctures, fewer releases from the service equipment (top and bottom fittings), and delayed release of flammable liquid from the tank cars through the pressure relief devices.

- Table 2 summarizes the safety features of the DOT Specification 117 tank car Options proposed in this rule. Note that the proposed Options differ on shell thickness, top fittings, and braking.

Table 17 summarizes the effectiveness of the proposed elements of each option. The effectiveness was calculated using the following assumptions:

- PHMSA examined the 13 accidents provided in Table 3 to arrive at its effectiveness rates. This subset of 13 accidents used to calculate effectiveness rates may not be representative of all 40 mainline accidents, from 2006 to present, for trains carrying crude oil and ethanol. (see Appendix B of the RIA for a complete listing of the 40 mainline

train accidents during this timeframe). However, PHMSA uses this subset because the data has been verified and demonstrative of HHFT risk.

- DOT Specification 111 tank cars composed the vast majority of the type of tank cars involved in the derailments listed in Table 3. The type of damages these tank cars experienced were used to design the tank car options proposed in the NPRM.
- The volume of lading lost from each tank car in the derailments indicated in Table 3 compiled relative to the documented damage to each tank car that lost lading. These values were used as the baseline for tank car constructed to the current DOT 111 specification.
- Improvement in performance was based on the following assumptions.
    - The ratio of puncture force (DOT111/option) was used as a multiplier to determine the reduction in lading loss.
    - Thermal protection prevented thermal damage that results in loss of containment.
    - Top fittings protection halves the damage to service equipment.
    - BOV modification prevents lading loss through valve.
- The reduced volume of lost lading relative to each enhancement was compared to the baseline to calculate respective reduction or effectiveness.

PHMSA will place into the docket for this rulemaking a more detailed technical supplement that describes the baseline accidents, model inputs, and assumptions that were used to develop the effectiveness rates for each tank car option). For a detailed discussion of these safety features, please refer to Section F. New Tank Cars for High-Hazard Flammable Trains.

Table 17: Effectiveness of newly constructed tank car options relative to the non-jacketed DOT111 specification tank car

Tank Car	Total (%)	Head	Shell	Thermal	Top fittings	BOV

		puncture (%)	puncture (%)	damage (%)	(%)	(%)
Option 1	55	21	17	12	4	<1
Option 2	51.3	21	17	12	1.3	<1
Option 3	41.3	19	9	12	1.3	0

* The top fitting protection for the DOT117 is based on the load conditions described in 179.102-3. The top fittings protection for the BNSF and CPC-1232 car meet the load conditions in M-1002 Appendix E, 10.2. The former is a dynamic load and the latter is a static load. Modeling indicates the stresses imparted in the tank shell during the dynamic loads is three time those encountered during the static load. Therefore, DOT assumes the effectiveness of top fittings for the DOT 117 is 3 times that of the BNSF tank car.

PHMSA will place into the docket for this rulemaking a technical supplement that describes the model inputs and assumptions that were used to develop the effectiveness rates in table 17.

Puncture Resistance

Shell and head punctures are the failure modes that result in rapid and often complete loss of tank contents. A HFFT poses a greater increase risk resulting from puncture due to the volatility of the lading. Minimizing the number of cars punctured in a derailment is critical because flammable liquids, if ignited, can quickly affect the containment of adjacent cars. For example, a derailment in Columbus, Ohio in July 2012 involved 17 freight cars, three of which were tank cars containing ethanol. One of the tank cars was punctured, releasing ethanol, and a fire ensued. Two adjacent tank cars also carrying ethanol were exposed to the fire for an extended period of time. Both cars experienced a thermal tear, resulting in a release of product and a fire ball. In many cases, tank cars of flammable liquid exposed to pool fire conditions experience significant pressure rise. When the pressure relief valve actuates to prevent an energetic failure of the tank car, it discharges flammable liquid, prolonging the fire.

Shell Puncture

PHMSA examined data collected by both PHMSA and FRA for information on derailments involving crude oil and ethanol. For the purposes of this analysis PHMSA focused on main line train derailments beginning in 2006 and forward. We focused on this date range

due to the apparent increase in both the frequency and severity of derailments. PHMSA believes that this recent trend is a result of increased use of HHFTs to transport flammable material and we believe this trend will continue. In reviewing the incidents in table 3, shell puncture is the most common train accident damage that results in loss of lading. A number of strategies exist to improve puncture resistance of a tank car, including using higher strength and tougher steel and increasing the thickness of the shell and head of the tank. Tougher steel absorbs more energy by deforming. Thickness of the tank shell/head can be increased and/or a jacket can be added to the design.

DOT is considering both of these strategies. While the shells and heads of DOT Specification 111 and the CPC-1232 standard can be constructed of A516-70 steel, all tank car design standard Options in this proposed rule would require normalized TC-128 steel because of its superior strength and toughness. Further, the head and shells of DOT Specification 111 and the CPC-1232 standards are 7/16 inch thick (not including the jacket). Options 1 and 2 propose to require DOT Specification 117 tank car head and shells be a minimum of 9/16 inch thick.

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

Using the analytical method developed by E.I. DuPont de Nemours and validated through testing performed at the Transportation Technology Center in Pueblo, CO, available for review in the public docket for this rulemaking, FRA calculated the shell puncture resistance of all three Options compared to the DOT Specification 111 tank car. [57]

[57] "Detailed Puncture Analyses Tank Cars: Analysis of Different Impactor Threats and Impact Conditions" can be found at: http://www.fra.dot.gov/eLib/details/L04420

The proposed materials, minimum thickness of 9/16 inch, and jacket provide a 68 percent improvement in the puncture force for Options 1 and 2 relative to the current specification requirements for a DOT Specification 111 tank car. This translates to a 17 percent effectiveness rate. A tank car constructed to the proposed requirements of Option 3, would have a 35 percent improvement in puncture force relative to the current DOT Specification 111 tank car.[58] This translates into a 9 percent effectiveness rate.

In addition, PHMSA and FRA do not expect the increased thickness, combined with a full-height head shield and a jacket, in Options 1 and 2 to decrease new tank car capacity. The T87.6 Task Force, in considering increased thickness and jacket recommendations, stated that the increased weight per car "results in a decrease in the capacity of the tank and a commensurate increase in the number of shipments required to meet customer demand. Additional shipments would result in an increase in the number of tank cars derailed." However, for the reasons mentioned in the section "Effects of Increased Weight" below, PHMSA does not expect that these requirements will cause fully loaded tank cars to exceed 286,000 GRL.

1b. Head Puncture

Puncture resistance of the tank head is another important consideration. Table 3 above highlights this risk of HHFTs by summarizing the impacts of major train accidents involving trains of crude oil and ethanol. Derailment data from table 3 indicates that approximately 30 percent of ethanol and crude oil tank cars experienced punctures in their heads. Of the punctured heads, approximately 38 percent occurred in the top half, and 62 percent occurred in the bottom half of the head.

[58] Modeling and simulation of puncture velocity indicate a puncture velocity of approximately 7.4 mph for a legacy DOT Specification 111; 9.6 mph for Option 3; and 12.3 mph for the cars under Options 1 and 2. Puncture velocity is based on an impact with a rigid 12" x 12" indenter with a weight of 297,000 pounds.

Tank head puncture resistance has been the subject of a number of previous rulemakings. On July 23, 1974, DOT's Hazardous Materials Regulations Board published a final rule HM-109 (39 FR 27572) that established requirements for head shields in the HMR at § 179.100-23. The requirements were for half height head shields (on non-jacketed pressure cars) with specific minimum dimensions, and performance requirements defined by the AAR impact test. The requirements were based on three studies that indicate half height head shields were between 50 percent and 77 percent effective.

On May 26, 1976, DOT's Materials Transportation Bureau published a final rule under Docket HM-109 (41 FR 21475) that adopted minor amendments to the head shield requirements.

On September 15, 1977, DOT's Materials Transportation Bureau published a final rule under Docket HM-144 (42 FR 46306) that introduced § 179.105-5 Tank Head Puncture requirements, which included performance standards and test requirements. Coupler restraint and thermal protection systems were also included. Half height head shields were not precluded from use as long as they met the requirements in § 179.100-23.

On September 21, 1995, DOT's RSPA published a final rule under Dockets HM-201 and HM-175A (60 FR 49048) that introduced the current § 179.16 and removed §§ 179.100-23 and 179.105-5. The new requirements applied to tank cars transporting all Class 2 materials. In the preamble of the rule PHMSA stated "research demonstrates that puncture resistance is an inter-related function of head thickness, insulation thickness, and jacket thickness, and the concept of head protection must include more than just traditional (half-height) head shields." DOT maintains this position and, accordingly, is proposing all Options for the DOT Specification 117 tank car with a jacket and 1/2 inch thick full height head shields.

The combination of the shell thickness and head shield of Options 1 and 2 provide a head

puncture resistance velocity of 18.4 mph (21% effectiveness rate). Because the Option 3 tank car has a 7/16 inch shell, as opposed to the 9/16 inch shell in Options 1 and 2, it has a head puncture resistance velocity of 17.8 mph.

The results of this modeling are described in Table 18.

Table 18: Shell and Head Puncture Velocities by Tank Car Option

Tank Car	Shell Puncture Velocity (improvement relative to DOT111 non-jacketed)	Head Puncture Velocity (improvement relative to DOT111 non-jacketed)
Option 1	12.3 mph (66%)	18.4 mph (114%)
Option 2	12.3 mph (66%)	18.4 mph (114%)
Option 3	9.6 mph (30%)	17.8 mph (107)
CPC-1232 unjacketed	8.5 mph (15%)	Top – 10.3 (20%) Bottom – 17.6 (105%)
DOT-111 jacketed	9.3 mph (26%)	11.6 mph (35%)

Thermal Protection System

In train accidents listed in Table 3 above, approximately 10 percent of tank car breaches were attributed to exposure to fire conditions. It is worth distinguishing between insulation and thermal protection. Insulation is intended to keep lading at or near a desired temperature during transportation. Insulation is ineffective at temperatures exceeding 350F because it disintegrates into a powder. Thermal protection is intended to limit the heat flux into the lading when exposed to fire. Thermal protection will survive for a certain period of time in pool fire conditions. Thermal protection will prevent rapid temperature increase of the lading and commensurate

increase in vapor pressure in the tank. This limits the volume of material evacuated through the pressure relieve valve and dangerous over pressurization of the tank.

All DOT Specification 117 options in this NPRM require a thermal protection system sufficient to meet the performance standard of § 179.18, and which must include a reclosing pressure release valve. Section 179.18 requires that a thermal protection system be capable of preventing the release of any lading within the tank car, except release through the pressure release device, when subjected to a pool fire for 100 minutes and a torch fire for 30 minutes. Typically, tank cars with thermal protection are equipped with a weather-tight 11-gauge jacket. Intumescent materials, which do not require a jacket, are infrequently used because of high maintenance costs. The jacket provides the necessary protection by shielding the radiated heat to the commodity tank.

Consistent with current minimum industry standards and Federal regulations for pressure cars for Class 2 materials, the T87.6 Task Force agreed that a survivability time of 100-minutes in a pool fire should be used as a benchmark for adequate performance in this proposed rule. The 100-minute survival time is the existing performance standard for pressure tank cars equipped with a thermal protection system and was established to provide emergency responders with adequate time to assess a derailment, establish perimeters, and evacuate the public as needed, while also giving time to vent the hazardous material from the tank and prevent an energetic failure of the tank car.

The Analysis of Fire Effects on Tank Cars (AFFTAC)[59] was used to evaluate the relative performance of tank cars equipped with different thermal protection systems. The analysis simulated tank cars of varied configurations (jackets and non-jacketed) and positions (rolled over

[59] Information regarding AFFTAC can be found at the following link. http://www.srconsult.com/AFFTACInfo.htm

at different angles) exposed to pool and torch fires meeting the requirements in the In evaluating the performance of the thermal protection systems in the simulations, the T87.6 Task Force considered the amount of material remaining in the tank at the time of breach, rather than survival time, to be the best metric of the potential for energetic rupture. The Task Force came to this conclusion because research shows that there is a direct relationship between this amount and the energy of the tank failure[60] and, as with any simulation, there are uncertainties in the absolute survival time estimates. Under all simulation conditions and all thermal protection systems, when the tank failed all of the lading had been vaporized. That indicates that there would be little energy remaining in the tank to produce an energetic rupture at the time of breach. Moreover, the thermal protection prolonged the survivability of the tank by delaying the moment where pressure in the tank exceeded the start to discharge of the pressure relief valve, thus delaying the unintended release of flammable liquid. Because all the thermal protection systems meeting the § 179.18 performance standard that PHMSA studied performed equally well in the simulations, and because the simulations indicated the importance of a pressure relief valve, PHMSA is not requiring a particular system, but instead is requiring that a thermal protection system meet the performance standard of § 179.18 and include a reclosing pressure relief device.

Top Fittings Protection

The top fitting protection consists of a structure designed to prevent damage to the tank car service equipment under specified loading conditions. For the DOT Specification 117 is based on the load conditions described in 179.102-3. The top fittings protection for the BNSF and CPC-1232 car meet the load conditions in M-1002 Appendix E, 10.2. The former is a

[60] "Fire Tests of Propane Tanks to Study BLEVEs [Boiling Liquid Expanding Vapor Explosions] and Other Thermal Ruptures: Detailed Analysis of Medium Scale Test Results", Department of Mechanical Engineering, Queen's University, Kingston, Ontario, Nov. 1997. Online link to study and research: http://me.queensu.ca/People/Birk/Research/ThermalHazards/

dynamic load and the latter is a static load. Damage to top fittings can occur when a tank car rolls-over and the equipment strikes the ground or another tank car or is stuck by another car. The specification requirements must consider all of these potential causes of damage to prevent loss of containment. The volume of releases from top fittings is a fraction, typically less than 5 percent of the volume of releases from tank shell and head punctures. Nonetheless, top fittings represent 25 percent of the documented damage to tank cars in recent train accidents. A unique issue with derailments of tank car containing flammable liquids is that ignited lading from a single car can initiate a domino effect of heating an adjacent car(s) which will expels flammable liquid from the PRV that fuels the existing fire and effect additional cars. Preventing the release of flammable liquids in a derailment, regardless of the volume that is lost from a specific source, reduces risk to public health and the environment.

The T87.6 Task Force considered three options related to top fittings with the dual purpose of improved crashworthiness and reduction of NARs: removal of vacuum relief valves (VRVs), elimination of hinged and bolted manways, and roll-over protection.

VRVs, if operated properly, are an important feature of the tank car's service equipment as they provide an additional safeguard against implosion of tank cars that are filled with elevated temperature material or are cleaned with steam or hot liquid. Tank cars are offered with VRVs as standard equipment. They are often misused by personnel at the loading or unloading facilities and used as venting equipment during normal operations (tank cars are typically equipped with air valves that are designed and intended for repeated opening and losing for loading and unloading operations. The VRV is an emergency device to function in only particular circumstances. As a result of misuse VRV are a common source of non-accident releases. The task force evaluated whether VRVs should be prohibited from application to all

DOT Specification 111 tank cars.

Hinged and bolted manways are a closure on manways of general purpose tank cars (DOT Specification 111). The hinge and bolted design permits repeated opening and closing for loading and unloading, and inspection. Proper securement of hinged and bolted manways is sensitive to the size and condition of sealing surface, the type of gasket, condition of bolts and torque procedure. Unless all these factors are considered when securing a tank car for transportation a release of lading will occur resulting from the sloshing of the liquid in transportation. In derailment conditions, if the manway cover is not damaged by impact, leaks are often encountered in car rolled-over on their side. Accordingly, the T87.6 Task Force evaluated the elimination of hinged and bolted manways. For example, five hinged and bolted manways were damaged (creating a leak point) in the Arcadia, OH derailment. The damages included a shattered manway cover and sheared bolts. In addition, hinged and bolted manways account for nearly 30 percent of all NARS. Representatives of the shipping community expressed several concerns regarding the elimination of hinged and bolted manways, including infrastructure issues. The infrastructure at many loading facilities is set up with a system that seats on the manways and include a stinger to deliver the lading as well as vapor recovery. In addition, the loading facilities often use the manways as a means to inspect the gage bar to determine the outage, inspect the condition of the siphon pipe, interior of the tank shell or an interior coating. Alternatives to hinged and bolted securement are currently under development and testing. This option is not being considered for regulatory action at this time because the burden on the shipping community may be reduced if alternatives are available at the time of regulation.

As proposed, only the Option 1 tank car must be equipped with protective structure

capable of sustaining, without failure, a rollover accident at a speed of 9 mph, in which the structure strikes a stationary surface assumed to be flat, level, and rigid and the speed is determined as a linear velocity, measured at the geometric center of the loaded tank car as a transverse vector. Failure is deemed to occur when the deformed protective housing contacts any of the service equipment or when the tank retention capability is compromised.

