



P-1577

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March 9, 2011

Dr. Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety
Pipeline and Hazardous Materials Safety Administration
U.S. Department of Transportation
East Building, 2nd Floor
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

Dear Dr. El-Sibaie:

Pursuant to 49 C.F.R. section 106.95, AAR submits the enclosed petition to amend PHMSA's standards for tank cars used to transport packing group I and II materials. Thank you for considering the petition.

Sincerely, _

BEFORE THE
PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION

PETITION FOR RULEMAKING:
TANK CAR STANDARDS FOR DOT CLASS 111 TANK CARS
USED FOR PACKING GROUP I AND II MATERIALS

SUBMITTED BY
THE ASSOCIATION OF AMERICAN RAILROADS

The Association of American Railroads (AAR),¹ on behalf of itself, its member railroads, and the members of the AAR Tank Car Committee,² submits the following petition for the adoption of new standards of construction for Class 111 tank cars used for the transportation of packing group I and II materials.³ These new requirements would improve the ability of tank cars to survive an accident without the release of hazardous materials.

I. Background

On January 13, 2009, PHMSA published new standards of construction for tank cars used for the transportation of poison inhalation hazard (PIH) materials.⁴ The standards represented a significant improvement in the ability of tank cars to withstand an accident. The standards were promulgated in recognition of the hazards posed by PIH materials.

However, PIH materials are not the only hazardous materials posing significant hazards when released. PHMSA classifies packing group I materials as

¹ AAR is a trade association whose membership includes freight railroads that operate 72 percent of the line-haul mileage, employ 92 percent of the workers, and account for 95 percent of the freight revenues of all railroads in the United States; and passenger railroads that operate intercity passenger trains and provide commuter rail service.

² The roster for AAR's Tank Car Committee, which is composed of shippers, tank car builders, tank car lessors, and railroads, is enclosed as Attachment A.

³ AAR is simultaneously petitioning Transport Canada.

⁴ 74 Fed. Reg. 1,770.

materials posing a “great danger” and packing group II materials as materials posing a “medium danger.”⁵

Indeed, experience confirms that accidents involving packing group I and II materials can have significant consequences. AAR surveyed its members for information on derailments involving packing group I and II materials from 2004-2008. The derailments resulted in one fatality and eleven injuries, the release of approximately 925,000 gallons of these hazardous materials, and cleanup costs totaling approximately \$63 million.⁶

Recognizing that it is time to reexamine the tank car standards for packing group I and II materials, AAR’s Tank Car Committee charged a task force with investigating possible risk-reduction options for Class 111 tank cars carrying packing group I and II materials. The task force’s mission statement provided that that the task force was to:

[r]eview performance of DOT/TC Class 111 tank cars transporting hazardous materials in packing groups I and II, investigate possible changes in design, use of existing types of protective systems, or changes in operations related to performance, and determine benefit of making changes to new cars, existing cars or operations.

The task force examined both construction standards and outage requirements. This petition addresses construction standards. The task force is still considering whether there should be an increase in outage requirements.

The task force initially considered whether it should be addressing standards for both the existing fleet and new construction and concluded that it should focus its efforts on standards for new construction and recommend no modification or retrofit for existing cars⁷. The task force examined a number of risk-reduction

⁵ 49 C.F.R. § 171.8.

⁶ See Attachment B.

⁷ The task force considered applying potential risk reduction options to the existing fleet. However, there were no feasible options that could be applied to all existing and new cars. For example, RSI conservatively estimates the cost of retrofitting existing cars with head shields and jackets alone at well over \$1 billion over the life of a retrofit program, not including cleaning and out of service costs. By comparison, derailment costs totaled approximately \$64 million over the past five years, including equipment, lading, response, and environmental remediation costs. Furthermore, application of head shields or jackets presents significant technical problems. The added weight might overload the draft sill of cars designed to 263K

options, including half-height (HHP) and full-height (FHP) head shields, 11-gauge jackets (with and without insulation), increased shell thickness, and increased head thickness.⁸

The University of Illinois (U of I) was tasked with analyzing the effectiveness of the risk-reduction options under consideration. U of I looked at the estimated quantity of release (EQR), that is, the estimated quantity of product that would be released should a tank car be involved in an accident. U of I considered tank cars with varying capacities and concluded that the risk-reduction options would have a similar effect for all tank cars. Consequently, for the purposes of its analysis, the task force concentrated on one tank car, a 30,000 gallon tank car.

and even cars operating at 263K but with sills designed to 286K. Of course, increasing the shell or head thickness on existing cars is impossible.

