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Tank Car Design Debate Split Over Safety of Voluntary Industry Standard By Patrick Ambrosio

March 18 — Industry groups, members of Congress and the National Transportation Safety Board are pushing the Transportation Department to quickly establish new safety design standards for rail tank cars used to carry crude oil, but there is disagreement over how stringent the new safety requirements should be.

There is now a consensus that a new federal design standard is needed to provide certainty to the industry and improve the safety of transporting flammable liquids by rail, but groups are split over whether the new standards should go beyond the Association of American Railroads' CPC-1232 standard, a voluntary industry standard adopted for all new tank cars ordered after Oct. 1, 2011.

The Pipeline and Hazardous Materials Safety Administration, in conjunction with the Federal Railroad Administration, is working on a proposed rule that would update federal design standards for tank cars, commonly known as DOT-111 cars, that are used to carry crude oil, ethanol and other flammable liquids. The rulemaking is partially in response to a 2011 petition filed by the AAR, which represents major U.S. railroad companies such as CSX Transportation Inc. and BNSF Railway Co., requesting that the DOT adopt the CPC-1232 standard as a federal design standard for new cars.

The safety features included in CPC-1232-compliant cars include thicker shells for non-jacketed tank cars, enhanced top fittings protection, reclosing pressure relief devices and half-height head shields on both ends of the tank car.

“Their continued use to ship flammable liquids poses an unacceptable risk to the public.”

Christopher Hart, NTSB

Legacy Cars Called Unsafe

The safety of DOT-111 rail tank cars has been called into question after a series of recent derailments involving trains carrying crude oil, including a July 2013 derailment in Lac-Mégantic, Quebec, that resulted in 47 fatalities. DOT-111 rail tank cars also were involved in a December 2013 derailment near Casselton, N.D., which resulted in the release of more than 400,000 gallons of crude oil, a significant fire and the evacuation of nearby residents.

The AAR estimates that there are about 92,000 DOT-111 rail tank cars in service carrying crude oil, ethanol and other flammable liquids. Of those, about 78,000 are “legacy” cars that do not meet the CPC-1232 standard.

Following the Lac-Mégantic incident, the National Transportation Safety Board reiterated a series of recommendations made to PHMSA after a 2009 derailment involving DOT-111 tank cars in Cherry Valley, Ill. Those recommendations included requirements that all new and existing tank cars used to transport crude oil and ethanol be equipped with enhanced tank head and shell puncture resistance systems, top fittings protection that exceed current requirements and bottom outlet valves designed to remain closed during accidents (37 CRR 1409, 12/16/13).

Christopher Hart, vice chairman of the NTSB, told the Senate Commerce, Science and Transportation Subcommittee on Surface Transportation and Merchant Marine Infrastructure March 6 that the NTSB has warned the DOT since 1991 that older DOT-111 rail tank cars are too easily damaged, even when involved in low-speed crashes and derailments.

“Their continued use to ship flammable liquids poses an unacceptable risk to the public,” Hart said.

Hart said the NTSB thinks the CPC-1232 design standard needs additional changes to improve the “crash worthiness” of tank cars used to carry crude oil and flammable liquids. He cited enhanced head shields and tank jackets and increased tank shell thickness as features that the NTSB recommends.

Rail Industry Reverses Course

Edward Hamberger, president and chief executive officer of the AAR, said at the same Senate subcommittee hearing that since filing its 2011 petition the association has changed its position and now recommends that the DOT require new tank cars to be built to meet specifications exceeding the CPC-1232 standard.

Hamberger said that although the AAR thinks that the CPC-1232 standard is a “big step above” the legacy DOT-111 cars, the railroads now think safety needs to “go beyond” the voluntary industry standard.

The AAR is recommending that the federal tank car standards adopt the following safety design features that exceed those found in the CPC-1232 standard:

- a high-capacity pressure relief valve to protect the tank car from an increase in internal pressure resulting from a fire;
- a minimum 9/16-inch-thick steel tank;
- a 1/2-inch-thick full-height head shield on both ends of the tank car;
- a bottom outlet handle that will not inadvertently open the bottom outlet in the event of a derailment; and

- an 1/8-inch-thick steel jacket around the tank car, with thermal protection.

The AAR recommendations also are supported by the American Short Line and Regional Railroad Association, which represents the interests of about 450 short line and regional railroad companies in the U.S.

\$7 Billion Already Invested

The AAR estimates that its proposal would require the phase-out or retrofit of about 78,000 legacy cars and the retrofit of about 14,000 cars built since 2011 that meet the CPC-1232 standard.

The Railway Supply Institute, which represents manufacturers, distributors and service providers for the freight and passenger rail industries, estimates that as of December 2013, the crude oil and ethanol sector has invested more than \$7 billion to build new tank cars to meet the CPC-1232 standard since the standard was adopted in 2011. Thomas Simpson, president of the RSI, told Bloomberg BNA that an estimated 55,000 new tank cars built to meet the CPC-1232 standard will be in crude oil and ethanol service by the end of 2015.