For Options 2 and 3, newly constructed tank cars would require top fittings consistent with the AAR's specification for Tank Cars, M-1002, Appendix E, paragraph 10.2. The top fittings protection design requirements are for static loads. The rollover protection performance requirement prescribed in the HMR is for a dynamic load. The resultant stresses in a protective housing and tank from the dynamic load exceed those from the static loads by a factor of three based on a study by Sharma & Associates[61] comparing the performance of the different systems under both the static requirements of top fittings protection and dynamic conditions of roll-over protection. The industry was concerned that a 7/16 inch thick shell could not withstand the stresses imparted by a roll-over protection structure. This concern remains. However, there is general agreement that a tank car constructed of 9/16 inch steel is capable of withstanding the stresses during a roll-over event. As such, a protective structures meeting the rollover protection performance standard will offer protection of the top fittings superior to that of a structure meeting the static load requirements.

Bottom Outlet Protection

The bottom outlet protection ensures that the bottom outlet valve does not open during a train accident. The NTSB recommended that PHMSA require all bottom outlet valves used on newly-manufactured and existing non-pressure tank cars are designed to remain closed during

[61] The studies (Phase I and Phase II) can be found on the e-Library of the FRA Web site at: http://www.fra.dot.gov/eLib/details/L02545

accidents in which the valve and operating handle are subjected to impact forces. The proposed requirements for all DOT Specification 117 Options in this NPRM require the bottom outlet handle to be removed or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

The T87.6 Task Force considered elimination of BOVs. Representatives of the shipping community expressed the following concerns regarding this idea:

- BOVs are a valued feature of the tank car for the shipping community. The BOV is used to unload, and in some cases, load the tank cars.
- The BOV is necessary when the car is cleaned to drain the rinse liquid.
- Eliminating the allowance for BOV will require major alterations of existing infrastructure of loading and unloading facilities.

Therefore, the AAR TCC created a docket T10.5 and a task force to evaluate bottom outlet performance. The task force considered the following ideas:

- Shipment of the car without the BOV handle attached and development of a standard/universal handle attachment.
- Eliminating use of an overly strong handle.
- Incorporating operating stops on valve bodies.

In addition to the AAR TCC, recommendations, PHMSA also received NTSB Recommendation R-12-6. This recommendation requests that PHMSA require all bottom outlet valves used on newly-manufactured and existing non-pressure tank cars be designed to remain closed during accidents where the valve and operating handle are subjected to impact forces.

PHMSA has considered the loading and unloading concerns of offerors regarding the removal of the bottom outlet valve entirely. Therefore, PHMSA is not proposing to eliminate the

BOV entirely. Instead, PHMSA is proposing that on cars with bottom outlet valves, the bottom outlet handle be removed or be designed to prevent unintended actuation during train accident scenarios. For example, this requirement could be met simply by removing the handle during transportation or redesigning bottom outlet configurations (i.e. recessed valving).

Effects of Increased Weight

The additional safety features of the proposed new tank car standard could increase the weight of an unloaded tank car. For instance, all proposed Options for the DOT Specification 117 car include head shields, a jacket, thicker tank shell steel, and other safety features not required in DOT Specification 111 tank cars. Additional weight for the tank car could lead to a reduction in lading capacity per tank car, as rail cars must be under the applicable gross rail weight (GRL) when fully loaded. However, PHMSA and FRA believe there will not be less capacity in practice, for the following reasons:

- PHMSA is proposing a performance standard and expects that the regulations will spur innovation in tank car design and construction. Industry is currently evaluating new, tougher steels as well as composite materials and crash energy management systems intended to improve energy absorption with little or no weight penalty. Innovation will be driven by a desire to decrease the tare weight of the tank car. Assuming the market will be interested if the new materials will restore the pre-DOT Specification 117 tare weight and cost no more than the materials in the DOT Specification 117, the reduction will be at least 9%. This decrease in the tare weight will increase the load limit (carrying capacity) of the car by 9% without increasing material cost.
- When considering risk associated with decreased tank car load limit it is the number of trains and derailment rate that is relevant. DOT believes the railroads will optimize unit

train length which may result in longer trains. Optimization will be based on a number of factors including train length, available horse power, grade along route, required speed, loading rack capacity and loop size. Because there are so many variables it is difficult to predict the change in operations resulting from a potential decrease in load limit. As such, DOT is seeking comment on the issue.

- The DOT 117 is authorized to operate at a GRL of 286,000 lbs. The regulations currently authorize the DOT 111 to operate at a GRL of 263,000 lbs. However, DOT 111 tank cars that meet the minimum standards provided in FRA's Federal Register Notice of January 25, 2011[62] are permitted to operate at a GRL of up to 286,000 lbs. The proposed tank car specifications meet those minimum requirements and PHMSA and FRA believe that the additional weight of the safety features will be accommodated by the increase in allowable GRL and will not decrease the load limit (or innage) as indicated in the table below. For example, a jacketed CPC1232 can be loaded to 1% outage and not weigh 286,000 pounds (approximately 281,000 pound) and as such, there is no capacity gain to be had unless the allowable GRL is increased beyond 286,000.
- Bridge capacity along the routes limits the GRL of a particular railroad or segment of rail. The primary concern for this issue is the terminal railroads. DOT believes all of the Class I RRs are capable of 286,000. The ASLRRA, website indicates that nearly half of its member railroads are capable of moving tank cars with a gross rail load of 286,000. There is very little specific information provided and perhaps a RR has a trestle on a line not capable of handling a 286,000 car that would not necessarily affect the

[62] This FR Notice required compliance with AAR standard S286. AAR Standard S-286 applied to four axel freight cars designed and designated to carry a gross rail load of greater than 268,000 pounds and up to 286,000 pounds. The standard includes requirements for car body design loads, fatigue design, brake systems. Bearings, axels, wheels, draft system, springs, trucks, and stenciling.

delivery of crude oil to a customer because the trestle exists beyond the delivery point. DOT is requesting information from industry that will provide a better understanding of the capacity of the terminal railroads.

The capacity of candidate tank cars are as follows:

Tank Car Characteristics	Gross Rail load	Tare Weight	Ethanol Capacity (6.58 lbs./gallon)	Crude Oil Capacity (6.78 lbs./gallon)	Total Weight of tank car (Ethanol)	Total Weight of tank car (Crude)
DOT 111 specification non-jacketed	**263,000**	67,800	29,666	28,790	263,000	263,000
	286,000	67,800	29,700	29,700	233,226	269,166
DOT111/CPC1232 non jacketed	**263,000**	75,200	28,540	27,699	263,000	263,000
	286,000	75,200	29,700	29,700	270,626	276,566
DOT111/CPC1232 jacketed	**263,000**	80,800	27,690	26,873	263,000	263,000
	286,000	80,800	29,700	29,700	276,226	282,166
FRA and PHMSA designed car (Option 1)	**263,000**	85,500	26,976	26,180	263,002	263,000
	286,000	85,500	29,700	29,572	280,926	286,000

***29,700 gallons is the minimum allowable outage (1%) on a 30,000 gallon capacity car.**
Note: For cars operating at a gross rail load of 286,000 pounds there is no loss of capacity.
Note: If limited to 263,000 pound gross rail load, all cars except the legacy DOT Specification 111 will have a lower capacity. The DOT Specification 117 represents a larger decrease in capacity than the DOT Specification 111/CPC-1232 jacketed.

As a result, we do not expect more, or longer, trains being offered into transportation as a result of any tank car requirement options in this proposal. We request comments on our rationale and conclusion that there will be no reduction in tank car capacity.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. PHMSA expects that all new tank cars put into in crude oil and ethanol service would, in the absence of this rule, have jacket, thermal protection, TC-128 Grade B normalized

steel, full height head shield, enhanced top fittings protection, and bottom outlet valve reconfigurations. Would any new crude oil or ethanol tank cars, manufactured in 2015 and beyond, not have all of these features? If so, please provide specific data on missing features and the numbers of cars in each category.

2. For the reasons listed above, PHMSA estimates no decrease in tank car capacity from the increased weight of Options 1 and 2. However, some commenters on the ANPRM suggested otherwise. PHMSA solicits data and other relevant information in order to be able to fully evaluate such claims. To the extent that commenters believe tank car capacity would be adversely affected, PHMSA seeks information on the benefits and costs of any such effects or of industry responses (such as developing innovative materials) to respond to capacity reduction / weight increases
3. Would the increased size and weight of the tank car Options have any other effects not discussed in the NPRM or accompanying RIA? To what extent would they affect braking effectiveness? To what extent would they affect track safety performance? To what extent would they affect loading practices?
4. What additional safety features not discussed here, if any, should PHMSA consider? If so, please provide detailed estimates on the costs and benefits of individual safety features.
5. Do any of the safety features included in any of the Options have costs that are likely to exceed benefits? If so, please provide detailed estimates on the costs and benefits of individual safety features.
6. As noted above, PHMSA estimates that that the 1/8-inch thickness would provide an 9 percent reduction in accident severity and would cost $2,000. To what extent does the

risk reduction align with the findings of other tank car effectiveness studies? To what extent does this cost estimate reflect market prices?

7. For Option 1, PHMSA expects the upgrade to roll-over protection can be made at almost no cost. To what extent does this cost estimate reflect market prices?
8. What would be the benefits and costs of allowing CPC-1232 cars ordered before October 1, 2015 to be placed into service for their useful life? What, if any, additional safety features should be required for these cars during their useful lives?

b. DOT Specification 117 – Performance Standard

In this NPRM, we propose to require a tank car that is constructed after October 1, 2015 and used to transport ethanol or crude oil or used in a HHFT, to either meet the proposed DOT Specification 117 design requirements or the performance criteria. Under this proposal, a car manufactured to the performance standard must be approved in accordance with § 179.13(a) and must incorporate several enhancements to increase puncture resistance; provide thermal protection to survive a 100-minute pool fire; and protect top fitting and bottom outlets during a train accident. The proposed performance standard is intended to encourage innovation in tank car designs, including materials of construction and tank car protection features, while providing an equivalent level of safety as the DOT Specification 117. Tank car manufacturers would be allowed to develop alternative designs provided they comply with the performance requirements. Under the proposal, such a design, for example, may incorporate materials of construction that increase puncture resistance but reduce the tank weight, increasing the amount of product in a tank and reducing the number of shipments required to move the same amount of hazardous materials.

A tank car that meets the performance requirements, if adopted, will be assigned to "DOT

Specification 117P." Builders would have to demonstrate compliance with the performance standards and receive FRA approval prior to building the cars

G. Existing Tank Cars for High-Hazard Flammable Trains

As discussed in Section F above, there are three proposed tank car Options for new cars, each with a prescribed tank car and a performance standard. PHMSA proposes to also require existing cars to meet the same DOT Specification 117P performance standard as these new cars, except for the requirement to include top fittings protections. Existing tank car tanks may continue to rely on the equipment installed at the time of manufacture. PHMSA chose not to include top fitting protections as part of any retrofit requirement as the costliness of such retrofit is not supported with a corresponding appropriate safety benefit.[63] Therefore, retrofitted cars will meet the DOT Specification 117P performance standard and may continue to rely on the equipment installed at the time of manufacture. The Options for the performance standard outlined above and in the regulatory text of this NPRM are:

- Option 1: PHMSA and FRA designed car;
- Option 2: AAR 2014 Tank Car; and
- Option 3: Enhanced Jacketed CPC-1232.

We request comments regarding the impacts associated with each tank car option as a standard for existing tank cars. Specifically, we would like to know which portions of the fleet commenters expect would be retrofitted, repurposed, or retired under each option, and the anticipated costs and benefits.

In the September 6, 2013 ANPRM we specifically requested comments pertaining to the various retrofit options discussed in the tank car petitions. In its comments, NTSB urges

[63] The cost to retrofitting Top fitting protection (if no top fitting protection) is estimated to be $24,500, while the comparable effectiveness rates are low. For effectiveness rates see Table 19.

PHMSA to take immediate action to require a safer package for transporting flammable hazardous materials by rail. In its comments, NTSB restates its concerns that any regulatory action should apply to new construction and the existing tank car fleet.

Railway Supply Institute strongly urges PHMSA to adopt a separate approach for existing tank cars that is uniquely tailored to the needs of the existing DOT Specification 111 tank car fleet. It adds,

> Many builders and offerors 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. 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.

In their comments Watco and the Railway Supply Institute (RSI) provided detailed cost information on each of the enhancements necessary to bring older cars up to the new performance standard. These include the cost of top fitting protections,[64] jackets, thermal protection or replacement of the pressure relief valve, a new bottom outlet valve handle, full-height head shields, and ECP brake installation (for Option 1).

Table 19: Retrofit Costs for Public Comments

Retrofit Option	Cost
Bottom outlet valve handle	$1,200
Pressure relief valve	$1,500
New truck	$16,000
Thermal protection	$4,000
Full jacket	$23,000
Full height head shield	$17,500
Top fitting protection (if no top	$24,500

[64] Top Fitting Protections are new construction requirements only and are not required as part of any retrofits.

fitting protection)[68]	
ECP brakes	$5,000

Two retrofit options—increased 1/8-inch thickness and roll-over protection—were not included in the public comments providing cost estimates. We expect that existing tank cars with 7/16-inch shell thickness will meet this any tank car standard with 9/16-inch shell thickness by adding 1/8-inch thickness to the retrofitted jacket (increasing the jacket thickness from its usual 11-gauge thickness), and assume this thicker jacket costs an additional $2,000 (from the estimated $23,000 cost for an 11-gauge jacket). In addition, we expect no costs from any retrofit for roll-over protection relative to the top-fitting the protection cost estimate provided in public comments.

Many public commenters raised technical issues and potential implementation problems from an industry-wide retrofit for crude oil and ethanol cars. For example, the API public comment noted issues with the extra weight on stub sills and tank car structures, and issues with head shields and brake wheels/end platforms, and issues with truck replacement. API also expressed implementation concerns about shop capacity, the current backlog of car orders, and engineering capacity. Public commenters stated that PHMSA should set an implementation timeframe conducive to avoiding service bottlenecks.

While the CPC 1232 tank car enhancements will significantly improve safety for newly manufactured tank cars, RSICTC strongly urges PHMSA to promulgate a separate rulemaking for existing tank cars that is uniquely tailored to the needs of the existing DOT Specification 111 tank car fleet. RSICTC further states, "[s]hould modifications be made to the existing jacketed DOT-111s to conform to the CPC-1232 standards, we again urge PHMSA to allow these modified cars to remain in active service for the duration of their regulatory life." RSICTC also submits that PHMSA adopt a ten-year program allowing compliance to be achieved in phases

through modification, re-purposing or retirement of unmodified tank cars in Class 3, PG I and II flammable liquid service. Tank car modifications supported by RSICTC include adding half-height head shields, protecting top and bottom fittings and adding pressure release valves or enhancing existing pressure release valves.

Greenbrier, a tank car manufacturer and servicer has stated that the most vital of these modifications is the addition of a trapezoidal or conforming half-height head shield to prevent penetration of tank cars by loose rails. Greenbrier stated that together with the top and bottom fittings protections and enhanced release valves, these improvements could significantly limit the likelihood of breaching the tank car. Further, Greenbrier commented that the ten-year timeline suggested by RSICTC is excessive and unmodified tank cars could and should be removed from hazardous materials service much sooner.

API and other commenters stated in their comments that they are strongly opposed to the mandating of any retrofits beyond the higher-flow pressure relief device recommended by the T87.6 Task Force for thermal protection due to the lack of economic and logistical feasibility. The table 20 presents how we expect the fleet to evolve going forward if regulations are not adopted.

Table 20: Fleet Projections 2015-2034 Absent New Regulation

Year	Total Cars Baseline	DOT 111	DOT 111 with Jacket	CPC 1232	CPC 1232 with Jacket
2014	89,422	51,592	5,600	22,380	9,850
2015	109,722	51,592	5,600	22,380	30,150
2016	115,544	51,592	5,600	22,380	35,972
2017	121,366	51,592	5,600	22,380	41,794
2018	127,188	51,592	5,600	22,380	47,616
2019	133,010	51,592	5,600	22,380	53,438
2020	133,010	51,592	5,600	22,380	53,438
2021	133,010	51,592	5,600	22,380	53,438
2022	133,010	51,592	5,600	22,380	53,438

2023	133,010	51,592	5,600	22,380	53,438
2024	133,010	51,592	5,600	22,380	53,438
2025	133,010	51,592	5,600	22,380	53,438
2026	133,010	51,592	5,600	22,380	53,438
2027	133,010	51,592	5,600	22,380	53,438
2028	133,010	51,592	5,600	22,380	53,438
2029	133,010	51,592	5,600	22,380	53,438
2030	133,010	51,592	5,600	22,380	53,438
2031	133,010	51,592	5,600	22,380	53,438
2032	133,010	51,592	5,600	22,380	53,438
2033	133,010	51,592	5,600	22,380	53,438
2034	133,010	51,592	5,600	22,380	53,438

PHMSA believes that reliance on HHFTs to transport millions of gallons of flammable materials is a risk that must be addressed. For the purposes of crude oil and ethanol that are classed as flammable liquids, the DOT Specification 111 tank car would no longer be authorized for use in HHFT. A risk-based timeline for continued use of the DOT Specification 111 tank car in HHFTs is provided in §§ 173.241, 173.242, and 173.243. This approach also provides time for car owners to update existing fleets while prioritizing risk-reduction from the highest danger (packing group) flammable liquid material (See table 15).