⁸ The task force also considered the removal of bottom fittings, but concluded that it would be impractical because of the loading and unloading infrastructure at fixed facilities.

The results of the U of I analysis are set forth in the table below.

	Option ID	Tank Car Safety Design	EQR (gal.)	Per Cent Change in EQR
	B0	Old Baseline	5,175	-6.0%
	B1	New Baseline, includes Top Fittings Protection	4,884	0.0%
Contribution of Individual Option to New Baseline	I1	With Jacket Head	4,428	13.0%
	I2	With half height head shield, HHP	4,271	12.5%
	I3	With full height head shield, FHP	4,148	15.1%
	I4	Increase Head & Shell 1/16"	4,294	12.1%
	I5	Increase Head & Shell 1/8"	3,781	22.6%
	I6	With Shell Jacket	3,507	28.2%
Contribution of Collective Options to New Baseline	C1	Increase Head & Shell 1/16" & HHP	3,719	23.9%
	C2	Increase Head & Shell 1/16" & FHP	3,604	26.2%
	C3	Increase Head & Shell 1/8" & HHP	3,247	33.5%
	C4	Increase Head & Shell 1/8" & FHP	3,142	35.7%
	C5	With Head & Shell Jacket	2,809	42.5%
	C6	With Shell Jacket & HHP	2,503	48.8%
	C7	With Shell Jacket & FHP	2,445	49.9%

The results must be viewed with caution. While some of the results are statistically significant, not all are. Some of the smaller differences among the estimated effects may be due to chance and not a true underlying effect. AAR recognizes that two of the results seem counterintuitive: according to the analysis, full-head shields are only marginally better than half-head shields and jackets are not significantly better than increasing shell thickness by the thickness of the jacket.

The U of I results point in the direction of AAR requirements for 286,000 pound cars.⁹ The task force considered the relationship and concluded that the simplicity of using the same requirements for the improvements at issue for upgraded Class 111 cars and 286,000 pound cars would be advantageous. Furthermore, those requirements have already been vetted by the affected industries. Note that the requirements for 286,000 pound cars were designed to produce the greatest benefit for the least amount of added weight.

With this background, AAR believes it time that DOT address the upgrading of Class 111 tank cars used for packing group I and II materials. To do so now is a logical outgrowth of PHMSA's recent rule addressing tank cars used to transport PIH materials.

⁹ AAR's requirements for 286,000 pound cars are enclosed as Attachment C.

II. Proposed Construction Standards

AAR proposes that DOT consider applying AAR's requirements for 286,000 pound tank cars in the areas of top fittings protection, reclosing pressure relief devices, and head and shell material and thickness requirements to Class 111 tank cars used for packing group I and II materials. Specifically, AAR proposes that DOT consider adopting the following requirements for any Class 111 tank car constructed in the future used for packing group I and II materials. AAR also proposes that cars constructed to these requirements be permitted with gross weights of 286,000 pounds (AAR would continue to apply all of its requirements for 286,000 pound tank cars to these cars should they be used in service above 263,000 pounds).

Top Fittings Protection

Class 111 tank cars used to transport packing group I or II materials must be equipped with top fittings protection as follows:

(a) The protective structure must be as tall as the tallest fitting involved and must provide protection for those fittings, without overstressing the tank shell and nozzles, when subjected to forces of $1/2W$ in the vertical downward direction, $1W$ horizontal in the longitudinal direction, and $1/2W$ horizontal in the lateral direction, where

- (1) W is defined as the designed gross rail load of the car, less trucks;
- (2) the forces are applied separately and uniformly over the projected plane of the protective structure perpendicular to the direction of the force;
- (3) for horizontal loads, the projected plane extends from the top of the tank to the top of the protective structure;
- (4) in the case of multiple nozzles,
 - (A) the forces are applied uniformly over their combined projected area if the reinforcement zones of the nozzle, as defined in paragraph 3.3.1 of this appendix, have a positive overlap; and

(B) if there is no overlap of the reinforcement zones, each nozzle must be protected so that it can withstand the applied loads independent of the other nozzles;

(5) calculations should use the minimum specified tensile strength of the material for the tank, nozzle(s), unprotected service equipment, and protective device (where applicable); and

(6) Stresses must not exceed the critical buckling stress of the assembly under consideration.