Prentiss Searles, marketing issues manager at the American Petroleum Institute, told the Senate Commerce, Science and Transportation Subcommittee on Surface Transportation and Merchant Marine Infrastructure that the petroleum industry believes that CPC-1232-compliant tank cars will be sufficient to safely move crude oil and other hazardous liquids.

Searles said a multi-industry committee reviewed available data for three years to determine whether the CPC-1232 standard would be sufficient to carry crude oil.

“Those are safe cars,” Searles said.

Vulnerabilities Addressed

Brigham McCown, managing director of the consulting group Nouveau Inc., told Bloomberg BNA that the government and industry should be looking at the improved DOT-111 rail tank cars manufactured after 2011 to improve rail car safety. McCown formerly served as the first acting administrator and interim CEO of PHMSA.

McCown said the CPC-1232 standard addresses the three major vulnerabilities of the legacy DOT-111 rail tank cars.

He said rail tank cars commonly “flip over” on their sides during derailments, and older DOT-111 tank cars have a propensity to break open during such accidents. He also said that bulkheads on the end of older DOT-111 cars can easily be dented and either break or rupture, and that the valves on older DOT-111 cars can break off if they are not adequately protected, resulting in a release of flammable liquid.

Retrofit Issues

Searles said the API has requested that PHMSA and the FRA lead a task force to review the challenges associated with retrofitting existing DOT-111 cars to include additional safety features.

API, when asked for additional information on the challenge of retrofitting existing DOT-111 rail cars, directed Bloomberg BNA to comments filed with PHMSA in December 2013 on the rail tank car design issue.

The comments raised several concerns associated with a retrofit program, including the difficulty of applying 1/2-inch-thick head shields to non-jacketed tank cars. API said the additional weight could compromise the structure of the car because it would be impossible to measure the existing fatigue on tank cars that have already been in service.

Installing a head shield onto a non-jacketed car also could require existing equipment, including brake wheels and end platforms, to be rearranged on the car before the head shield is welded to the tank for support, which could potentially affect the interior coating of the tank, API said.

Simpson of the RSI told Bloomberg BNA that there are feasible modifications that can be made to legacy DOT-111 cars to get them “close” to the CPC-1232 standard, including removing the handle on the bottom outlet valve to prevent it from opening during a crash and installing a half-height head shield. Simpson noted that adding a 1/8-inch-thick steel jacket to a legacy car is “more problematic,” and said companies are looking at whether that is feasible.

Evolution of Rail Industry Tank Car Standards for Crude Oil

Limited Repair Capacity

API also said the nation's repair shop network is incapable of handling the large number of existing tank cars that would need to be upgraded if retrofits were required.

“The repair shop network that exists today, even if it were to be increased by a third, could not handle all of the work in a reasonably timely manner,” API said.

API added that most repair facilities are not even capable of completing major retrofits to older tank cars, such as adding jackets to legacy cars or installing top fittings protection.

Simpson said the RSI has suggested that PHMSA give the industry a 10-year timeframe to modify the legacy fleet to meet any upgraded safety design standards.

Simpson said the RSI does support expanding design requirements for all new tank cars intended for crude oil and ethanol service to include full-height head shields and thermal protection and would support the prioritization of retrofitting legacy tank cars over cars that comply with the CPC-1232 industry design standard.

The RSI suggested that PHMSA freeze the current fleet of DOT-111 rail tank cars and not allow any additional legacy tank cars to be assigned to crude oil or ethanol service. Simpson said that under that

proposal, any tank car needed to handle an increase in crude traffic or to replace a non-operational car would at least have to be compliant with the CPC-1232 standard.

Manufacturer Offers Retrofit Packages

The Greenbrier Companies, an Oregon-based supplier of equipment and services to the rail industry, announced in February that it will begin offering retrofits for both legacy DOT-111 tank cars and newer tank cars that were built to meet the current CPC-1232 standard.

The company will retrofit legacy tank cars with high-flow pressure relief valves, head shields, top fittings protection and thermal protection. Greenbrier also will install high-flow pressure relief valves and improved bottom outlet valve handles on any CPC-1232 cars that were not originally built with those features.

Greenbrier announced that it will design a next-generation tank car for use in transporting crude oil and ethanol that will be designed to “better withstand” the demands of carrying flammable liquids on a unit train. The company did not offer specifications for the new tank car, but said the car will address safety concerns about the older DOT-111 tank cars.

A Greenbrier representative said the company anticipates that the design of the retrofitted DOT-111 tank cars and the next-generation tank car will comply with all pending regulatory standards.