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

PHMSA is proposing to limit continued use of the DOT Specification 111 tank car to non-HHFTs. In addition, PHMSA is proposing to authorize the continued use of DOT Specification 111 tank car in combustible liquid service, given the risks associated with crude oil or ethanol, classified as a flammable liquid, are greater than that of combustible liquids. This rule does not cover unit trains of materials that are classed or reclassified as a combustible liquid.

Existing HMR requirements for these materials will not change. Therefore, under current § 172.102(c)(3) Special provision B1, for materials with a flash point at or above 38 °C (100 °F) that are classed or reclassed as combustible liquids (see § 173.150(f)) or, crude oil and ethanol that are classed as flammable liquids (all packing groups) and not transported in HHFTs, an existing DOT Specification 111 tank car will continue to be authorized for use. Thus, except those tank cars intended for combustible liquid service, any tank car manufactured after October 1, 2015 that will be used in a HHFT must meet or exceed the new DOT Specification 117 standard.

Because of the risks involved, PHMSA is applying the same requirements for new cars as it is for existing cars, with one exception. PHMSA does not propose to require additional top fittings protection for retrofits, because the costs exceed the benefits. Newly constructed cars, however, are required to have additional top fittings protection. Except for additional top fittings protection, the requirements for newly constructed tank cars and retrofits are the same

If it can be ascertained that an existing tank car can meet the new performance standards, it would be authorized for use in a HHFT. From a technical standpoint, PHMSA expects legacy cars will be able to withstand the additional weight across all of the tank car options, without truck replacement, because PHMSA believes the vast majority of cars in crude and ethanol service have been built in the past 15 years. As a result, cars in this service should have a truck that would support the extra weight of the retrofits. PHMSA believes all cars manufactured in this time period were built to a 286,000 lbs. weight limit standards, and would include a truck that would support the extra weight of retrofits.

The proposed changes for existing tank cars are based on comments discussed above, simulations, and modeling. Modeling and simulation of puncture speed velocity of DOT

Specification 111 tank cars currently used to transport ethanol or crude oil indicate that a velocity of approximately 7.4 mph will puncture the shell of the tanks when struck with a rigid 12” x 12” indenter with a weight of 297,000 pounds. Validation of this model has been accomplished using the results of puncture tests performed at the Transportation Technology Center in Pueblo, CO.[65] Further, based on modeling and simulation, the head of an unjacketed DOT Specification 111 tank car, when struck with a 12” x 12” indenter weighing 286,000 pounds will puncture at 7.6 mph. Table 21 provides the tank car shell and head puncture velocities of the DOT Specification 117 tank car Options proposed in this rule.

Table 21: Effectiveness of existing tank car options relative to the non-jacketed DOT111 specification tank car

Tank Car	Total (%)	Head puncture (%)	Shell puncture (%)	Thermal damage (%)	Top fittings (%)	BOV (%)**chose not to include top fitting protections**
Option 1	51	21	17	12	N/A	<1
Option 2	50	21	17	12	N/A	<1
Option 3	40	19	9	12	N/A	0

Similar to the methodology for estimating the effectiveness of new cars, PHMSA uses these puncture velocities to arrive at risk reduction estimates for retrofits. In evaluating train accidents involving HHFTs listed in Table 3 above, we found that all but one of the derailments occurred in excess of 20 mph. Only two of the derailments occurred at a speed of between 20 mph and 30 mph, four occurred between 30 and 40 mph and six occurred at speeds in excess of 40 mph. The documented derailment speeds exceed the puncture velocity of both the DOT Specification 111 tank car and the Options proposed in this rule. However, during a derailment the speeds of impacts will vary considerably between cars, and many of those impacts will not

[65] “Detailed Puncture Analyses Tank Cars: Analysis of Different Impactor Threats and Impact Conditions” can be found at: http://www.fra.dot.gov/eLib/details/L04420

result in a puncture. The portion of those impacts that could result in a puncture would decline with the higher puncture velocity of the DOT Specification 117 tank car Options proposed in this NPRM. As a result of use of the proposed DOT Specification 117 tank cars, we expect the volume of flammable liquid released into the environment and the consequences of a train accident to be reduced.

For Option 1, the PHMSA and FRA designed car,

- Retrofitting a DOT 111 Unjacketed (not including ECP brake risk reduction) reduces accident severity by 51 percent.
- Retrofitting a DOT 111 Jacketed (not including ECP brake risk reduction) reduces accident severity by 28 percent.
- Retrofitting a CPC 1232 Unjacketed (not including ECP brake risk reduction) reduces accident severity by 21 percent.
- Retrofitting a CPC 1232 Jacketed (not including ECP brake risk reduction) reduces accident severity by 10 percent.

For Option 2, the AAR 2014 car,

- Retrofitting a DOT 111 Unjacketed reduces accident severity by 50 percent.
- Retrofitting a DOT 111 Jacketed reduces accident severity by 21 percent.
- Retrofitting a CPC 1232 Unjacketed reduces accident severity by 28 percent.
- Retrofitting a CPC 1232 Jacketed reduces accident severity by 10 percent.

For Option 3, the Enhanced CPC 1232 car,

- Retrofitting a DOT 111 Unjacketed reduces accident severity by 40 percent.
- Retrofitting a DOT 111 Jacketed reduces accident severity by 11 percent.
- Retrofitting a CPC 1232 Unjacketed reduces accident severity by 18 percent.

- Retrofitting a CPC 1232 Jacketed does not reduce accident severity.

In Recommendation R-12-5, NTSB recommended that new and existing tank cars authorized for transportation of ethanol and crude oil in PGs I and II have enhanced tank head and shell puncture resistance systems and top fittings protection. PHMSA chose not to include top fitting protections as part of any retrofit requirement as the costliness of such retrofit is not supported with a corresponding appropriate safety benefit.

A requirement to retrofit existing cars would be costly. Total costs could exceed $30,000 per car. In addition, a retrofit would result in a decrease in asset utilization (out-of-service time of at least one month). As such, PHMSA is proposing to allow numerous options for compliance. Existing DOT Specification 111 tank cars may be retrofitted to DOT Specification 117, retired, repurposed, or operated under speed restrictions.

As a result of this rule, PHMSA expects all DOT Specification 111 Jacketed and CPC 1232 Jacketed crude oil and ethanol cars (about 15,000 cars) to be transferred to Alberta, Canada tar sands services. It does, however, expect the majority of DOT 111 Un-Jacketed and CPC 1232 Unjacketed cars (about 66,000 cars) to be retrofitted; some DOT Unjacketed and CPC 1232 Unjacketed cars (about 8,000 cars) will be transferred to Alberta, Canada tar sands services. No existing tank cars will be forced into early retirement.

Specifically, for Option 1, the PHMSA and FRA designed car,

- Retrofitting a DOT 111 Unjacketed would cost $33,400, plus $1,032 in out-of-service time and $1,019 in additional fuel and maintenance costs per year.
- Retrofitting a CPC 1232 Unjacketed would cost $32,900, plus $944 in out-of-service time and $641 in additional fuel and maintenance costs per year.

For Option 2, the AAR 2014 car,

- Retrofitting a DOT 111 Unjacketed would cost $28,900, plus $1,033 in out-of-service time and $1,019 in additional fuel and maintenance costs per year.
- Retrofitting a CPC 1232 Unjacketed would cost $28,400, plus $944 in out-of-service time and $641 in additional fuel and maintenance costs per year.

For Option 3, the Enhanced CPC 1232 car,

- Retrofitting a DOT 111 Unjacketed would cost $26,730, plus $1,032 in out-of-service time and $1019 in additional fuel and maintenance costs per year.
- Retrofitting a CPC 1232 Unjacketed would cost $26,230, plus $944 in out-of-service time and $641 in additional fuel and maintenance costs per year.

To better focus limited resources on the highest risk materials, we are proposing to revise each of the bulk packaging sections, §§ 173.241, 173.242, and 173.243, to a provide a timeline for the phase out of existing cars that are in HHFTs based on packing group (See table 15).

This risk-based approach provides sufficient time for car owners to update the existing fleet while prioritizing the highest danger material. Specifically, based on estimates of the current fleet size and composition paired with production capacity of tank car manufacturers expressed by commenters to the ANPRM, we believe that providing a two year phase in of packing group I will not result in a shortage of available tank cars for HHFT (See RIA for further detail). It also provides additional time for cars to meet the DOT Specification 117 performance standard if offerors take steps to reduce the volatility of the material. Separation of dissolved gases from crude oil, for example can reduce the boiling point and flammability of the material, potentially shifting the product to a different Packing Group. This may be achieved through a number of methods, including using better separators and aging of crude oil.

As proposed in this NPRM, DOT Specification 111 tank cars may be retrofitted to DOT

Specification 117, retired, repurposed, or operated under speed restrictions. Further our proposal limits the future use of DOT Specification 111 tank cars only if used in a HHFT. DOT Specification 111 tank cars can continue to be used to transport other commodities, including flammable liquids provided they are not in a HHFT. These options provide tank car owners and rail carriers with the opportunity to make operational changes that focus on the greatest risks and minimize the impact to the greatest extent practicable.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence.

1. PHMSA expects about 23,000 cars will be transferred to Alberta tar sands service as a result of this rule. PHMSA also expects no cars will be retired as a result of this rule. How many of the existing DOT Specification 111 and CPC-1232 tank cars that will be retired? How many will be repurposed? How many will be retrofitted?
2. What are the benefits and costs of each of those actions (retiring, re-purposing, and retrofitting)?
3. Does this estimate for tar sand service re-purposing reflect the demand for these tank cars? Would any tank cars be re-purposed to transport a different material?
4. Should the CPC-1232 cars be exempted from some or all of the retrofitting requirements described here? If so, what are the benefits and costs of those exemptions?
5. Should CPC-1232 cars have a different implementation timeframe than legacy DOT 111 cars? If so, what are the benefits and costs of a different implementation timeframe? What would the economic effects be of retiring, repurposing or retrofitting, within five

years, CPC-1232 tank cars used in flammable liquid service? What would the economic effects be of retiring, repurposing or retrofitting, within ten years, CPC-1232 tank cars used in flammable liquid service?

6. For Options 1 and 2, how would existing legacy tank cars comply with the requirement for an additional 1/8-inch thickness? Would these cars be retrofitted to have jackets thicker than 11-gauge? To what extent would this introduce engineering challenges?
7. PHMSA estimates all existing crude oil and ethanol cars are capable of handling 286,000 GRL without truck replacement. To what extent would the additional weight of the retrofit Options require structural changes to existing tank cars?
8. PHMSA requests any available detailed data set on the safety features of the existing fleet.
9. Would the increased size and weight of the tank car Options have any other effects not discussed in the NPRM or accompanying RIA? To what extent would they affect braking rates? To what extent would they affect track safety performance? To what extent would they affect loading practices?
10. What additional safety features not discussed here, if any, should PHMSA consider? If so, please provide detailed estimates on the costs and benefits of individual safety features.
11. Do any of the safety features included in any of the Options have costs that exceed benefits? If so, please provide detailed estimates on the costs and benefits of individual safety features.

In addition, while DOT's September 6, 2013 ANPRM, NTSB Recommendation R-12-5, and some commenters and petitions linked enhanced tank car specifications and retrofitting of

existing tanks cars to only packaging group I and II materials, this NPRM proposes packaging requirements for all flammable liquids in a HHFT, regardless of packing group. Table 22 provides PHMSA's rational for including flammable liquids in packing groups I, II, and III.

DOT created Class 3 packing groups based on differences in volatility and ignitability [55 FR 16500]. Volatile liquids, having a lower flash point, have higher vapor phase concentrations and upon release, may catch fire immediately or from surface evaporation upon forming pools , generate a flammable cloud which could ignite and burn (flash fire), or explode in a vapor cloud explosion. It is also possible there is no ignition source and instead a potentially toxic and or flammable vapor cloud results. Other factors such as weather conditions, wind direction, and congestion around the release influence the potential impact of the incident. In order to perform a consequence and impact analysis on different types of incidents, PHMSA would model the release amount and properties and determine the subsequent impact of the material and/or energy on people, environment, and physical surroundings. The impact of different types of flammable liquid spills could be evaluated based on trinitrotoluene (TNT) equivalency approach, multi-energy methods, the Baker-Strehlow model, or other methods.[66,67] The results of the modeling could include l radiant heat from a fire, peak overpressure from an explosion, impulse duration, and potential blast size to determine the potential damages. Lower overpressures (less than 10 psig) may result in collapse of nearby buildings, resulting in the people inside them susceptible to injury or fatality, while relatively higher overpressures (>15 psig) are needed to cause a human fatality directly from an explosion.[68,69]

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[66] Sochet I. ***Blast effects of external explosions*** *Eighth International Symposium on Hazards, Prevention, and Mitigation of Industrial Explosions*, Yokohama : Japan (2010) - http://hal.archives-ouvertes.fr/hal-00629253
[67] Center for Chemical Process Safety, *Guidelines for Chemical Process Quantitative Risk Analysis*. Wiley (2010).
[68] Kent, J. Handbook of Industrial Chemistry and Biotechnology. Springer (2013).
[69] Nolan, D. Handbook of Fire and Explosion Protection Engineering Principles: for Oil, Gas, Chemical and Related Facilities. William Andrew (2014).

While Packing Group III materials (flash point greater than or equal to 73 °F) are less volatile and may pose a lower fire and explosion risk than materials in Packing Groups I and II, PHMSA believes the risk of an incident from a HHFT containing Packing Group III flammable liquids is sufficient to warrant enhanced car standards and inclusion in the HHFT definition. Further, PHMSA is concerned about the possibility of spills and fires from HHFT carrying Packing Group III materials in large volumes. Table 22 provides PHMSA's rational for including flammable liquids in packing groups I, II, and III.

Table 22: Enhanced Car Standards for Flammable Liquids in HHFT

Issue	**Explanation**
Volume of Material	The large volume of flammable liquid transported in a HHFT poses a safety and environmental risk regardless of the packing group. Specifically, this amount of material contained in a tank car poses a risk of a considerable oil spill (~35,000 gallon per tank car). Based on the accidents evaluated in the RIA, approximately 5 cars on average release product with an average quantity release of approximately 84,000 gallons. Such a spill could result in significant environmental damage regardless of packing group. By requiring packing group III materials to be contained in a more robust tank car, the potential environmental damage from an oil spill is mitigated as the conditional probability of release would be decreased.
Combustible Liquid Exception	PHMSA is proposing to retain the exception that permits flammable liquids with a flash point at or above 38 °C (100 °F) to be reclassed as combustible liquids, provided that material does not meet the definition of any other hazard class. Therefore, the existing DOT Specification 111 tank cars would continue to be authorized for these materials. This would allow the existing tank cars to continue to be used for certain low-hazard packing group III flammable liquids that are reclassified as combustible liquids. However, except for combustible liquids service, tank cars manufactured after October 1, 2015, would be required to meet the requirements for the DOT Specification 117 when used in a HHFT.
Consistency	Providing a single packaging authorization across all three flammable liquid packaging groups would simplify the requirements while providing a packaging appropriate to handle all flammable liquids.

PHMSA seeks public comment on the following discussions and questions. When commenting, please reference the specific portion of the proposal, explain the reason for any recommended change, and include the source, methodology, and key assumptions of any supporting evidence. Further, we request comments on the following:

1. Are there any relatively lower hazard, lower risk flammable liquids that could potentially be exempt from the enhanced car standards for HHFT?
2. Is the current exception for combustible liquids sufficient to incentivize producers to reduce the volatility of crude oil for continued use of existing tank cars?
3. Would an exception for all PG III flammable liquids further incentivize producers to reduce the volatility of crude oil prior to transportation?
4. What are the impacts on the costs and safety benefits of degasifying to these levels?
5. What are the economic impacts of the proposed phase out date for existing DOT Specification 111 tank cars used to transport PG III flammable liquids?
6. Fire and explosion risk of Class III Flammable liquids
    a. What characteristics of a released flammable liquid significantly affect the likelihood and consequence of fire or explosion upon release?
    b. What physical or environmental features of a release affect the likelihood and consequence of fire or explosion upon release?
    c. What existing scientific information is available concerning the explosion hazards of hydrocarbons and other liquids?
    d. What types of flammable liquids are most susceptible to a high-consequence detonation explosion upon release?
    e. What data exists on the relationship between liquid properties and fire and blast zone

size?