(b) The design stresses must not exceed the minimum specified tensile stress for the tank, nozzle, and protective housing, provided that the critical buckling stresses are not exceeded.

(c) The protective structure must not reduce the pressure relief device flow capacity below the minimum required.

(d) The protective structure must provide a means of drainage with a minimum flow area equivalent to six 1-in.-diameter holes (4.71 in.²).

(e) The strength of the attachment of the protective structure to its base structure should not exceed 70 percent of the attachment strength of the base structure to its base structure. For example, if the protective structure is attached to the nozzle, the strength of the attachment of the protective structure to the nozzle may not exceed 70 percent of the strength of the attachment of the nozzle to the tank.

(f) Individual fittings may be unprotected if there is no loss of lading when subjected to the design loads in subsection (a). If unprotected fittings are used in conjunction with a protective structure, the design loads are shared in proportion to the projected areas of the protective structure and the fittings.

(g) Discontinuity protection is not required for manway covers that have internal or external shear rings designed to resist the horizontal loads defined in paragraph subsection (a).

(h) No discontinuity protection is required for internal safety relief valves, cover plates, blind flanges, or plugs.

Pressure Relief Devices

Class DOT-111 cars used to transport packing group I or II materials must be equipped with reclosing pressure relief devices. Upon approval of FRA's Associate Administrator for Safety, a non-reclosing device can be used where the applicant demonstrates that a non-reclosing device is required and affords an equivalent level of safety.

Tank Material and Thickness

Class DOT-111 cars with carbon steel tanks used to transport packing group I or II materials must have heads and shells constructed of normalized TC128 Grade B steel or normalized A516-70 steel. Tank car heads must be normalized after forming, unless approval is granted by FRA's Associate Administrator for Safety on the basis that a facility has demonstrated its equipment and controls provide an equivalent level of safety. For tanks constructed of normalized TC 128 Grade B steel, non-jacketed tanks must be at least ½ in. thick and jacketed cars must be at least 7/16" thick. For tanks constructed of normalized A516-70 steel, non-jacketed cars must be at least 9/16 in. thick and jacketed cars must be at least ½ in. thick. In all cases the cars must be equipped with at least ½ in. half-head shields.

Class DOT-111 cars with high-alloy steel tanks (111****W6 and 111****W7) used to transport packing group I or II materials must have heads and shells at least ½ in. thick and be equipped with at least ½ in. half-head shields if not jacketed. Jacketed tanks must be at least 7/16 in. thick and be equipped with ½ in. thick jacket heads at a minimum.

III. Conclusion

Promulgating enhanced standards for new tank cars used to transport packing group I and II materials is the logical next step following the issuance of enhanced standards for PIH materials. AAR urges DOT to act expeditiously.

Respectfully submitted,



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March 9, 2011

Attachment A

Tank Car Committee

Pat Whelan (Chair), BNSF Railway Company

Carl Akins, Kansas City Southern

Andy Ash, Railway Association of Canada

John Byrne, General Electric Transportation-Railway Supply Institute Representative

Ken Dorsey, Association of American Railroads

Kevin Flahive, The Fertilizer Institute

Jorge Gallardo, Ferromex

Marco A.G. Garza, Kansas City Southern de Mexico

Jim Kozey, Canadian Pacific Railway

Dave Maechling, American Railcar Leasing- Railway Supply Institute Representative

Tim Mannas, CSXT

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Lou Oborny, Union Pacific Railroad

Joe Perez, Union Tank Car- Railway Supply Institute Representative

Frank Reiner, Chlorine Institute

Mike Richardson, Clay Producers Association

Allen Richter, Consolidated Railroad Company

Pat Student, Union Pacific Railroad representing AAR's Hazardous Materials Committee