Proposal Expected in 2014

PHMSA Administrator Cynthia Quarterman said in March that she is “hopeful” that a proposed rule on rail tank car design standards will be released for public comment by the end of 2014.

Quarterman said PHMSA and FRA staffs are “moving as fast as we possibly can” to draft the rule, but noted the importance of a rulemaking that would establish a standard that could be in effect for decades.

“We really need to get this right,” Quarterman said.

Sen. John Hoeven (R-N.D.) told Bloomberg BNA in early March that he has been informed that the proposed rule will be submitted to the White House Office of Management and Budget “soon,” possibly sometime in early April. That would allow the proposed rule to be released to the public in 2014, probably in November, according to Hoeven.

Hoeven said the estimated time frame from DOT would allow for the publication of a final rule establishing tank car design standards sometime after January 1, 2015.

Push for Faster Action

Although the industry is split on whether the DOT should go beyond the CPC-1232 standard and whether legacy tank cars should be retrofitted or phased out, there is consensus that a resolution of the issue is needed to provide certainty for the industry.

Hoeven said upgrading the nation's rail tank car fleet represents a “big investment” for the petroleum industry, which needs to make sure that it is meeting federal standards so it can transition from the legacy cars to upgraded cars.

Searles of the API said PHMSA could move forward immediately with an interim final rule on new tank car design that would provide the industry with consistency and certainty, though he added that more study is needed on retrofitting before PHMSA can issue any regulations requiring existing cars to meet more stringent design requirements.

Hamberger of the AAR suggested that PHMSA could speed up the process by splitting its tank car rulemaking in half by addressing the design standard for new tank cars first. He noted that there is currently a two-year backlog of new cars that have been ordered to meet the CPC-1232 standard, which could be deemed inadequate by the time the cars are built.

Hamberger said that there is “not a great deal of difference” between the AAR proposal and the design standards for new cars supported by other groups. The retrofit issue is more complicated because there are different kinds of DOT-111 rail tank cars, including some tank cars that are jacketed and some that are not, according to Hamberger.

Advances in Materials

Ken Grantham, executive vice president at Crompton International, said he is trying to make the crude oil tank car industry aware of advances in materials that could be used in the construction of safer tank cars. Crompton is a Louisiana-based manufacturer and distributor of specialty steel products.

Grantham said the discussion on tank car safety has only focused on design enhancements, even though much stronger metals are available than the metals currently used to construct DOT-111 rail tank cars. The NTSB recommendations and the AAR proposal for a new tank car design standard do not address the issue of using enhanced raw materials to construct rail tank cars.

The stainless steel types used to construct DOT-111 rail tank cars are older varieties of steel that have been around for 100 years or more, according to Grantham. He said there have been a “multitude of advances” in the past 20 years that have resulted in new metals that are much stronger than traditional metals and are comparable or superior in corrosion resistance.

Grantham said he would like to see newer stainless steel added to any design standard as additional materials that could be used to construct tank cars that meet DOT specifications, which would give companies the option of considering the stronger materials. He said combining the proposed enhanced safety features with the use of stronger metals would “optimize” the effort to make tank cars safer.

“We really feel that materials should be as much a part of the conversation as design improvements,” he said.

Grantham noted that Crompton is already supplying large volumes of enhanced stainless steel varieties for use in constructing rail cars used to transport coal. He said that in addition to the safety benefits of

using stronger metals, the use of corrosion and abrasion resistant steel allowed for the use of thinner plates to construct those rail cars, which makes the rail car lighter and capable of transporting additional volumes of coal.

Newer generation varieties of steel also are already being used to construct static storage tanks for crude oil and other flammable liquids, according to Grantham.

BNSF Seeks Enhanced Cars

Some companies have decided to move ahead with new car orders without federal design standards.

A spokeswoman with BNSF Railway told Bloomberg BNA that the company issued a request for proposals to major railcar manufacturers seeking bids for the construction of 5,000 new rail tank cars that would be used to transport crude oil.

The design specifications described by BNSF for the new tank cars would meet the standards proposed by the AAR, including thicker tank body shells, full-height head shields, a bottom outlet valve handle that can be disengaged and a thermal protection system incorporating ceramic thermal blanketing and a pressure relief device capable of surviving an ethanol-based pool fire.

The company spokeswoman said the RFP is a “significant voluntary commitment” that will provide tank car manufacturers with a “head start” on tank car design and production while the Transportation Department continues with the formal rulemaking process.

Tesoro Corp., an independent refiner and marketer of petroleum products, has pledged that the company's entire fleet of tank cars that are used to carry crude oil will meet the CPC-1232 design standard by the middle of 2014 (38 CRR 182, 2/10/14).

Keith Casey, senior vice president of strategy and business development at Tesoro, said in February that the company decided to be proactive in upgrading its rail tank car fleet in advance of expected regulatory changes because “it's the right thing to do.”