7. Should shippers be allowed to petition PHMSA for an exemption from the requirements for HHFT based on the properties of Class III liquids? What should be considered (e.g. chemical properties, historical data, scientific information) before issuing an exemption?

H. Forthcoming FRA NPRM on securement and attendance

On July 23, 2013, Transport Canada issued an Emergency Directive providing safety and security requirements for locomotives in Canada by focusing on securement, attendance, crew size and security of locomotives on main track and sidings.[70] In regard to attendance, the Emergency Directive requires attendance for any locomotive coupled to one or more loaded tank cars containing hazardous materials that are on a main line track.

On August 7, 2013, FRA published EO 28 to address safety issues related to attendance and securement of certain hazardous materials trains. EO 28 prohibits railroads from leaving trains or vehicles transporting the specified hazardous materials unattended on mainline track or siding outside of a yard or terminal unless the railroad adopts and complies with a plan that provides sufficient justification for leaving them unattended under specific circumstances and locations.

In addition to demonstrating the potential tragic consequences of a derailment involving rail cars containing hazardous materials, the incident in Lac Mégantic, Quebec identified vulnerabilities of safety and security that could result in future train accidents. Emergency Order No. 28 was issued to address certain vulnerabilities specific to the Lac-Mégantic incident, but others likely exist. In addition, the agencies' Joint Safety Advisories published on August 7,

[70] The Emergency Directive is available at the following URL: http://www.tc.gc.ca/eng/mediaroom/backgrounders-safety-locomotives-7292.html

2013 and November 20, 2013 stress the importance of security planning and updating security plans to address changes made to railroad operations as a result of Emergency Order No. 28.

We did not seek comments on these or other attendance requirements in the ANPRM. However, as outlined above, RSAC members have submitted a consensus recommendation to FRA regarding the hazard classes and threshold quantities of hazardous materials that should trigger additional operating procedures, including attendance and securement requirements.[71] In summary, RSAC recommended that trains with loaded cars meet new requirements regarding: (1) the duty status and hours of service for any railroad personnel left to attend or secure a train; (2) job briefings for train crews that cover the details of individual responsibilities for the securement of a train; (3) locking requirements for locomotives and/or train controls; (4) verification of securement procedures by personnel not members of the train crew, and reporting verified securement to dispatchers; and (5) procedures for verifying securement in the event that emergency response personnel have been on, under, or between equipment that has been previously secured.

Because the RSAC recommendation is robust in its approach to matters of attendance and securement, and because it covers hazmat beyond crude oil and ethanol, PHMSA believes that FRA is best suited to address the matter in its forthcoming NPRM based on the RSAC recommendation. PHMSA seeks information and comment on any alternate approaches that may be considered along with the RSAC recommendation regarding the attendance and securement of these types of trains.

VI. Regulatory Review and Notices

[71]The recommendation is available at the following URL: https://rsac.fra.dot.gov/meetings/Railroad%20Safety%20Advisory%20Committee%20Securement%20Recommendation%20VOTE.pdf.

A. Executive Order 12866, Executive Order 13563, Executive Order 13610 and DOT Regulatory Policies and Procedures

This NPRM is considered a significant regulatory action under section 3(f) of Executive Order 12866 and was reviewed by the Office of Management and Budget (OMB). The NPRM is considered a significant regulatory action under the Regulatory Policies and Procedures order issued by DOT (44 FR 11034, February 26, 1979). PHMSA has prepared and placed in the docket a Regulatory Impact Assessment addressing the economic impact of this proposed rule.

Executive Orders 12866 ("Regulatory Planning and Review") and 13563 ("Improving Regulation and Regulatory Review") require agencies to regulate in the "most cost-effective manner," to make a "reasoned determination that the benefits of the intended regulation justify its costs," and to develop regulations that "impose the least burden on society." Executive Order 13610, issued May 10, 2012, urges agencies to conduct retrospective analyses of existing rules to examine whether they remain justified and whether they should be modified or streamlined in light of changed circumstances, including the rise of new technologies. The Department of Transportation believes that streamlined and clear regulations are important to ensure compliance with important safety regulations. As such the Department has developed a plan detailing how such reviews are conducted.[72]

Additionally, Executive Orders 12866, 13563, and 13610 require agencies to provide a meaningful opportunity for public participation. Accordingly, PHMSA invites comments on these considerations, including any cost or benefit figures or factors, alternative approaches, and relevant scientific, technical and economic data. These comments will help PHMSA evaluate whether the proposed requirements are appropriate. PHMSA also seeks comment on potential

[72] Department of Transportation's plan for retrospective regulatory reviews is available at the following URL: http://www.dot.gov/regulations/dot-retrospective-reviews-rules

data and information gathering activities that could be useful in designing an evaluation and/or retrospective review of this rulemaking.

The United States has experienced a dramatic growth in the quantity of flammable materials being shipped by rail in recent years. According to the rail industry, in the U.S. in 2009, there were 10,800 carloads of crude oil shipped by rail. In 2013, there were 400,000 carloads. In the Bakken region, over one million barrels a day of crude oil was produced in March 2014,[73] most of which is transported by rail.

Transporting flammable material carries safety and environmental risks. The risk of flammability is compounded in the context of rail transportation because petroleum crude oil and ethanol are commonly shipped in large unit trains.

In recent years, train accidents involving a flammable material release and resulting fire with severe consequences have occurred with increasing frequency (i.e. Arcadia, OH, Plevna, MT, Casselton, ND, Aliceville, AL, Lac-Mégantic, Quebec).

PHMSA isproposing this NPRM, in order to increase the safety of crude and ethanol shipments by rail. We are proposing revisions to the HMR to establish requirements specific to HHFTs. As described in greater detail throughout this document, this NPRM is a system-wide, comprehensive approach consistent with the risks posed by flammable liquids transported by rail in HHFTs. Specifically, requirements address:

(1) rail routing restrictions;

(2) tank car integrity;

(3) speed restrictions

[73] Information regarding oil and gas production is available at the following URL: http://www.eia.gov/petroleum/drilling/#tabs-summary-2

(4) braking systems;

(5) proper classification and characterization of mined liquid and gas; and

(6) notification to State Emergency Response Commissions (SERCs).

Table 1 (Restated here) summarizes major provisions of the proposal, and identifies those affected.

Table 1: Affected Entities and Requirements

Proposed Requirement	Affected Entity
Better classification and characterization of mined gases and liquids. • Written sampling and testing program for all mined gases and liquids, such as crude oil, to address: (1) frequency of sampling and testing; (2) sampling at various points along the supply chain; (3) sampling methods that ensure a representative sample of the entire mixture; (4) testing methods to enable complete analysis, classification, and characterization of material; (5) statistical justification for sample frequencies; and, (6) duplicate samples for quality assurance. • Require offerer to certify that program is in place, document the testing and sampling program, and make results available to DOT personnel, upon request.	Offerors / Shippers of all mined gases and liquids
Rail routing risk assessment. • Requires carriers to perform a routing analysis that considers 27 safety and security factors. The carrier must select a route based on findings of the route analysis. These planning requirements are prescribed in § 172.820 and would be expanded to apply to HHFTs. Notification to SERCs. • Require trains containing one million gallons of Bakken crude oil to notify State Emergency Response Commissions (SERCs) or other appropriate state delegated entity about the operation of these trains through their States. Reduced operating speeds. • Restrict all HHFTs to 50-mph in all areas • PHMSA is requesting comment on three speed restriction options for HHFTs that contain any tank cars not meeting the enhanced tank car standards proposed by this rule: (4) a 40-mph maximum speed restriction in all areas (5) a 40-mph speed restriction in high threat urban areas[74]; and, (6) a 40-mph speed restriction in areas with a 100K+ population. • PHMSA is also requesting comment on a 30-mph speed restriction for HHFTs that do not comply with enhanced braking requirements. Enhanced braking. • Require all HHFTs be equipped with alternative brake signal propagation systems. Depending on the outcome of the tank car standard proposal and implementation timing, all HHFTs would be operated with either electronic controlled pneumatic brakes (ECP), a two-way end of train device (EOT), or distributed power (DP).	Rail Carriers, Emergency Responders

[74] As defined in 49 CFR 1580.3 – High Threat Urban Area (HTUA) means an area comprising one or more cities and surrounding areas including a 10-mile buffer zone, as listed in appendix A to Part 1580 of the 49 CFR.

Enhanced standards for both new and existing tank cars. • Require new tank cars constructed after October 1, 2015 (that are used to transport flammable liquids as part of a HHFT) to meet criteria for a selected option, including specific design requirements or performance criteria (e.g., thermal, top fittings, and bottom outlet protection; tank head and shell puncture resistance) is selected in the final rule. PHMSA is requesting comment on the following three options for the DOT Specification 117: 1. FRA and PHMSA Designed Car, or equivalent 2. AAR 2014Tank Car,[75] or equivalent 3. Jacketed CPC-1232[76], or equivalent • Require existing tank cars that are used to transport flammable liquids as part of a HHFT, to be retrofitted to meet the selected option for performance requirements, except for top fittings protection. Those not retrofitted would be retired, repurposed, or operated under speed restrictions for up to five years, based on packing group assignment of the lading.	Tank Car Manufacturers, Tank Car Owners, Shippers and Rail Carriers

Table 5 provides the costs and benefits of the individual provisions of the proposed rule. PHMSA is co-proposing three different options for tank car standards and three different options for speed restrictions. Table 6 presents the costs and benefits of the various combinations of proposed tank car and speed restriction provisions.

Please note that because there is overlap in the risk reduction achieved between some of the proposed requirements listed in the Table 5 (restated). The total benefits and costs of the provisions cannot be accurately calculated by summing the benefits and costs of each proposed provision. Table 6 (restated), on the other hand, presents total benefits and costs of the combinations of speed restriction and tank car proposals. Explanation of the comprehensive benefits and costs of each combination of proposals is included at the end of the RIA.

Please also note that, given the uncertainty associated with the risks of crude oil and ethanol shipments in the table below (Table 5 restated here) contains a range of benefits estimates. The low end of the range estimates risk from 2015 to 2034 based on the U.S. safety

[75] On March 9, 2011 AAR submitted petition for rulemaking P-1577, which was discussed in the ANPRM. In response to the ANPRM, on November 15, 2013, AAR and ASLRAA submitted as a comment recommendations for tank car standards that are enhanced beyond the design in P-1577. For the purposes of this rulemaking this tank car will be referred to as the "AAR 2014 tank car." See http://www.regulations.gov/#!documentDetail;D=PHMSA-2012-0082-0090.

[76] In 2011, the AAR issued Casualty Prevention Circular (CPC) 1232, which outlines industry requirements for additional safety equipment on certain DOT Specification 111 tanks ordered after October 1, 2011, and intended for use in ethanol and crude oil service.

record for crude oil and ethanol from 2006 to 2014, adjusting for the projected increase in crude oil and ethanol shipment volume over the next 20 years. The high end of the range estimates risk from 2015 to 2034 based on the U.S. safety record for crude oil and ethanol shipments from 2006 to 2014, adjusting for the projected increase in crude oil and ethanol shipments volume, plus an estimate that the U.S. would experience the equivalent of10 higher consequence safety events—nine of which would have environmental damages and monetized injury and fatality costs exceeding $1.15 billion and one of which would have environmental damages and monetized injury and fatality costs exceeding $5.75 billion—over the next 20 years. This outcome could result from a smaller number of more severe events, or more numerous events that are less severe.

Table 5 : 20 Year Costs and Benefits by Stand-Alone Proposed Regulatory Amendments 2015-2034[77]

Affected Section[78]	Provision	Benefits (7%)	Costs (7%)
49 CFR 172.820	**Rail Routing+**	Cost effective if routing were to reduce risk of an incident by .19%	$5.5 million
49 CFR 173.41	**Classification of Mined Gas and Liquid**	Cost effective if this requirement reduces risk by 0.75%	$16.2 million
49 CFR 174.310	**Notification to SERCs**	Qualitative	$0
	Speed Restriction: Option 1: 40 mph speed limit all areas*	$202 million – $645 million	$2,871 million
	Speed Restriction: Option 2: 40 mph 100k people*	$40.4 million – $484 million	$260 million
	Speed Restriction: Option 3: 40 mph in HTUAs*	$14.1 million- $42.5 million	$27.4 million
	Braking: Electronic Pneumatic Control with DP or EOT	$791 million - $1,844 million	$517.1 million
49 CFR Part 179	**Option 1: PHMSA and FRA designed car**	$899 million -$3,511 million	$3,032 million
	Option 2: AAR 2014 Tank Car	$670.4 million – $2,628 million	$2,590 million
	Option 3: Jacketed CPC-1232 (new const.)	$432.5 million – $1,701 million	$2,479 million

Note: "+" indicates voluntary actions that will be taken by shippers and railroads
"*" indicates voluntary partial compliance when transporting large volumes of crude oil in high-threat urban areas (HTUA)

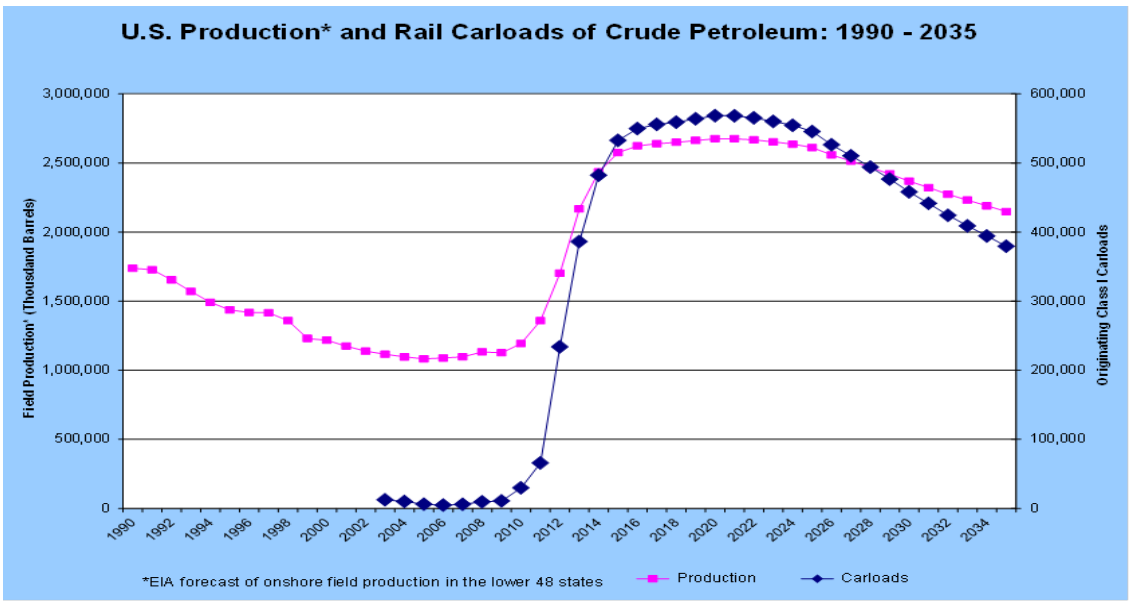
[77] All costs and benefits are in millions, and are discounted to present value using a 7 percent rate.
[78] All affected sections of the Code of Federal Regulations (CFR) are in Title 49.

Table 6: 20 Year Benefits and Costs of Proposal Combinations of Proposed Regulatory Amendments 2015-2034[79]		
Proposal	**Benefit Range (Millions)**	**Cost (Millions)**
PHMSA and FRA Design Standard + 40 MPH System Wide	$1,569 - $4,750	$6,023
PHMSA and FRA Design Standard + 40 MPH in 100K	$1,413 - $4,162	$3,412
PHMSA and FRA Design Standard + 40 MPH in HTUA	$1,388 - $4,067	$3,179
AAR 2014 Standard + 40 MPH System Wide	$878 - $3,308	$5,581
AAR 2014 Standard + 40 MPH in 100K	$712 - $2,683	$2,970
AAR 2014 Standard + 40 MPH in HTUA	$685 - $2,582	$2,738
CPC 1232 Standard + 40 MPH System Wide	$648 - $2,442	$5,470
CPC 1232 Standard + 40 MPH in 100K	$476 - $1,793	$2,858
CPC 1232 Standard + 40 MPH in HTUA	$448 - $1,687	$2,626

Crude Oil Transport by Rail

Figure 5 below shows the recent strong growth in crude oil production in the U.S., as well as growth in the number of rail carloads shipped. Figure 5 also shows forecasted domestic crude oil production from the Energy Information Administration (EIA) and PHMSA's projected strong demand for the rail shipment of crude oil.