Kirk Warner, American Petroleum Institute

Harold Weber, Sulphur Institute

Paul Williams, Norfolk Southern Railroad

Railroad	Date	City	State	Car Specification(s)	Commodity(s)	Quantity	Units	Car Failure Cause	Cost	Derailment Cause
BNSF	5/17/2008	Lafayette	LA	111A100W5	hydrochloric acid	94,000	Pounds	Sheared vapor valve	\$805,000	T110-Wide Gage (Due to Defect)
BNSF	6/5/2008	Springfield	MO	111A100W3	Potassium Hydroxide Solution, 8, PGII	8,000	Gallons	Punctured tank head	\$400,000	E32C-Coupler Drawhead Broken
BNSF	8/22/2008	Luther	OK	111A100W1	Petroleum Crude Oil, 3, PGIII	6000	Gallons	Derailed on side with side shell split towards top shell near A-end	\$133,000	T102-Cross Level of Track Irregu
"	"	"	"	111A100W1	Petroleum Crude Oil, 3, PGIII	17000	Gallons	Derailed on side & fire ensued from the liquid & vapor valve area after these valves were sheared off during the derailment. The manway gasket also melted & fire ignited at the manway.	\$160,500	"
"	"	"	"	111A100W1	Petroleum Crude Oil, 3, PGIII	12000	Gallons	TILX 191938 derailed on its side & a fire ensued from around the manway cover area & at the liquid valve.	\$148,000	"
"	"	"	"	111A100W1	Petroleum Crude Oil, 3, PGIII	27746	Gallons	UTLX 201925 derailed on its side and all product was deemed lost/consumed in the ensuing fire from a pressure heat induced tear in the side shell near the B-end.	\$187,400	"
"	"	"	"	111A100W1	Petroleum Crude Oil, 3, PGIII	18000	Gallons	TILX 194831 derailed leaning & fire ensued from a pressure/heat induced tear near the top side shell towards the B-end.	\$163,000	"
Total Cost									\$791,900	
BNSF	12/7/2007	Nolan	OK	111A100W1	Methanol, 3, PGII	6000	Gallons	Derailed in a pile & came to rest upside down. Methanol leaked from VRV & a small tank head puncture hole at 9 O'Clock position. A fire ensued & burned until another car was uprighted. The BOV was also sheared off after TC uprighted. Spillage was captured. Remaining product transferred to tank trucks.	\$101,500	T-204 Broken Rail (Weld Field)
"	"	"	"	111A100W1	Residue L/C Petroleum Crude Oil, 3, PGIII	140	Gallons	Derailed in pile & came to rest on its side with a gash hole at bottom tank near the B-end. Residue product was ignited by the methanol fire & extinguished.	\$11,250	"
"	"	"	"	105J300W	Residue L/C LPG (Stenched Propane), 2.1	150	Gallons	Derailed in the pile and came to rest on its side shell. A fire ensued ignited by the burning methanol.	\$11,050	"
"	"	"	"	112J340W	Residue L/C LPG (Stenched Propane), 2.1	150	Gallons	Derailed in the pile & came to rest atop another tank car & sustained a crack/split in its side shell.	\$11,050	"
"	"	"	"	112J340W	Residue L/C LPG (Stenched Propane), 2.1	150	Gallons	Derailed in the pile & came to rest leaning below another tank car sustaining a crack/split in its side shell.	\$11,050	"
"	"	"	"	111A100W1	Residue L/C Gasoline (Natural Gasoline), 3, PG II	120	Gallons	Derailed in the pile & came to rest leaning against another tank car & sustained a	\$11,080	"
Total									\$156,980	