Figure 5: Historic and Projected U.S. Production and Rail Carloads of Crude Petroleum 1990-2035

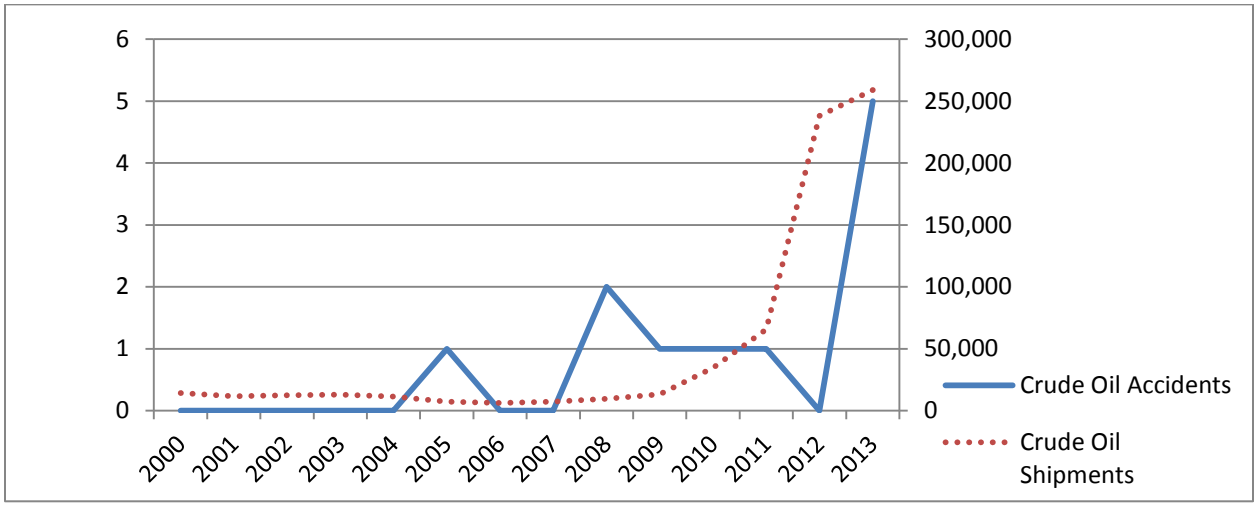


[79] All costs and benefits are in millions, and are discounted to present value using a 7 percent rate.

Source: EIA forecast

A rise in rail accidents involving crude oil has also risen along with the increase in crude oil production and rail shipments of crude oil. Figure 6 below shows this rise.

Figure 6: Carloads of Crude Oil Shipped and Rail Accidents (Mainline Derailments) 2000-2013



Source: STB Waybill Sample and PHMSA Incident Report Database

Based on these train accidents, the projected continued growth of domestic crude oil production, and the growing number of train accidents involving crude oil, PHMSA concludes that the potential for a train accident involving crude oil has increased, which has raised the likelihood of a catastrophic train accident that would cause substantial damage to life, property, and the environment.

Additional factors give rise to increased risks, and thus the increased probability of a catastrophic event occurring. First, the risk of flammability is compounded, because of the practice of shipping very large quantities of oil in one train, as shown by the increased use of high-hazard flammable trains. In 2008 there were less than 10,000 rail carloads of crude oil. By

2013 the number of rail carloads of increased to over 400,000.[80] Second, unlike other Class 3 manufactured goods, organic materials from oil and gas production represent a unique challenge in regards to classification. Differences in the chemical makeup of the raw material can vary across wells and over time. Unprocessed crude oil may present unique hazards such as corrosivity, sulfur content and resolved gas content, thereby affecting the integrity of the tank car.

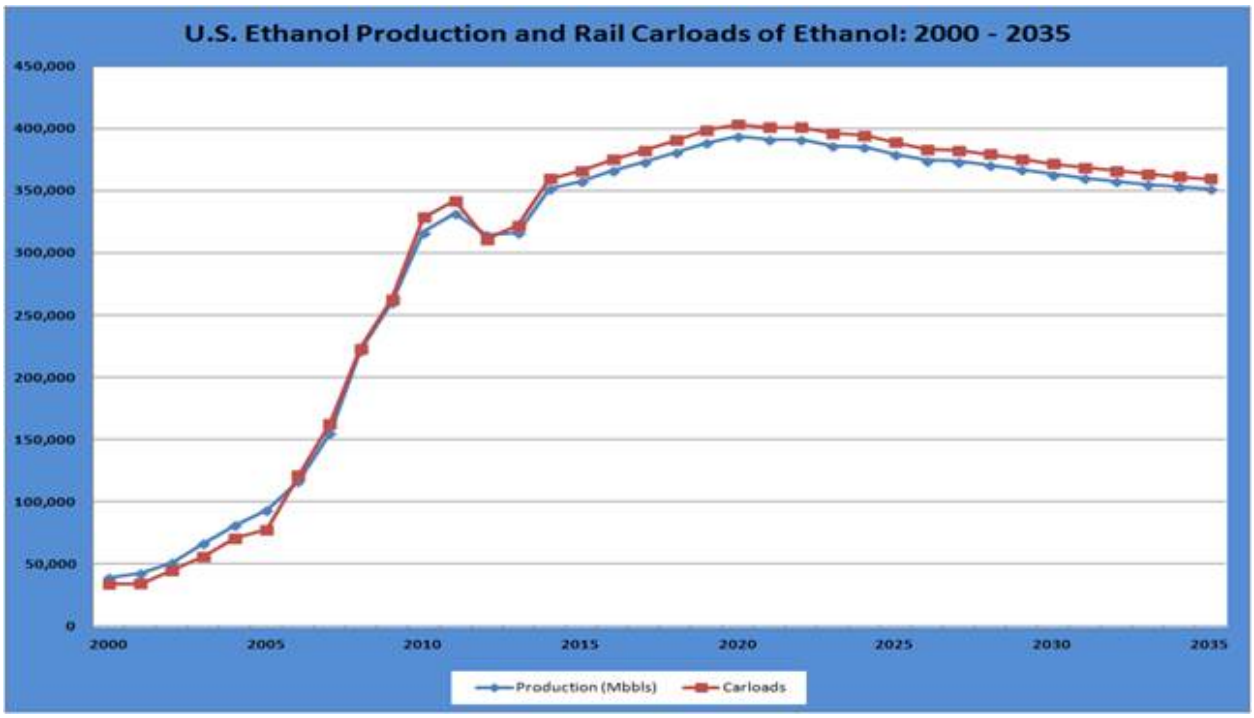
PHMSA's analysis of this combination of factors suggests an increase in the risk of rail related accidents and an increase in the likelihood of a catastrophic event.

Ethanol

U.S. ethanol production has increased considerably during the last 10 years and has generated similar growth in the transportation of ethanol by rail, according to a recent white paper by the Association of American Railroads (AAR).[81] As shown in the figure 7 EIA projects strong demand for ethanol in the future.

Figure 7: Historic and Forecasted U.S. Ethanol Production and Rail Carloads 2000-2035

[80] http://www.stb.dot.gov/stb/industry/econ_waybill.html
[81] Association of American Railroads. 2013. Railroads and Ethanol. Available online at https://www.aar.org/keyissues/Documents/Background-Papers/Railroads%20and%20Ethanol.pdf

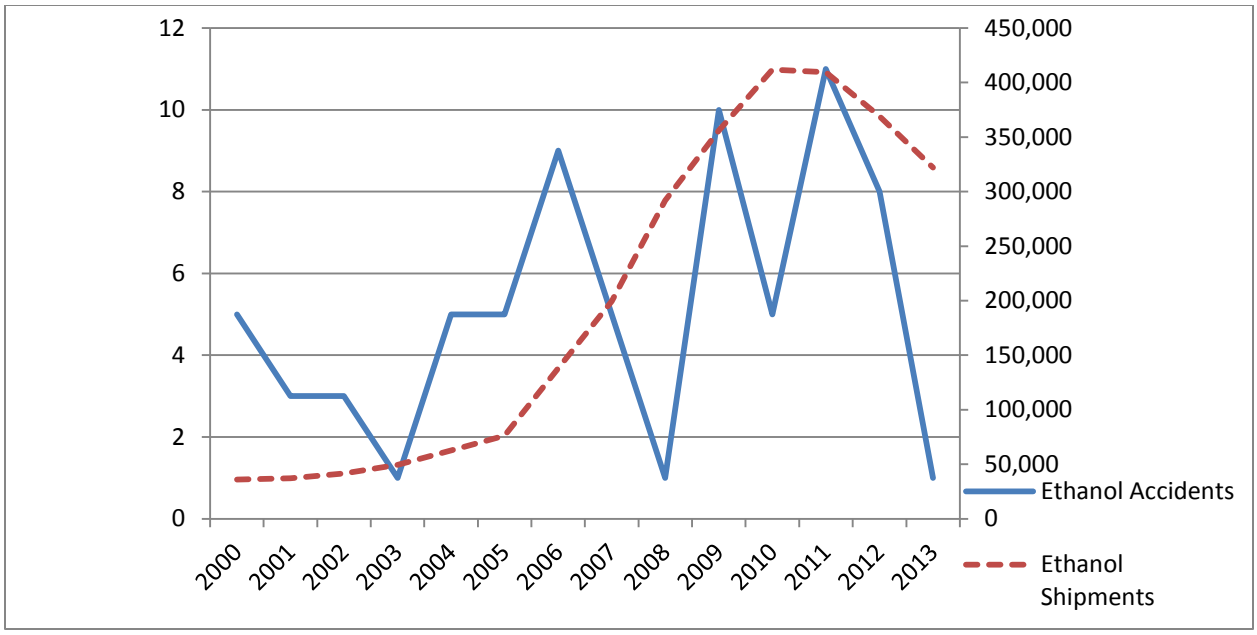


Source: EIA

In 2008 there were around 292,000 rail carloads of ethanol. In 2011, that number increased over 40 percent to 409,000.[82] Not surprisingly, this growth in rail traffic has been accompanied by an increase in the number of rail accidents involving ethanol. Figure 8 below plots the total number of rail accidents involving ethanol during the last 13 years compared to the total carloads of ethanol. The left axis shows the total number of rail derailments and the right axis shows total carloads shipped.

Figure 8: Carloads of Ethanol Shipped and Rail Accidents (Mainline Derailments) 2000-2013

[82] http://www.stb.dot.gov/stb/industry/econ_waybill.html



Source: STB Waybill Sample and PHMSA Incident Report Database

Summary of Regulatory Changes

As described in greater detail throughout this document, the proposed rule is a system-wide, comprehensive approach consistent with the risks posed by high-hazard flammable trains by rail. Requirements address:

- Rail Routing;
- Tank Cars;
- Braking;
- Speed Restrictions;
- Classification of Mined Gas and Liquid; and
- Notification to SERCs.

This approach is designed to mitigate damages of rail accidents involving flammable materials, though some provisions could also prevent accidents.

The RIA discusses, consistent with this NPRM, six requirement areas. Although we

analyze the effects of individual requirements separately, the preferred alternative proposed in this rulemaking is a system-wide approach covering all requirement areas consistent with this NPRM.

The analysis shows that expected damages based on the historical safety record are expected to exceed $4.5 billion and that damages from high-consequence events could reach $13.7 billion over a 20-year period in the absence of the rule.

PHMSA has proposed multiple options for Speed Restrictions and Tank Car standards. These options are mutually exclusive. PHMSA may select one of these options for each of Speed Restrictions and Tank Car standards, potentially including modifications based on public comments in response to this NPRM and changed circumstances.

PHMSA supports a system-wide approach covering all requirement areas provided above. Following consideration of public comments, PHMSA will consider alternatives for one or more of these requirement areas.

B. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (Public Law 104-4, 2 U.S.C. 1531) (UMRA) requires each agency to prepare a written statement for any proposed or final rule that includes a "Federal mandate that may result in the expenditure by State, local, and Native American Indian tribal governments, in the aggregate, or by the private sector, of $100,000,000 or more (adjusted annually for inflation) in any one year." The value equivalent of $100 million in 1995, adjusted for inflation to 2012 levels, is $151 million. If adopted, this proposed rule would not impose enforceable duties on State, local, or Native American Indian tribal governments. UMRA was designed to ensure that Congress and Executive Branch agencies consider the impact of legislation and regulations on States, local governments, and tribal

governments, and the private sector. With respect to States and localities, UMRA was an important step in recognizing State and local governments as partners in our intergovernmental system, rather than mere entities to be regulated or extensions of the Federal government.

As described in greater detail throughout this document, the proposed rule is a system-wide, comprehensive approach consistent with the risks posed by high-hazard flammable materials transported by rail. Specifically, requirements address: (1) proper classification and characterization, (2) operational controls to lessen the likelihood and consequences of train accidents and (3) tank car integrity. The RIA discusses, consistent with this NPRM, six requirement areas: Rail Routing, Classification of Mined Gas and Liquid, Notification of SERCs, Speed Restrictions, Braking, and enhanced Tank Car standards.

If adopted, this proposed rule would impose enforceable duties on the private sector of an annual average of approximately $300 million over a 20-year period. It might result in costs to the private sector that exceed $151 million in any one year and those costs and benefits associated with this rulemaking have been discussed under paragraph A, Executive Order 12866, Executive Order 13563, Executive Order 13610 and DOT Regulatory Policies and Procedures, of this section. The RIA is available in the public docket for this rulemaking.

PHMSA invites comments on these considerations, including any unfunded mandates related to this rulemaking.

C. Executive Order 13132: Federalism

Executive Order 13132 requires agencies to assure meaningful and timely input by state and local officials in the development of regulatory policies that may have “substantial direct effects on the states, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.”

This NPRM has been analyzed in accordance with the principles and criteria contained in Executive Orders 13132 ("Federalism"). The proposals in the NPRM, if adopted, would not have any direct effect on the states, or their political subdivisions; it would not impose any compliance costs; and it would not affect the relationships between the national government and the states, or political subdivisions, or the distribution of power and responsibilities among the various levels of government. We invite state and local governments with an interest in this rulemaking to comment on any effect that proposed requirements could have on them, if adopted. However, several of the issues addressed in this NPRM are subject to our preemption authority, i.e., classification, packaging, and rail routing. In regard to rail routing, for example, in a March 25, 2003 final rule (68 FR 14509) we concluded that the specifics of routing rail shipments of hazardous materials preempts all states, their political subdivisions, and Indian tribes from prescribing or restricting routes for rail shipments of hazardous materials, under Federal hazardous material transportation law (49 U.S.C. 5125) and the Federal Rail Safety Act (49 U.S.C. 20106). We would expect the same preemptive effect as a result of this rulemaking, and thus, the consultation and funding requirements of Executive Orders 13132 and 13175 do not apply. Nonetheless, we invite state and local governments with an interest in this rulemaking to comment on any effect that proposed requirements could have on them, if adopted.

D. Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

Executive Order 13175 requires agencies to assure meaningful and timely input from Indian tribal government representatives in the development of rules that significantly or uniquely affect Indian communities by imposing "substantial direct compliance costs" or "substantial direct effects" on such communities or the relationship and distribution of power

between the Federal Government and Indian tribes.

We analyzed this NPRM in accordance with the principles and criteria prescribed in Executive Order 13175 ("Consultation and Coordination with Indian Tribal Governments"). Because this rulemaking does not significantly or uniquely affect tribes, and does not impose substantial and direct compliance costs on Indian tribal governments, the funding and consultation requirements of Executive Order 13175 do not apply; thus, a tribal summary impact statement is not required. However, we are interested in any possible impacts of the notification requirements on Tribal Emergency Response Commissions (TERCs) or other tribal institutions. We invite Indian tribal governments to provide comments on the costs and effects the proposed requirements could have on them, if adopted, especially any burdens associated with the proposed notification requirements.

E. Regulatory Flexibility Act, Executive Order 13272, and DOT Policies and Procedures

Under the Regulatory Flexibility Act of 1980 (RFA) (5 U.S.C. 601 et seq.), PHMSA must consider whether a rulemaking would have a "significant economic impact on a substantial number of small entities." "Small entities" include small businesses, not-for-profit organizations that are independently owned and operated and are not dominant in their fields, and governmental jurisdictions with populations under 50,000.

To ensure potential impacts of rules on small entities are properly considered, PHMSA developed this NPRM in accordance with Executive Order 13272 ("Proper Consideration of Small Entities in Agency Rulemaking") and DOT's procedures and policies to promote compliance with the RFA.

The RFA and Executive Order 13272 (67 FR 53461, August 16, 2002) require agency

review of proposed and final rules to assess their impacts on small entities. An agency must prepare an initial regulatory flexibility analysis (IRFA) unless it determines and certifies that a rule, if promulgated, would not have a significant economic impact on a substantial number of small entities.

PHMSA is publishing this IRFA to aid the public in commenting on the potential small business impacts of the requirements in this NPRM. PHMSA invites all interested parties to submit data and information regarding the potential economic impact on small entities that would result from the adoption of the proposals in this NPRM. PHMSA will consider all information and comments received in the public comment process when making a determination regarding the economic impact on small entities in the final rule.

Under the RFA at 5 U.S.C 603(b), each initial regulatory flexibility analysis is required to address the following topics:

(1) The reasons why the agency is considering the action.

(2) The objectives and legal basis for the proposed rule.

(3) The kind and number of small entities to which the proposed rule will apply.

(4) The projected reporting, recordkeeping and other compliance requirements of the proposed rule.

(5) All Federal rules that may duplicate, overlap, or conflict with the proposed rule.[83]

The RFA at 5 U.S.C. 603(c) requires that each initial regulatory flexibility analysis contains a description of any significant alternatives to the proposal that accomplish the statutory objectives and minimize the significant economic impact of the proposal on small entities. In this instance, none of the alternatives accomplish the statutory objectives and minimize the

[83] See: http://www.fws.gov/policy/library/rgSBAGuide.pdf (accessed September 28, 2011).

significant economic impact of the proposal on small entities.

(1) Reasons why the agency is considering the action.

PHMSA is promulgating the NPRM in response to recent train accidents involving the derailment of HHFTs comprised of twenty rail carloads of a Class 3 flammable liquid. Shipments of large volumes of flammable liquids pose a significant risk to life, property, and the environment. For Example on December 30, 2013, a train carrying crude oil derailed and ignited near Casselton, North Dakota prompting authorities to issue a voluntary evacuation of the city and surrounding area. On November 8, 2013, a train carrying crude oil to the Gulf Coast from North Dakota derailed in Alabama, spilling crude oil in a nearby wetland and igniting into flames. On July 6, 2013, a catastrophic railroad accident occurred in Lac-Mégantic, Quebec, Canada when an unattended freight train containing hazardous materials rolled down a descending grade and subsequently derailed. The derailment resulted in a fire and multiple energetic ruptures of tank cars, which, along with other effects of the accident, caused the confirmed death of 47 people. In addition, this derailment caused extensive damage to the town center, clean-up costs, and the evacuation of approximately 2,000 people from the surrounding area. The Lac-Mégantic incident resulted in very large economic losses. PHMSA is taking this regulatory action to prevent accidents on the scale of that in Lac-Mégantic from happening in the United States.

(2) The objectives and legal basis for the proposed rule.

In this NPRM, PHMSA is proposing revisions to the HMR to ensure that the rail requirements address the risks posed by the transportation on railroads of HHFTs. This rulemaking addresses risks in three areas: (1) proper classification and characterization of the product being transported, (2) operational controls to decrease the likelihood and consequences

of train accidents, and (3) tank car integrity to decrease the consequences of train accidents. Promulgating this rulemaking in these areas is consistent with the goals of the HMR: (1) to ensure that hazardous materials are packaged and handled safely and securely during transportation; (2) to provide effective communication to transportation workers and emergency responders of the hazardous materials being transferred; and (3) to minimize the consequences of an incident should one occur.

The Secretary has the authority to prescribe regulations for the safe transportation, including the security, of hazardous materials in intrastate, interstate, and foreign commerce (49 U.S.C. 5103(b)) and has delegated this authority to PHMSA. 49 CFR 1.97(b).

(3) A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply.

The universe of the entities considered in an IRFA generally includes only those small entities that can reasonably expect to be directly regulated by the proposed action. Small railroads and offerors are the types of small entities potentially affected by this proposed rule.

A "small entity" is defined in 5 U.S.C. 601(3) as having the same meaning as "small business concern" under section 3 of the Small Business Act. This includes any small business concern that is independently owned and operated, and is not dominant in its field of operation. Title 49 U.S.C. 601(4) likewise includes within the definition of small entities non-profit enterprises that are independently owned and operated, and are not dominant in their field of operation.

The U.S. Small Business Administration (SBA) stipulates in its size standards that the largest a "for-profit" railroad business firm may be, and still be classified as a small entity, is 1,500 employees for "line haul operating railroads" and 500 employees for "switching and

terminal establishments." Additionally, 5 U.S.C. 601(5) defines as small entities governments of cities, counties, towns, townships, villages, school districts, or special districts with populations less than 50,000.

Federal agencies may adopt their own size standards for small entities in consultation with SBA and in conjunction with public comment. Pursuant to that authority, FRA has published a final Statement of Agency Policy that formally establishes small entities or small businesses as being railroads, contractors, and hazardous materials offerors that meet the revenue requirements of a Class III railroad as set forth in 49 CFR 1201.1-1, which is $20 million or less in inflation-adjusted annual revenues,[84] and commuter railroads or small governmental jurisdictions that serve populations of 50,000 or less. See 68 FR 24891 (May 9, 2003) (codified as appendix C to 49 CFR Part 209). The $20 million limit is based on the Surface Transportation Board's revenue threshold for a Class III railroad. Railroad revenue is adjusted for inflation by applying a revenue deflator formula in accordance with 49 CFR 1201.1-1. This definition is what PHMSA is proposing to use for the rulemaking.

Railroads

Not all small railroads would be required to comply with the provisions of this proposed rule. Most of the approximately 738 small railroads do not transport hazardous materials. Based on observations from FRA's regional offices, 64 small railroads could potentially be affected by this proposed rule because they transport HHFTs. Therefore, this proposed rule would impact a substantial number of small railroads.

Offerors

[84] For 2012 the Surface Transportation Board (STB) adjusted this amount to $36.2 million.

Almost all hazardous materials tank cars, including those cars that transport crude oil, ethanol, and other flammable liquids, are owned or leased by offerors. The proposed requirements for a testing and sampling program will directly affect shippers as they will now be required to create a document a sampling and testing program for mined gases and liquids. In addition, some of the other proposals in this rulemaking may indirectly affect offerors. DOT believes that a majority, if not all, of these offerors are large entities. DOT used data from the DOT/PHMSA Hazardous Materials Information System (HMIS) database to screen for offerors that may be small entities.

From the DOT/PHMSA HMIS database, and industry sources, DOT found 731 small offerors that might be impacted. Based on further information available on the companies' Web sites, all other offerors appear to be subsidiaries of large businesses. Out of these 731, however, only 297 own tank cars that would be affected. All the other 434 offerors either do not own tank cars or have tank cars that would not be affected by this proposed rule. Thus, DOT believes that there are only 297 offerors that are small businesses affected by this proposed rule. Additionally, no small offerors commented on PHMSA's ANPRM for this proceeding. PHMSA invites commenters to bring forth information that might assist it in assessing the number of small offerors that may be economically impacted by the requirement set forth in the proposed rule for development of the IRFA.

(4) A description of the projected reporting, recordkeeping and other compliance requirements of-the proposed rule.

For a thorough presentation of cost estimates, please refer to the RIA, which has been placed in the docket for this rulemaking.

This rulemaking has proposed requirements in three areas that address the potential risks:

(1) proper classification and characterization of the product being transported, (2) operational controls to decrease the likelihood of accidents, and (3) tank car integrity. Proposed requirements for braking, speed restrictions, and tank car production would not impact any small entities. Most small railroads affected by this proposed rule do not operate at speeds higher than those proposed for speed restrictions or travel long distances over which the reduced speed would cause a significant impact. Any small railroad that operates at speeds 30 mph or less would also not be impacted by the proposed braking requirement. Additionally, in a February 12, 2014, letter to the Secretary, ASLRRA announced that they recommend to their members to voluntarily operate unit trains of crude oil at a top speed of no more than 25 mph on all routes.

PHMSA believes that all offerors, both small and large, who would be required to select a car that complies with new construction requirements, would not see a significant increase in their lease rates. Lease rates are not expected to increase due to proposed improvements in the industry specification for tank car requirements as rates have already increased in recent years. . Additionally, also in the February 12th letter to the Secretary, the ASLRRA noted that it will support and encourage the development of new tank car standards including but not limited to adoption of a 9/16 inch tank car shell.

Proposed § 174.310(a)(3) would expand hazardous materials route planning and selection requirements for railroads. This would include HHFTs transporting flammable materials and, where technically feasible, require rerouting to avoid transportation of such hazardous materials through populated and other sensitive areas. Approximately 64 small railroads carry crude oil and ethanol in trains consists large enough that they would potentially be affected by this proposal. However, the majority of small railroads do not carry hazardous materials on a daily basis; in fact, some small railroads carry hazardous materials fewer than five times annually.

The affected Class III railroads are already compliant with the routing requirements established by HM-232E (71 FR 76834). In general, at the time that rule was promulgated, it was assumed that the small railroads, due to their limited size, would, on average, have no less than one and no more than two primary routes to analyze. Thus, the potential lack of an alternative route to consider would minimize the impact of this proposed requirement. Because the distance covered by the small railroads' routes is likely contained within a limited geographic region, the hours estimated for analyses are fewer than those estimated for the larger railroads.

Finally, this proposed rule would also require any offeror who offers a hazardous material for transportation to develop, implement, and update its sampling and testing programs related to classification and characterization of the hazardous material if it is a mined gas or liquid (e.g., crude oil). PHMSA believes that there would be an initial cost for each offeror of approximately $3,200 for the first year, and additional costs of $800 annually thereafter. PHMSA believes that this proposed section would not significantly burden any of these small entities.

PHMSA estimates the total cost to each small railroad to be $5,400 in the first year and $3,000 for subsequent years. Based on small railroads' annual operating revenues, these costs are not significant. Small railroads' annual operating revenues range from $3 million to $20 million. Previously, FRA sampled small railroads and found that revenue averaged approximately $4.7 million (not discounted) in 2006. One percent of average annual revenue per small railroad is $47,000. Thus, the costs associated with this proposed rule amount to significantly less than one percent of the railroad's annual operating revenue. PHMSA realizes that some small railroads will have lower annual revenue than $4.7 million. However, PHMSA is confident that this total cost estimate to each small railroad provides a good representation of the small railroads, in general.

In conclusion, PHMSA believes that although some small railroads would be directly impacted, they would not be impacted significantly as the impact would amount to significantly less than one percent of a small railroad's annual operating revenue. Information available indicates that none of the offerors would be significantly affected by the burdens of the proposed rule, but seeks information and comments from the industry that might assist in quantifying the number of small offerors who may be economically impacted by the requirements set forth in the proposed rule. Therefore, these requirements will likely not have a significant economic impact on any small entities' operations. PHMSA seeks comments on these conclusions.

(5) An identification, to the extent practicable, of all Federal rules that may duplicate, overlap, or conflict with the proposed rule

PHMSA is not aware of any relevant Federal rules that may duplicate, overlap, or conflict with the proposed rule. PHMSA will work with and coordinate with FRA to ensure that we are aligned with EO 28 or other FRA actions to the greatest extent practicable. This proposed rule would support most other safety regulations for railroad operations.

This proposed rule will not have a noticeable impact on the competitive position of the affected small railroads or on the small entity segment of the railroad industry as a whole. The small entity segment of the railroad industry faces little in the way of intramodal competition. Small railroads generally serve as "feeders" to the larger railroads, collecting carloads in smaller numbers and at lower densities than would be economical for the larger railroads. They transport those cars over relatively short distances and then turn them over to the larger systems, which transport them relatively long distances to their ultimate destination, or for handoff back to a smaller railroad for final delivery. Although their relative interests do not always coincide, the

relationship between the large and small entity segments of the railroad industry is more supportive and co-dependent than competitive.

It is also rare for small railroads to compete with each other. As mentioned above, small railroads generally serve smaller, lower density markets and customers. They tend to operate in markets where there is not enough traffic to attract or sustain rail competition, large or small. Given the significant capital investment required (to acquire right-of-way, build track, purchase fleet, etc.), new entry in the railroad industry is not a common occurrence. Thus, even to the extent the proposed rule may have an economic impact, it should have no impact on the intramodal competitive position of small railroads.

Even though PHMSA did not receive any comments on the ANPRM in opposition to PHMSA's preliminary finding that this rulemaking will not have a significant economic impact on a substantial number of small entities, PHMSA has not determined that this proposed rule would not have a significant economic impact on a substantial number of small entities. Therefore, PHMSA is publishing this IRFA to aid the public in commenting on the potential small business impacts of the proposals in this NPRM. PHMSA invites all interested parties to submit data and information regarding the potential economic impact that would result from adoption of the proposals in this NPRM. PHMSA will consider all comments received in the public comment process when making a determination in the final RFA.

F. Paperwork Reduction Act

PHMSA will request a new information collection from the Office of Management and Budget (OMB) under OMB Control No. 2137-XXXX entitled "Flammable Hazardous Materials by Rail Transportation." This NPRM may result in an increase in annual burden and costs under OMB Control No. 2137-XXXX due to proposed requirements pertaining to the creation of a

sampling and testing program for mined gas or liquid and rail routing for HHFTs.

Under the Paperwork Reduction Act of 1995, no person is required to respond to an information collection unless it has been approved by OMB and displays a valid OMB control number. Section 1320.8(d) of Title 5 of the CFR requires that PHMSA provide interested members of the public and affected agencies an opportunity to comment on information and recordkeeping requests.

In addition to the requirements proposed in this NPRM, we request comment on whether PHMSA should require reporting of data on the total damages that occur as a result of train accidents involving releases of hazardous material, including damages related to fatalities, injuries, property damage, environmental damage and clean-up costs, loss of business and other economic activity, and evacuation-related costs. Currently, PHMSA only collects some of this information, and data verification is inconsistent. Further, we request comment on whether PHMSA should require reporting on every car carrying hazardous material that derails, whether that car loses product or not. Such reporting would assist PHMSA in assessing the effectiveness of different kinds of cars in containing the hazardous materials that they carry. PHMSA seeks comment on how hazardous incident reporting of rail accidents can be improved upon, in the context of this rule. How can PHMSA improve the data quality, utility, and response rates associated with reporting on the impacts of incidents associated with the transportation of hazardous materials on HHFTs? Are changes to the incident reporting forms or the method of collection warranted?

This notice identifies a new information collection request that PHMSA will submit to OMB for approval based on the requirements in this proposed rule. PHMSA has developed burden estimates to reflect changes in this proposed rule and specifically requests comments on

the information collection and recordkeeping burdens associated with this NPRM.

Sampling and Testing Plans

PHMSA estimates that there will be approximately 1,538 respondents, based on a review of relevant active registrations on the PHMSA Hazmat Intelligence Portal, each submitting an average of one sampling and testing plan each year. First year hourly burden is estimated at 40 hours per response, or 61,520 burden hours; hourly burden for each subsequent year is estimated at 10 hours per response, or 15,380 burden hours. PHMSA assumes a Chemical Engineer is the labor category most appropriate to describe sampling methodologies, testing protocols, and present test results. The mean hourly wage for a Chemical Engineer was $46.02 in May 2013, according to the Bureau of Labor Statistics. We inflate this wage by 60 percent to account for fringe benefits and overhead of $27.61 per hour, for a total weighted hourly wage of $73.63, or $74.30 per hour after adjusting for growth in median real wages. At an average hourly cost of $74.30 per hour, first year burden cost for this proposed requirement is estimated at $4,570,936.00; burden cost for each subsequent year is estimated at $1,142,734.00.

Routing – Collection by Line Segment

PHMSA estimates that there will be approximately 74 respondents (10 for Class II Railroads; 64 for Class III Railroads) each submitting an average of one routing collection response each year, and each subsequent year. Hourly burden is assumed to be 40 hours per response, or 2,960 burden hours each year. PHMSA used a labor rate that combines two employee groups listed in the Bureau of Labor Statistics May 2012 Industry-Specific Occupational Employment and Wage Estimates: NAICS 482000-Rail Transportation occupational code 11-0000 “Management Occupations” and occupation code 43-6011

"Executive Secretaries and Executive Administrative Assistants." A combination of these two groups will probably be utilized to perform the requirements in this proposed rule. The average annual wages for these groups are $100,820 and $54,520 respectively. The resulting average hourly wage rate, including a 60 percent increase to account for overhead and fringe benefits, is $67.96. At an average hourly cost of $67.96 per hour, burden cost for the first year and each subsequent year is estimated at $201,161.60.

Routing Security Analysis

For the first year, PHMSA estimates that there will be approximately 74 respondents (10 for Class II Railroads; 64 for Class III Railroads). Class II Railroads are expected to submit 50 routing security analysis responses per year, based on the number of feasible alternate routes to consider after future possible network changes, with each response taking approximately 80 hours each, or 4,000 hours. At an average hourly cost of $67.96 per hour, first year burden cost for Class II Railroads is estimated at $271,840.00. Class III Railroads are expected to submit 128 routing security analysis responses per year, with each response taking approximately 40 hours, or 5,120 hours. At an average hourly cost of $67.96 per hour, first year burden cost for Class III Railroads is estimated at $347,955.20.