BNSF	10/29/2007	Clara City	MN	111A100W5	Hydrochloric Acid, 8, PGII	196,000	Pounds	Sustained several breaches to its tank, including a large dent in the B-end tank head upper left quadrant with a large peel tear at this location. The A-end side shell also sustained a 3-inch square puncture hole.	\$230,000	H306 SHOVING MOVEMENT, A LEADING END OF MOVEMENT MOVEMENT OF ENGINES/CAF (EMPLOYEE)
BNSF	9/19/2006	Crawford	TX	211A100W6	Ethanolamine, 8, PGIII	20840	Gallons	Derailed on its side with the A-end head punctured (6 x 12 inch hole @ 7 o'clock position) caused by impact with other derailling railcars, possibly a coupler head. An evacuation impacted approx 300 people for a little more than 3-hours.	\$420,000	E46C Truck Bolster Stiff, Impropr
				111A100W1	Styrene Monomer, Stabilized, 3, PGIII	5	Gallons	Released a small amount of product at the threaded valve-pipe connection.	\$12,545	"
								Total	\$432,545	
BNSF	6/24/2005	Hoxie	AR	111A100W1	Potassium Hydroxide Solution, 8, PG II	4600	Gallons	On its side with several small puncture holes in its side shell.	\$242,000	T109 Track Alignment Irregular (f
"	"	"	"	111A100W1	Phosphoric Acid, 8, PGIII	10000	Gallons	On its side with a horizontal gash through the middle of its side shell.	\$241,000	"
"	"	"	"	AAR211A60W1	Phosphoric Acid, 8, PGIII	10000	Gallons	On its side sustained a vertical gash behind the tank head.	\$241,000	"
"	"	"	"	111A100W1	Phosphoric Acid, 8, PGIII	8500	Gallons	On its side with the manway nozzle & the top fittings partially sheared off.	\$240,800	"
								Total	\$964,800	
BNSF	1/11/2004	Hoyte	TX	111A100W1	3-Compartment: 1 - N-Propyl Acetate; 2 - N-Propanol	36900	Pounds	Sustained A-end head puncture (comp. 3) with a side shell split between compartments 1 & 2.	\$258,655	T204 Broken Rail - Weld (Field)
"	"	"	"	111A100W1	Styrene Monomer, Stabilized, 3, PGIII	39,550	Pounds	Sustained shell split on both sides in center of tank & PRV sheared off.	\$430,995	"
"	"	"	"	111A100W1	Vinyl Acetate, Stabilized, 3, PGII	123,395	Pounds	Sustained a puncture near manway area & at A-end bottom shell, also had a side shell split.	\$595,455	"
"	"	"	"	111A100W1	Styrene Monomer, Stabilized, 3, PGIII	187,000	Pounds	Sustained damage to the liquid & vapor line valves that were sheared off. The bottom outlet valve was also sheared off, with no product release from this area.	\$6,875	"
"	"	"	"	111A100W1	Styrene Monomer, Stabilized, 3, PGIII	1840	Pounds	Sustained a sizeable shell rip at the tank top from B-end to mid-center of tank.	\$618,340	"
"	"	"	"	111A100W1	Petroleum Distillates, NOS, CL, PGIII (Methyl Naphthalenes	185,000	Pounds	Sustained a square foot size puncture to the lower left quadrant of A-end tank head.	\$378,640	"
								Total cost	\$2,288,960	

BNSF	6/30/2004	Overbrook	OK	112J340W	Dimethylamine, Anhydrous	145,800	Pounds	Bulkhead flatcar with steel I-beams ahead of car lost an I-beam that cartwheeled into tank head after falling off railcar and striking the ground. Tank head punctured with resulting fire & commodity fire.	\$305,110	M202 - Load fell from an adjacent
BNSF	10/8/2004	Lincoln	NE	111A100W1	Waste Flammable Liquid, Toxic, NOS. 3, PGI (Waste Isopropanol, Toluene)	10,200	Gallons	Puncture hole on the A-end tank head approx. at the 8 o'clock position. It appeared that the twisted-off drawbar assembly on the lead empty hopper in the shove punctured the tank head.	\$500,000	H307 - Shoving Movement, Man
BNSF	10/8/2004	Landes	TX	111A100W1	Octyl Aldehydes	8,000	Gallons	Bottom outlet valve partially opened	\$217,980	E65C - Worn Tread (Car)
BNSF		Other		34 cars - 28 derailments					\$357,947	
CN	1/29/2005	Kenwood	ON	DOT111A100W2	Sulfuric Acid	18,497	Gallons	Puncture to bottom of tank	\$430,000	Equipment - retainer-pin/cross ke
CN	4/26/2005	Chicago	IL	111A100W1	Flammable liquid NOS	14,000	Gallons	Puncture to left side of tank	\$40,000	Transportation - passed couplers
CN	7/4/2005	Prescott	ON	111A100W1	Gasoline	5	Gallons	Puncture to bottom of tank	\$226,500	Engineering - alignment/buckled
CN	7/13/2005	Sarcee	AB	111A100W1	Fuel Aviation Turbine	28,000	Gallons	Puncture to bottom of tank	\$218,000	Transportation - Buff/Slack action
CN	8/5/2005	Squamish	BC	111A100W3	Sodium hydroxide solution	15,000	Gallons	Rolled damaged top valves destroyed	\$550,000	Transportation - Train handling
CN	6/4/2006	Charrett	QC	111A100W1	Gasoline	1,000	Gallons	Bottom outlet sheared off	\$442,700	Engineering - Defective or Missing
CN	8/27/2007	Chicago	IL	111A100W1	Alcohol NOS	270	Gallons	Small puncture L/B end tank head	\$50,000	Transportation - Switching mover passed couplers
CN	10/9/2007	Edmonton	AB	111A100W1	Methanol	2	Gallons	Tank torn at body bolster	\$2,500	Transportation - radio communication receive
CN	12/22/2007	Memphis	TN	111A100W3	Sodium Hydroxide Solution	1,200	Gallons	Bottom outlet Sheared Off	\$130,200	Equipment - Center sill broken or
"	"	"	"	111A100W3	Sodium Hydroxide Solution					"
"	"	"	"	111A100W3	Sodium Hydroxide Solution					"
CN	6/19/2009	Rockford	IL	111A100W1	Alcohol NOS	20,700	Gallons	Extensive dents and wheel gouges. On fire, SRV.		Wash-out
"	"	"	"	111A100W1	Alcohol NOS	25,800	Gallons	Buckled, L-side puncture, A-end head damage, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	26,357	Gallons	1 manway cover bolt slots sheared open, liquid and vapors valves torn off, on fire		"
"	"	"	"	111A100W1	Alcohol NOS	28,796	Gallons	Two B-end head punctures, on fire		"
"	"	"	"	111A100W1	Alcohol NOS	23,238	Gallons	B-end head puncture, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	28,796	Gallons	Both sides dented, B-end torn open due to stub-sill pull, on fire		"
"	"	"	"	111A100W1	Alcohol NOS	28,776	Gallons	Large hole B-end, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	27,000	Gallons	B-end head crease, A-end puncture, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	28,786	Gallons	B-end head torn, A-end dented, on fire		"
"	"	"	"	111A100W1	Alcohol NOS	11,051	Gallons	Heat damage, on fire via SRV		"
"	"	"	"	111A100W1	Alcohol NOS	25,667	Gallons	L-side dents, A-end tank head punctured, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	20,267	Gallons	A-end tank head punctured, on fire.		"
"	"	"	"	111A100W1	Alcohol NOS	28,729	Gallons	Large A-end tank head puncture, on fire.	\$8,000,000	"
CSX		Brooks	KY	111A	Cyclohexane	all		liquid/vapor lines blown off - fire		
"		"	"	111A	Cyclohexane	all		liquid/vapor lines blown off - fire		
"		"	"	111A	Methyl Ethyl Ketone	all		crushed - fire		
CSX		Oneida	NY	111A100W5	Ferric chloride solution	all		crushed		

"	"	"	"	111A100W5	Toluene	all			Top fittings - fire		
CSX	Painesville	OH	111A	111A	Alcohol NOS		20,000	Gallons	Shell punctures		
"	"	"	"	111A	Alcohol NOS		20,000	Gallons	Shell punctures		
"	"	"	"	111A	Alcohol NOS		20,000	Gallons	Shell punctures		
CSX	Defiance	OH	111A	111A	Alcohol NOS Residue	Unkonwn			Torn shell from manway to bottom outlet		
"	"	"	"	111A	Alcohol NOS Residue	Unkonwn			hole in head		
"	"	"	"	111A	Alcohol NOS Residue	Unkonwn			bottom outlet sheared off internal ball valve open 1/2 turn		
CSX	Irvine	KY	111A	111A	Vinyl Acetate	All			Shell failure		
CSX	Selkirk	NY	111A	111A	Methanol		11,000	Gallons	Head puncture		
CSX					TOTAL 6 DERAILMENTS						\$32,314,000
KCS	Amsterdam				NaOH	all			Head puncture		\$1,000,000
KCS	Hattiesburg	MS			NaOH		11,930	Gallons	Head puncture		
"	"	"	"		HCl		18,260	Gallons	Head puncture		\$1,900,000
NS	New Brighton	PA	DOT 111A100W1	DOT 111A100W1	Alcohol NOS		20	Gallons	seepage from bottom outlet, leaking vacuum relief valve		Broken rail
"	"	"	"	DOT 111A100W1	Alcohol NOS		0	Gallons	NA		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		21,748	Gallons	Liquid and vapor sheared off		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		0	Gallons	NA		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		27,613	Gallons	Pressure relief device operated		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		22,738	Gallons	Fire damage around pressure relief device, vapor line sheared off, tank ruptured open w/ 20' fracture near B-end		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,723	Gallons	Tank torn (6" x 30"), 5" puncture at B end, liquid valve pulled out of car, and vapor valve sheared off		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,706	Gallons	Center of tank entirely crushed, liquid and vapor valve missing, 48" x 72" near B-end stub sill, and 39" x 72" tear on shell near A-end, safety relief valve damaged		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,720	Gallons	Liquid and vapor valve damaged, pressure relief device missing		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,771	Gallons	Two large tears - 24" x 84" in right side near B-end, tear 56" x 16" in center of right side, and 20" x 20" in A-end.		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,740	Gallons	Tear (12" x 6") at B-end. Two tears (30" x 10") in the bottom of the shell. Tear (20" x 20") in A-end. Liquid, vapor, and vacuum relief valve sheared off		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,785	Gallons	Vapor valve opened, bottom outlet valve discharge pipe sheared off and bottom outlet valve opened, tear in A end (84" x 12")		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		28,699	Gallons	Bottom outlet valve seat damaged		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		21,218	Gallons	Liquid, vapor valves, and bottom outlet valve sheared off, pressure relief valve damaged, tear (12" x 12") in bottom of tank		"
"	"	"	"	DOT 111A100W1	Alcohol NOS		13,209	Gallons	liquid and vapor line sheared off		"