PHMSA assumes that new route analyses are necessary each year based on changes in commodity flow, but that after the first year's route analyses are completed, analyses performed on the same routes in subsequent years will take less time. For each subsequent year, PHMSA estimates that there will be approximately 74 respondents (10 for Class II Railroads; 64 for Class III Railroads). Class II Railroads are expected to submit 50 routing security analysis responses per year, with each response taking approximately 16 hours each, or 800 hours. At an average hourly cost of $67.96 per hour, first year burden cost for Class II Railroads is estimated at

$54,368.00. Class III Railroads are expected to submit 128 routing security analysis responses per year, with each response taking approximately 8 hours, or 1,024 hours. At an average hourly cost of $67.96 per hour, first year burden cost for Class III Railroads is estimated at $69,591.04.

Incident Reporting

From 2011-2014, PHMSA identified 32 incidents, for an average of 11 incidents per year, involving the derailment and release of crude oil/ethanol. Each report would be submitted by a single respondent and would take approximately 2 additional hours to submit per response, compared to the current requirements. At an average hourly cost of $67.96 per hour, burden cost is estimated at $1,495.12. We do not currently have sufficient data to estimate the number of respondents and responses that would be required if PHMSA extended incident reporting requirements to derailments not involving a product release.

Total

We estimate that the total information collection and recordkeeping burden for the requirements as specified in this proposed rule would be as follows:

OMB No. 2137-XXXX, "Flammable Hazardous Materials by Rail Transportation"

First Year Annual Burden:

Total Annual Number of Respondents:	1,612
Total Annual Responses:	1,801
Total Annual Burden Hours:	73,622
Total Annual Burden Cost:	$5,393,387.92

Subsequent Year Burden:

Total Annual Number of Respondents:	1,612
Total Annual Responses:	1,801
Total Annual Burden Hours:	20,186
Total Annual Burden Cost:	$1,469,349.76

In addition to the Paperwork Reduction Act requirements outlined above, PHMSA seeks comment on whether any other provisions in this rule will result in additional information collection requirements and/or burdens, including but not limited to: notification to state emergency response commissions, and tank car design requirements.

Please direct your requests for a copy of the information collection to Steven Andrews or T. Glenn Foster, U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA), East Building, Office of Hazardous Materials Standards (PHH-12), 1200 New Jersey Avenue SE, Washington DC, 20590, Telephone (202) 366-8553.

G. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. section 4321-4375), requires that Federal agencies analyze proposed actions to determine whether the action will have a significant impact on the human environment. The Council on Environmental Quality (CEQ) regulations require Federal agencies to conduct an environmental review considering (1) the need for the proposed action, (2) alternatives to the proposed action, (3) probable environmental impacts of the proposed action and alternatives, and (4) the agencies and persons consulted during the consideration process. 40 CFR 1508.9.

1. Need for the Proposal

This NPRM is intended to address serious safety and environmental concerns revealed by various recent train accidents and incidents involving HHFTs. This NPRM is proposing requirements designed to lessen the frequency and consequences of train accidents involving the unintentional release flammable liquids in HHFTs. The growing reliance on trains to transport large volumes of flammable liquids, particularly crude oil and ethanol, poses a significant risk to life, property, and the environment. These significant risks have been highlighted by the recent instances of trains carrying crude oil that derailed in Casselton, North Dakota; Aliceville, Alabama; and Lac-Mégantic, Quebec, Canada and recent instances of trains carrying ethanol that derailed in Arcadia, Ohio and Cherry Valley, Illinois. The proposed changes also address NTSB recommendations on accurate classification, enhanced tank cars, rail routing, and oversight.

2. Alternatives to the Proposed Action

In proposing this NPRM, PHMSA is considering the following alternatives:

1. No Action Alternative – If PHMSA chose this alternative, it would not proceed with any rulemaking on this subject, and the current regulatory standards would remain in effect.
2. Preferred Alternative –This alternative is the current proposal as it appears in this NPRM. The proposed amendments are more fully addressed in the preamble and regulatory text sections. However, they generally include:

    a. New defined term of "High-hazard flammable train;"

    b. Rail Routing requirements as specified in Part 172, Subpart I of the HMR;

    c. Sampling and testing program to ensure proper classification and characterization;

    d. Notification to SERCs or other appropriate state delegated entity, of petroleum crude oil train transportation;

e. Phase in requirements for updated braking devices and braking systems;

f. Speed restrictions for rail cars that do not meet the safer DOT Specification 117 standard (In this NPRM we proposed three alternatives for differing levels of speed restrictions for trains that do not meet the DOT Specification 117); and

g. Phase out DOT 111 cars in HHFTs and require DOT Specification 117 for such train sets (In this NPRM we proposed three alternatives tank car design of the proposed DOT Specification 117).

3. The Alternative Proposed in the ANPRM– This alternative includes the following substantive provisions as proposed in the ANPRM:

   a. Relax regulatory requirements to afford the FRA greater discretion to authorize the movement of non-conforming tank cars;

   b. Impose additional requirements that would correct an unsafe condition associated with pressure relief valves (PRV) on rail cars transporting carbon dioxide, refrigerated liquid;

   c. Relax regulatory requirements applicable to the repair and maintenance of DOT Specification 110, DOT Specification 106, and ICC 27 tank car tanks (ton tanks);

   d. Relax regulatory requirement for the removal of rupture discs for inspection if the removal process would damage, change, or alter the intended operation of the device; and

   e. Impose additional requirements that would enhance the standards for DOT Specification 111 tank cars used to transport Packing Group (PG) I and II hazardous materials.

<u>3. Probable Environmental Impacts of the Proposed Action and Alternatives</u>

1. No-Action Alternative

If PHMSA were to select the no-action alternative, current regulations would remain in place, and no new provisions would be added. However, the safety and environmental threats that result from the increasing use of HHFTs would not be addressed. The existing threat of derailment and resulting fire, as exhibited in serious accidents like Lac- Mégantic, Quebec, which resulted in 47 fatalities, and Aliceville, Alabama, where we estimate that 630,000 gallons of crude oil entered navigable waters, destroying a significant area of wetland and forest, would continue. Clean-up is ongoing for both of these accidents.

2. Preferred Alternative

If PHMSA selects the provisions as proposed in this NPRM, PHMSA believes that safety and environmental risks would be reduced and that protections to human health and environmental resources would be increased.

The proposed application of the existing rail routing requirements to HHFTs would require that rail carriers consider safety and security risk factors such as population density along the route; environmentally-sensitive or significant areas; venues along the route (stations, events, places of congregation); emergency response capability along the route; etc., when analyzing and selecting routes for those trains. PHMSA believes that the use of routes that are less sensitive could mitigate the safety and environmental consequences of a train accident and release, were one to occur. It is possible that this requirement could cause rail carriers to choose routes that are less direct based on these concerns, potentially increasing the emission of greenhouse gases. However, PHMSA believes that the reduction in risk to sensitive areas outweighs a slight increase in greenhouse gases.

Next, the sampling and testing proposal is intended to ensure that each material is

properly classified to ensure that: (1) the proper regulatory requirements are applied to each shipment to minimize the risk of incident, (2) first responders have accurate information in the event of a train accident, and (3) the characteristics of the material are known and fully considered so that offerors and carriers are aware of and can mitigate potential threats to the integrity of rail tank cars. PHMSA believes that this provision will reduce the risk of release of these materials.

PHMSA is proposing to require railroads that operate trains containing one million gallons of Bakken crude oil to notify SERCs or other appropriate state delegated entity about the operation of these trains through their States. Railroads must identify each county, or a particular state or commonwealth's equivalent jurisdiction in the state through which the trains will operate. PHMSA believes that the notification will allow communities to better prepare and work with the railroads to ensure that resources are in place to respond to a spill that could affect water and environmental resources. As a result, responders can better mitigate a spill that has entered navigable waters by preventing further spread of the oil. This prevents further damage to drinking water resources and wildlife habitat.

PHMSA believes that the proposed braking and speed restrictions, especially for older DOT Specification 111 tank cars, will reduce the likelihood of train accidents and resulting release of flammable liquids. PHMSA also believes that the braking requirements could improve fuel efficiency, thereby reducing greenhouse gas emissions. Additionally, system wide implementation of ECP brakes, as proposed for a DOT Specification 117 manufactured under tank car Option 1, would improve the efficiency of the rail system by permitting trains to run closer together because of the improved performance of the brake system.

PHMSA believes that the phasing out of DOT Specification 111 tank cars in HHFTs

would reduce risk of release because of the improved integrity and safety features of the proposed DOT Specification 117 and 117P. The DOT Specification 117 will provide bottom outlet protection and a robust top fitting protection structure. To improve integrity and puncture resistance of the tank, DOT Specification 117 has a full-height 1/2 inch minimum thickness head shield, an 11-gauge jacket, and, based on the Option, either a 7/16 inch or 9/16 inch shell and head thickness in comparison to DOT Specification 111, which has no head shield, or jacket requirement and is constructed with a 7/16 inch thick shell.

The proposed DOT Specification 117 tank car must have a thermal protection system, capable of surviving a 100-minute pool fire after a train accident. The 100-minute survivability period is intended to provide emergency responders time to assess an accident, establish perimeters, and evacuate the public as needed, while permitting hazardous material to be vented from the tank to prevent a violent failure of the tank car. This thermal protection is critical in limiting human health risks to the public and first responders and limiting environmental damage in the event of a train accident. The introduction of the new DOT Specification 117 and 117P, along with the gradual phase out of the DOT Specification 111 used in HHFTs will result in increased manufacture of new tank cars. While the gradual nature of the phase out is intended to decrease burden on the rail industry, increased manufacture could result in greater release of greenhouse gases and use of resources needed to make the cars, such as steel. However, PHMSA believes that these possible risks are far outweighed by the increased safety and integrity of each railcar and each train and the decreased risk of release of these fossil fuels to the environment.

3. <u>ANPRM Alternative</u>

If PHMSA were to select the provisions as proposed in the ANPRM, PHMSA believes

that the significant safety risks that have recently come to light resulting from HHFTs would not be fully addressed. While the ANPRM proposed safety enhancements to DOT Specification 111 tank cars, public comments and current events have led PHMSA to believe that the gradual phase-out of the tank car in HHFT service is a more prudent alternative to improve safety. The ANPRM also sought comment on certain speed restrictions and braking equipment, which was helpful to PHMSA in drafting the current proposal.

The ANPRM also sought comment on various matters that are not directly related to the increasing threats described in this notice and will be addressed at another time as those provisions do not address the modified purpose and need of this rulemaking.

Agencies Consulted

PHMSA worked closely with the FRA, EPA, and DHS/TSA in the development of this proposed rulemaking for technical and policy guidance. PHMSA also considered the views expressed in comments to the ANPRM submitted by members of the public, state and local governments, and industry.

Conclusion

The provisions of this proposed rule build on current regulatory requirements to enhance the transportation safety and security of shipments of hazardous materials transported by rail, thereby reducing the risks of an accidental or intentional release of hazardous materials and consequent environmental damage. PHMSA believes the net environmental impact will be positive. PHMSA believes that there are no significant environmental impacts associated with this proposed rule.

PHMSA welcomes any views, data, or information related to environmental impacts that may result if the proposed requirements are adopted, as well as possible alternatives and their

environmental impacts.

H. Privacy Act

Anyone is able to search the electronic form of any written communications and comments received into any of our dockets by the name of the individual submitting the document (or signing the document, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement, published in the Federal Register on April 11, 2000 (65 FR 19477) or you may visit http://www.dot.gov/privacy.html.

I. Executive Order 13609 and International Trade Analysis

Under Executive Order 13609, agencies must consider whether the impacts associated with significant variations between domestic and international regulatory approaches are unnecessary or may impair the ability of American businesses to export and compete internationally. In meeting shared challenges involving health, safety, labor, security, environmental, and other issues, regulatory approaches developed through international cooperation can provide equivalent protection to standards developed independently while also minimizing unnecessary differences.

Similarly, the Trade Agreements Act of 1979 (Public Law 96-39), as amended by the Uruguay Round Agreements Act (Public Law 103-465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. For purposes of these requirements, Federal agencies may participate in the establishment of international standards, so long as the standards have a legitimate domestic objective, such as providing for safety, and do not operate to exclude imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards.

PHMSA participates in the establishment of international standards in order to protect the safety of the American public, and we have assessed the effects of the proposed rule to ensure that it does not cause unnecessary obstacles to foreign trade. Accordingly, this rulemaking is consistent with Executive Order 13609 and PHMSA's obligations under the Trade Agreement Act, as amended.

PHMSA welcomes any data or information related to international impacts that may result if the petitions and recommendations are adopted, as well as possible alternatives and their international impacts. Please describe the impacts and the basis for the comment.

J. Statutory/Legal Authority for this Rulemaking

This NPRM is published under the authority of 49 U.S.C. 5103(b), which authorizes the Secretary of Transportation to "prescribe regulations for the safe transportation, including security, of hazardous materials in intrastate, interstate, and foreign commerce." The proposed changes in this rule address safety and security vulnerabilities regarding the transportation of hazardous materials in commerce.

K. Regulation Identifier Number (RIN)

A regulation identifier number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document can be used to cross-reference this action with the Unified Agenda.

List of Subjects

49 CFR Part 171

Exports, Hazardous materials transportation, Hazardous waste, Imports, Reporting and recordkeeping requirements.

49 CFR Part 172

Hazardous materials transportation, Hazardous waste, Labeling, Packaging and containers, Reporting and recordkeeping requirements, Security measures.

49 CFR Part 173

Hazardous materials transportation, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 174

Hazardous materials transportation, Rail carriers, Reporting and recordkeeping requirements, Security measures.

49 CFR Part 179

Hazardous materials transportation, Railroad safety, Reporting and recordkeeping requirements.

The Proposed Rule

In consideration of the foregoing, we are proposing to amend title 49, chapter I, subchapter B, as follows:

PART 171--GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

1. The authority citation for part 171 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; Pub. L. 101–410 section 4 (28 U.S.C. 2461 note); Pub. L. 104-121, sections 212-213; Pub. L. 104–134, section 31001; 49 CFR 1.81 and 1.97.

2. In § 171.7, revise paragraph (k) to read as follows:

* * * * *

(k) * * *

(1) * * *

(2) AAR Manual of Standards and Recommended Practices, Section C—III, Specifications for Tank Cars, Specification M-1002 (AAR Specifications for Tank Cars), Appendix E, April 2010; into §§ 179.203a-9; 179.203b-5; 179.204a-9; 179.204b-5.

(3) AAR Manual of Standards and Recommended Practices, Section I, Specially Equipped Freight Car and Intermodal Equipment, 1988, into § 174.55; 174.63.

(4) AAR Specifications for Design, Fabrication and Construction of Freight Cars, Volume 1, 1988, into § 179.16.

(5) AAR Standard 286; AAR Manual of Standards and Recommended Practices, Section C, Car Construction Fundamentals and Details, Standard S-286, Free/Unrestricted Interchange for 286,000 lb Gross Rail Load Cars (Adopted 2002; Revised: 2003, 2005, 2006), into § 179.13.

* * * * *

3. In § 171.8 a definition for "High-hazard flammable train" is added in appropriate alphabetical order to read as follows:

§ 171.8 Definitions

* * * * *

High-hazard flammable train means a single train carrying 20 or more carloads of a Class 3 flammable liquid.

* * * * *

PART 172--HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

4. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 44701; 49 CFR 1.81 and 1.97.

5. In § 172.820, paragraph (a)(4) is added to read as follows:

§ 172.820 Additional planning requirements for transportation by rail.

(a) * * *

(4) A high-hazard flammable train as defined in § 171.8 of this subchapter.

PART 173--SHIPPERS--GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

6. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81 and 1.97.

7. Add new § 173.41, to read as follows:

§ 173.41 Sampling and testing program for mined gas and liquid.

(a) General. Mined gases and liquids, such as petroleum crude oil, extracted from the earth and offered for transportation must be properly classed and characterized as prescribed in § 173.22 of this subpart, in accordance with a sampling and testing program which specifies at a minimum:

(1) A frequency of sampling and testing that accounts for appreciable variability of the material, including the time, temperature, method of extraction (including chemical use), and location of extraction;

(2) Sampling at various points along the supply chain to understand the variability of the material during transportation;

(3) Sampling methods that ensure a representative sample of the entire mixture, as packaged, is collected;

(4) Testing methods that enable complete analysis, classification, and characterization of the material under the HMR.

(5) Statistical justification for sample frequencies;

(6) Duplicate samples for quality assurance purposes; and

(7) Criteria for modifying the sampling and testing program.

(b) Certification. Each person who offers a hazardous material for transportation shall certify, as prescribed by § 172.204 of this subchapter, that the material is offered for transportation in accordance with this subchapter, including the requirements prescribed by paragraph (a) of this section.