									Liquid line and vacuum relief valve sheared off, pressure relief valve damaged, bottom outlet valve damaged, (39" x 11") tear in A end w/ crack		
"		"	"	DOT 111A100W1	Alcohol NOS	28,720	Gallons				"
"		"	"	DOT 111A100W1	Alcohol NOS	28,721	Gallons		Liquid valve half tore off		
"		"	"	DOT 111A100W1	Alcohol NOS	28,670	Gallons		Big tear on A end		"
"		"	"	DOT 111A100W1	Alcohol NOS	8,738	Gallons		Liquid, vapor, and vacuum relief valves sheared off		"
"		"	"	DOT 111A100W1	Alcohol NOS	28,754	Gallons		multiple punctures on both ends - 12" x 12" in A-end head, and two similar holes in B-end		"
"		"	"	DOT 111A100W1	Alcohol NOS	28,721	Gallons		huge rip on A end (48" x 48")		"
"		"	"	DOT 111A100W1	Alcohol NOS	25,264	Gallons		Huge tear (72" x 48") on B end		"
"		"	"	DOT 111A100W1	Alcohol NOS	0	Gallons		NA		"
									Total Cost	\$5,900,000	
UP	9/17/2004	Calipatria	CA	111A100W5	Hydrochloric Acid	17,000	Gallons		Tank - Head - Crack		Train order, track warrant, track t
"	9/17/2004	"	"	111A100W5	Hydrochloric Acid				Weld failure/head puncture	\$370,000	Train order, track warrant, track t
UP	9/21/2004	East St. Louis	IL	111A100W1	Vinyl Acetate, Inhibited	26,178	Gallons		Tank failure		Unable to determine
"	9/21/2004	"	"	111A100W1	Vinyl Acetate, Inhibited	30,018	Gallons		Tank failure	unknown	Unable to determine
UP	10/21/2004	Green River	WY	111A100W1	Sodium hydroxide solution				Liquid line		Unable to determine
"	10/21/2004	"	"	111A60W1	Sodium hydroxide solution	25	Gallons		Liquid valve	\$150,000	Unable to determine
UP	9/15/2005	Shepherd	TX	111A100ALW1	Methyl isobutyl ether	10	Gallons		Head crack	\$138,111	Switch improperly lined
UP	6/30/2007	Pulga	CA	111A100W1	Alcohols NOS	29,357	Gallons		Head puncture	\$2,035,200	Snow, ice, mud, gravel, coal, etc.
UP	3/3/2008	Mecca	CA	211A100W1	Phosphoric acid	8,000	Gallons		Head/shell puncture		Journal (roller bearing) failure fro
"	3/3/2008	"	"	211A100W1	Phosphoric acid	20	Gallons		bottom outlet valve		Journal (roller bearing) failure fro
"	3/3/2008	"	"	111A100W1	Hydrochloric acid	15,200	Gallons		air valve		Journal (roller bearing) failure fro
"	3/3/2008	"	"	111A100W1	Hydrochloric acid	20,000	Gallons		Head/shell puncture	\$764,739	Journal (roller bearing) failure fro
UP	3/31/2008	Northfield	MN	111A100W2	Sulfuric acid	665	Gallons		Head crack	\$137,856	Buffing or slack action excessive.
UP	10/23/2008	Caney	OK	111A100W1	Fuel oil	12,000	Gallons		Head puncture		Traction motor failure (LOCOMO
"	10/23/2008	"	"	111A100W1	Fuel oil	12,000	Gallons		Head and shell puncture	\$541,000	Traction motor failure (LOCOMO
UP		Other		31 cars in 35 derailments						\$563,507	
					TOTAL					\$63,355,535	
			Total	117 cars	TOTAL	924,542	Gallons				

Attachment C

Chapter 2, Section 2.5 of M-1002 published 10/2007 with updated 2.5.2.3

2.5 Requirements for DOT/TC Tank Cars Weighing Over 263,000 lb GRL

2.5.1 All Class DOT/TC Tank Cars

Paragraph 2.5 applies to all Class DOT and TC tank cars ordered after December 31, 2003, when the gross weight exceeds 263,000 lb.