(c) Documentation, retention, review, dissemination of program. The sampling and testing program must be documented in writing and must be retained for as long as it remains in effect. The sampling and testing program must be reviewed at least annually and revised and/or updated as necessary to reflect changing circumstances. The most recent version of the sampling and testing program, or relevant portions thereof, must be available to the employees who are responsible for implementing it. When the sampling and testing program is updated or revised, all employees responsible for implementing it must be notified, and all copies of the sampling and testing program must be maintained as of the date of the most recent revision.

(d) Access by DOT to copy of program documentation. Each person required to develop and implement a sampling and testing program must maintain a copy of the sampling and testing program documentation (or an electronic file thereof) that is accessible at, or through, its principal place of business, and must make the documentation available upon request at a reasonable time and location to an authorized official of the Department of Transportation.

8. In § 173.241, revise paragraph (a) to read as follows:

§ 173.241 Bulk packagings for certain low-hazard liquid and solid materials.

* * * * *

(a) Rail cars: Class DOT 103, 104, 105, 109, 111, 112, 114, 115, 117, or 120 tank car tanks; Class 106 or 110 multi-unit tank car tanks; and AAR Class 203W, 206W, and 211W tank car tanks. Additional operational requirements apply to high-hazard flammable trains (see § 171.8 of this subchapter) as prescribed in § 174.310 of this subchapter. Notwithstanding the tank car specifications prescribed in this section, DOT Specification 111 tank cars are no longer authorized for Class 3 (flammable liquids) in Packing Group III for use in high-hazard flammable train service, after October 1, 2020.

* * * * *

9. In § 173.242 revise paragraph (a) to read as follows:

§ 173.242 Bulk packagings for certain medium hazard liquids and solids, including solids with dual hazards.

* * * * *

(a) Rail cars: Class DOT 103, 104, 105, 109, 111, 112, 114, 115, 117, or 120 tank car tanks; Class 106 or 110 multi-unit tank car tanks and AAR Class 206W tank car tanks. Additional operational requirements apply to high-hazard flammable trains (see § 171.8 of this subchapter) as prescribed in § 174.310 of this subchapter. Notwithstanding the tank car specifications prescribed in this section, DOT Specification 111 tank cars are no longer authorized for use in high-hazard flammable train service, based on packing group, after the following dates:

Packing Group	DOT 111 Not Authorized After
II	October 1, 2018

III	October 1, 2020

* * * * *

10. In § 173.243 revise paragraph (a) to read as follows:

§ 173.243 Bulk packaging for certain high-hazard liquids and dual-hazard materials that pose a moderate hazard.

* * * * *

(a) Rail cars: Class DOT 103, 104, 105, 109, 111, 112, 114, 115, 117, or 120 fusion-welded tank car tanks; and Class 106 or 110 multi-unit tank car tanks. Additional operational requirements apply to high-hazard flammable trains (see § 171.8 of this subchapter) as prescribed in § 174.310 of this subchapter. Notwithstanding the tank car specifications prescribed in this section, DOT Specification 111 tank cars are no longer authorized for Class 3 (flammable liquids) in Packing Group I for use in high-hazard flammable train service, after the October 1, 2017.

* * * * *

PART 174--CARRIAGE BY RAIL

11. The authority citation for part 174 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

12. Add new § 174.310, to read as follows:

§ 174.310 Requirements for the operation of high-hazard flammable trains.

(a) General. Each rail carrier operating a high-hazard flammable train (as defined in § 171.8) must comply with each of the following additional safety requirements with respect to each high-hazard flammable train that it operates:

(1) Routing. The additional planning requirements for transportation by rail in accordance with part 172, subpart I of this subchapter;

(2) Notification to State Emergency Response Commissions of Petroleum Crude Oil Train Transportation.

(i) Any railroad transporting in a single train 1,000,000 gallons or more of UN 1267, Petroleum crude oil, Class 3, as described by § 172.101 of this subchapter and sourced from the Bakken shale formation in the Williston Basin (North Dakota, South Dakota, and Montana in the United States, or Saskatchewan or Manitoba in Canada), must, within 30 days of [INSERT EFFECTIVE DATE OF FINAL RULE], provide notification to the State Emergency Response Commission (SERC) or other appropriate state delegated entities in which it operates. Information required to be shared with SERCs or other appropriate state delegated entity must consist of the following:

(1) a reasonable estimate of the number of affected trains that are expected to travel, per week, through each county within the State;

(2) the routes over which the affected trains will be transported;

(3) a description of the petroleum crude oil and applicable emergency response information required by subparts C and G of part 172 of this subchapter; and,

(4) at least one point of contact at the railroad (including name, title, phone number and address) responsible for serving as the point of contact for the State Emergency Response Commission and relevant emergency responders related to the railroad's transportation of affected trains.

(ii) Railroads shall update notifications made under paragraph (a) of this section prior to making any material changes in the estimated volumes or frequencies of trains traveling through

a county.

(iii) Copies of railroad notifications to State Emergency Response Commissions made under paragraph (a) of this section must be made available to FRA upon request.

(3) Speed restrictions. All trains are limited to a maximum speed of 50 mph. In addition, the following restrictions apply:

(i) Option 1 - The train is further limited to a maximum speed of 40 mph, unless all tank cars containing a flammable liquid meet or exceed the performance standard for the DOT Specification 117 tank car provided in part 179, subpart D of this subchapter;

(ii) Option 2 - The train is further limited to a maximum speed of 40 mph while operating in an area, determined by census population data, that has a population of more than 100,000 people, unless all tank cars containing a flammable liquid meet or exceed the performance standard for the DOT Specification 117 tank car provided in part 179, subpart D of this subchapter; and

(iii) Option 3 - The train is further limited to a maximum speed of 40 mph while that train travels within the limits of high-threat urban areas (HTUAs) as defined in § 1580.3 of this title, unless all tank cars containing a flammable liquid meet or exceed the performance standard for the DOT Specification 117 tank car provided in part 179, subpart D of this subchapter.

(iv) The train is further limited to a maximum speed of 30 mph, unless it conforms with paragraph (a)(4) of this section.

(4) Braking.

(i) The train must be equipped and operated with either a two-way end of train device, as defined in § 232.5 of this title, or a distributed power (DP) system, as defined in § 229.5 of this title.

(ii) After October 1, 2015, a train comprised entirely of tank cars manufactured in accordance with proposed § 179.202a-3 or the performance specification prescribed in § 179.202b (Option 1 only), except for required buffer cars, must be operated in ECP brake mode as defined by 49 CFR 232.5.

(5) Tank cars manufactured after October 1, 2015.

(i) A tank car manufactured for use in a HHFT after October 1, 2015 must meet DOT Specification 117, in part 179, subpart D of this subchapter.

(ii) A tank car manufactured for use in a HHFT after October 1, 2015, in accordance with proposed § 179.202a-3 or the performance specification prescribed in § 179.202b (Option 1), must be equipped with ECP brakes in accordance with subpart G of part 232 of this title.

PART 179--SPECIFICATIONS FOR TANK CARS

13. The authority citation for part 179 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

14. Revise subpart D of part 179, to read as follows:

Subpart D–Specifications for Non-Pressure Tank Car Tanks (Classes DOT-111AW, 115AW, and 117AW)

* * * * *

§ 179.202 Individual specification requirements applicable to DOT-117 tank car tanks (Option 1).

Each tank built under these specifications must conform to either the requirements of §§ 179.200 and 179.202a, or the performance standard requirements of § 179.202b.

§ 179.202a-3 Type**.**

(a) General. The tank car must either be designed to the DOT 117 specification in §

179.202a or conform to the performance specification prescribed in § 179.202b.

(b) Approval. The tank car design must be approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration, FRA, 1200 New Jersey Ave., SE., Washington, DC 20590, and must be constructed to the conditions of that approval in accordance with § 179.13.

(c) Design. The design must meet the individual specification requirements of § 179.202.

§ 179.202a-4 Thickness of plates**.**

The wall thickness after forming of the tank shell and heads must be, at a minimum, 9/16 of an inch AAR TC-128 Grade B, in accordance with § 179.200-7(b).

§ 179.202a-5 Tank head puncture resistance system.

The DOT 117 specification tank car must have a tank head puncture resistance system. The full height head shields must have a minimum thickness of ½ inch.

§ 179.202a-6 Thermal protection systems.

The DOT 117 specification tank car must have a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.202a-7 Jackets.

The entire thermal protection system must be covered with a metal jacket of a thickness not less than 11 gauge A1011 steel or equivalent; and flashed around all openings so as to be weather tight. The exterior surface of a carbon steel tank and the inside surface of a carbon steel jacket must be given a protective coating.

§ 179.202a-8 Bottom outlets.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train

movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.202a-9 Top fittings protection.

The DOT 117 tank car must be equipped with a top fittings protection system and a nozzle capable of sustaining, without failure, a rollover accident at a speed of 9 miles per hour, in which the rolling protective housing strikes a stationary surface assumed to be flat, level, and rigid and the speed is determined as a linear velocity, measured at the geometric center of the loaded tank car as a transverse vector. Failure is deemed to occur when the deformed protective housing contacts any of the service equipment or when the tank lading retention capability is compromised (e.g., leaking).

§ 179.202a-10 DOT 117 design.

DOT Specification	Insulation	Bursting Pressure (psig)	Minimum Plate Thickness (Inches)	Test Pressure (psig)	Bottom Outlet
117A100W	Optional	500	9/16	100	Optional

§ 179.202b-1 Performance standard requirements.

(a) Approval. Design, testing, and modeling results must be reviewed and approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration (FRA), 1200 New Jersey Ave., SE., Washington, DC 20590.

(b) Approval to operate at 286,000 gross rail load (GRL). In addition to the requirements of paragraph (a) of this section, the tank car design must be approved, and the tank car must be constructed to the conditions of an approval issued by the Associate Administrator for Railroad Safety/Chief Safety Officer, FRA, in accordance with § 179.13.

§ 179.202b-2 Puncture resistance**.**

(a) Minimum side impact speed: 12 mph when impacted at the longitudinal and vertical center of the shell by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

(b) Minimum head impact speed: 18 mph when impacted at the center of the head by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

§ 179.202b-3 Thermal protection systems.

The tank car must be equipped with a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.202b-4 Bottom outlet.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.202b-5 Top fittings protection.

(a) New construction. Tank car tanks must be equipped with a top fittings protection system and a nozzle capable of sustaining, without failure, a rollover accident at a speed of 9 miles per hour, in which the rolling protective housing strikes a stationary surface assumed to be flat, level, and rigid and the speed is determined as a linear velocity, measured at the geometric center of the loaded tank car as a transverse vector. Failure is deemed to occur when the deformed protective housing contacts any of the service equipment or when the tank car lading retention capability is compromised (e.g., leaking).

(b) Existing tank cars. Existing tank car tanks may continue to rely on the equipment installed at the time of manufacture.

§ 179.203 Individual specification requirements applicable to DOT-117 tank car tanks (Option

2).

Each tank built under these specifications must conform to either the requirements of §§ 179.200 and 179.203a, or the performance standard requirements of § 179.203b.

§ 179.203a-3 Type**.**

(a) General. The tank car must either be designed to the DOT 117 specification or conform to the performance specification prescribed in § 179.203b.

(b) Approval. The tank car design must be approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration, FRA, 1200 New Jersey Ave., SE., Washington, DC 20590, and must be constructed to the conditions of that approval in accordance with § 179.13.

(c) Design. The design must meet the individual specification requirements of § 179.203.

§ 179.203a-4 Thickness of plates**.**

The wall thickness after forming of the tank shell and heads must be, at a minimum, 9/16 of an inch AAR TC-128 Grade B, in accordance with § 179.200-7(b).

§ 179.203a-5 Tank head puncture resistance system.

The DOT 117 specification tank car must have a tank head puncture resistance system. The full height head shields must have a minimum thickness of ½ inch.

§ 179.203a-6 Thermal protection systems.

The DOT 117 specification tank car must have a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.203a-7 Jackets.

The entire thermal protection system must be covered with a metal jacket of a thickness

not less than 11 gauge A1011 steel or equivalent; and flashed around all openings so as to be weather tight. The exterior surface of a carbon steel tank and the inside surface of a carbon steel jacket must be given a protective coating.

§ 179.203a-8 Bottom outlets.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.203a-9 Top fittings protection.

The tank car tank must be equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1 (IBR, see § 171.7 of this subchapter).

§ 179.203a-10 DOT 117 design.

DOT Specification	Insulation	Bursting Pressure (psig)	Minimum Plate Thickness (Inches)	Test Pressure (psig)	Bottom Outlet
117A100W	Optional	500	9/16	100	Optional

§ 179.203b-1 Performance standard requirements.

(a) Approval. Design, testing, and modeling results must be reviewed and approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration (FRA), 1200 New Jersey Ave., SE., Washington, DC 20590.

(b) Approval to operate at 286,000 gross rail load (GRL). In addition to the requirements of paragraph (a) of this section, the tank car design must be approved, and the tank car must be constructed to the conditions of an approval issued by the Associate Administrator for Railroad Safety/Chief Safety Officer, FRA, in accordance with § 179.13.

§ 179.203b-2 Puncture resistance**.**

(a) Minimum side impact speed: 12 mph when impacted at the longitudinal and vertical center of the shell by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

(b) Minimum head impact speed: 18 mph when impacted at the center of the head by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

§ 179.203b-3 Thermal protection systems.

The tank car must be equipped with a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.203b-4 Bottom outlet.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.203b-5 Top fittings protection.

(a) New construction. The tank car tank must be equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1 (IBR, see § 171.7 of this subchapter).

(b) Existing tank cars. Existing tank car tanks may continue to rely on the equipment installed at the time of manufacture.

§ 179.204 Individual specification requirements applicable to DOT-117 tank car tanks (Option 3).

Each tank built under these specifications must conform to either the requirements of §§ 179.200 and 179.204a, or the performance standard requirements of § 179.204b.

§ 179.204a-3 Type**.**

(a) General. The tank car must either be designed to the DOT 117 specification or

conform to the performance specification prescribed in § 179.204b.

(b) Approval. The tank car design must be approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration, FRA, 1200 New Jersey Ave., SE., Washington, DC 20590, and must be constructed to the conditions of that approval in accordance with § 179.13.

(c) Design. The design must meet the individual specification requirements of § 179.204.

§ 179.204a-4 Thickness of plates**.**

The wall thickness after forming of the tank shell and heads must be, at a minimum, 7/16 of an inch AAR TC-128 Grade B, in accordance with § 179.200-7(b).

§ 179.204a-5 Tank head puncture resistance system.

The DOT 117 specification tank car must have a tank head puncture resistance system. The full height head shields must have a minimum thickness of ½ inch.

§ 179.204a-6 Thermal protection systems.

The DOT 117 specification tank car must have a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.204a-7 Jackets.

The entire thermal protection system must be covered with a metal jacket of a thickness not less than 11 gauge A1011 steel or equivalent; and flashed around all openings so as to be weather tight. The exterior surface of a carbon steel tank and the inside surface of a carbon steel jacket must be given a protective coating.

§ 179.204a-8 Bottom outlets.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train

movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.204a-9 Top fittings protection.

The tank car tank must be equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1 (IBR, see § 171.7 of this subchapter).

§ 179.204a-10 DOT 117 design.

DOT Specification	Insulation	Bursting Pressure (psig)	Minimum Plate Thickness (Inches)	Test Pressure (psig)	Bottom Outlet
117A100W	Optional	500	7/16	100	Optional

§ 179.204b-1 Performance standard requirements.

(a) Approval. Design, testing, and modeling results must be reviewed and approved by the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration (FRA), 1200 New Jersey Ave., SE., Washington, DC 20590.

(b) Approval to operate at 286,000 gross rail load (GRL). In addition to the requirements of paragraph (a) of this section, the tank car design must be approved, and the tank car must be constructed to the conditions of an approval issued by the Associate Administrator for Railroad Safety/Chief Safety Officer, FRA, in accordance with § 179.13.

§ 179.204b-2 Puncture resistance.

(a) Minimum side impact speed: 9 mph when impacted at the longitudinal and vertical center of the shell by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

(b) Minimum head impact speed: 17 mph when impacted at the center of the head by a rigid 12-inch by 12-inch indenter with a weight of 286,000 pounds.

§ 179.204b-3 Thermal protection systems.

The tank car must be equipped with a thermal protection system. The thermal protection system must be designed in accordance with § 179.18 and include a reclosing pressure relief device in accordance with § 173.31.

§ 179.204b-4 Bottom outlet.

If the tank car is equipped with a bottom outlet, the handle must be removed prior to train movement or be designed with protection safety system(s) to prevent unintended actuation during train accident scenarios.

§ 179.204b-5 Top fittings protection.

(a) New construction. The tank car tank must be equipped per AAR Specifications Tank Cars, appendix E paragraph 10.2.1 (IBR, see § 171.7 of this subchapter).

(b) Existing tank cars. Existing tank car tanks may continue to rely on the equipment installed at the time of manufacture.

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Anthony R. Foxx
Secretary of Transportation