2.5.1.1 Cars must comply with all requirements of the AAR *Manual of Standards and Recommended Practices*, Section C, Standard S-286, latest version.

2.5.1.2 Shippers are reminded that regulations limit the gross weight of Class DOT/TC tank cars to 263,000 lb and that a federal exemption is required to operate these cars at higher weights.

2.5.1.3 In addition to the design loads described in *MSRP S-286*, all REPOS loading, including horizontal and vertical coupler loads, used for fatigue calculations must be increased by a factor of 1.09 above the loading used for 263,000-lb cars.

2.5.1.4 Car owner must identify appropriate areas of inspection for fatigue, corrosion, wear, etc., and must have a "life-cycle" maintenance plan for cars. This must identify inspection items, inspection methods, acceptance criteria, and inspection frequencies. The car owner or designee must have written procedures that ensure that work performed on cars conforms to federal and AAR requirements.

2.5.1.5 New cars may not be equipped with reconditioned truck components.

2.5.1.6 Class DOT/TC cars with tanks constructed of aluminum or nickel plate with gross weight over 263,000 lb are not authorized.

2.5.2 Class DOT/TC-111 Nonpressure Tank Cars

2.5.2.1 Class DOT/TC-111 cars must be equipped with top fittings protection in accordance with Appendix E, paragraph 10.2.

2.5.2.2 Class DOT/TC-111 cars must be equipped with reclosing pressure relief devices, except where the applicant can demonstrate that a non-reclosing device affords an equivalent level of safety.

2.5.2.3 Class DOT/TC-111 cars with carbon steel tanks must meet one of the following minimum criteria:

- Tanks are constructed of normalized TC128 steel at least 7/16 in. thick and equipped with steel jackets and ½ in. thick steel jacket heads.
- Tanks are constructed of normalized TC128 steel at least ½ in. thick and equipped with ½ in. thick steel half-head shields.
- Tanks are constructed of normalized ASTM A516 steel at least ½ in. thick and equipped with steel jackets and ½ in. thick steel jacket heads.
- Tanks are constructed of normalized ASTM A516 steel at least 5/8 in. thick and equipped with ½ in. thick steel half-head shields.

Tank heads must be normalized after forming unless specific approval is granted for a facility's equipment and controls.

2.5.2.4 Class DOT/TC-111 cars with high-alloy steel tanks (111****W6 and 111****W7) must have heads and shells at least 1/2 in. thick and be equipped with half-head shields if not jacketed. Jacketed tanks must be at least 7/16 in. thick and be equipped with 1/2-in.-thick jacket heads.

2.5.3 Class DOT/TC Pressure Cars

2.5.3.1 In addition to the requirements of paragraph 2.5.1, Class DOT/TC-105, 112, 114, and 120 tank cars having a gross weight on rail over 263,000 lb must conform to paragraph 2.5.1 and be equipped with a metal jacket and tank head protection.

2.5.3.2 Notwithstanding paragraph 2.5.3.1, if the federal regulations authorize the use of a tank car without a metal jacket, the AAR requirement for a metal jacket is waived, if not required by car specification, provided that the tank heads and shell are constructed from normalized AAR TC128 Grade B steel and the required thickness of the tank heads and shell is increased by at least 1/16-in. over minimum specification thickness. Tank head protection is required.

2.5.4 Class DOT/TC-113 Cryogenic Cars

Class DOT/TC-113 cryogenic cars with gross weight over 263,000 lb must meet the requirements of paragraph 2.5.1.

2.5.5 Class DOT/TC-115 Nonpressure Tank Cars (tank within a tank)

In addition to the requirements of paragraph 2.5.1, Class DOT/TC-115 cars with gross weight over 263,000 lb must meet the requirements of paragraphs 2.5.2.1 and 2.5.2.2.