ASSOCIATION OF AMERICAN RAILROADS

Freight Rail Industry Crude-by-Rail Safety Measures

Freight railroads are committed to safely and securely delivering crude oil by rail. Railroads have safely moved this vital energy resource for many years, but since the accident in Lac-Megantic freight rail companies have rededicated themselves to improving the safety practices associated with moving crude oil by rail – nothing is more important.

Freight railroads have taken far-reaching actions to improve the safety of crude oil transportation and to reassure the public of its safety commitment. These actions include:

- TOP-TO-BOTTOM ASSESSMENT: In light of the increased crude oil shipments, railroads this past year have done a top-to-bottom review and voluntarily changed their operating practices and protocols.

- HIGHER STANDARDS: From the selection of routes, to train speeds, to track and equipment inspections, railroads across the board have raised their own standards beyond federal requirements for safely moving crude oil by rail.

- BETTER TANK CARS: Freight railroads are calling on the federal government to require more stringent design standards for tank cars carrying crude oil, as well as retrofit or phase-out older cars.

- PUBLIC OUTREACH: Railroads have stepped up their communication with communities through which they operate to address concerns and reinforce preparedness with local first responders.

- HUGE SAFETY INVESTMENTS: Railroads are continuously maintaining and upgrading rail infrastructure and devote enormous resources and effort to preventing and preparing for emergency situations.

- FIRST RESPONDERS TRAINING: Railroads actively work with state and local emergency response officials to ensure those who need to know what is moving through their area are informed and trained to respond to an emergency situation.

Specific Crude Oil Safety Measures Implemented by Railroads:

Increased Track Inspections – Railroads perform at least one additional internal-rail inspection each year above those required by new FRA regulations on main line routes over which trains moving 20 or more carloads of crude oil travel. In addition, for main line routes carrying these trains, railroads will conduct high-tech track geometry inspections – inspections that are above and beyond those currently required by FRA.

Braking Systems – Railroads are equipping all trains with 20 or more carloads of crude oil with either distributed power or two-way telemetry end-of-train devices. These technologies allow train crews to apply emergency brakes from both ends of the train in order to stop the train faster.

Rail Traffic Routing Technology – Railroads have begun using the Rail Corridor Risk Management System to aid in the determination of the safest and most secure rail routes for trains with 20 or more cars of crude oil.

Lower Speeds – Railroads carrying 20 or more tank cars of crude oil that include at least one older DOT-111 may go no faster than 40 miles-per-hour in 46 federally designated high-threat-urban areas, as established by DHS regulations. Railroads also committed to implementing a nationwide 50 mile-per-hour speed limit for these trains.

Community Relations - Railroads are working with communities through which crude oil trains move to address location-specific concerns those communities may have.

Increased Trackside Safety Technology – Railroads have begun installing additional wayside wheel bearing detectors along tracks with trains carrying 20 or more crude oil cars, as other safety factors allow. These further help prevent derailments.

Increased Emergency Response Training and Tuition Assistance – Railroads are providing $5 million to develop specialized crude by rail training and tuition assistance program for local first responders. The funding will provide program development as well as tuition assistance for an estimated 1,500 first responders in the first year.

Emergency Response Capability Planning – Railroads are developing an inventory of emergency response resources and equipment for responding to the release of large amounts of crude oil along routes over which trains with 20 or more cars of crude oil operate.

For more information, please visit the industry's Crude By Rail information webpage.

Moving Crude Oil by Rail

ASSOCIATION OF AMERICAN RAILROADS JUNE 2014

Summary

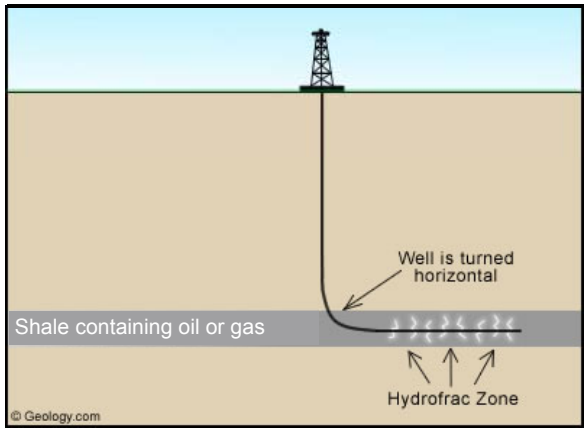
U.S. crude oil production has risen sharply in recent years, with much of the increased output moving by rail. In 2008, U.S. Class I railroads originated 9,500 carloads of crude oil. In 2013, they originated 407,761 carloads.

In light of these increased volumes, railroads have taken numerous steps to enhance crude oil safety. They've undertaken top-to-bottom reviews of their operations and voluntarily updated their operating practices, from the selection of routes, to train speeds, to track and equipment inspections. Railroads already provide training to more than 20,000 emergency responders each year, but they are increasing their efforts to train first responders and are creating inventories of emergency response resources along their lines. And in addition to reviewing their own operations to make them safer, railroads are urging federal regulators to toughen existing standards for new tank cars and require that existing tank cars used to transport crude oil be retrofitted with safety-enhancing technologies or, if not upgraded, aggressively phased out.

Additional pipelines will probably be built in the years ahead, but the competitive advantages railroads offer will keep them in the crude oil transportation market long into the future.

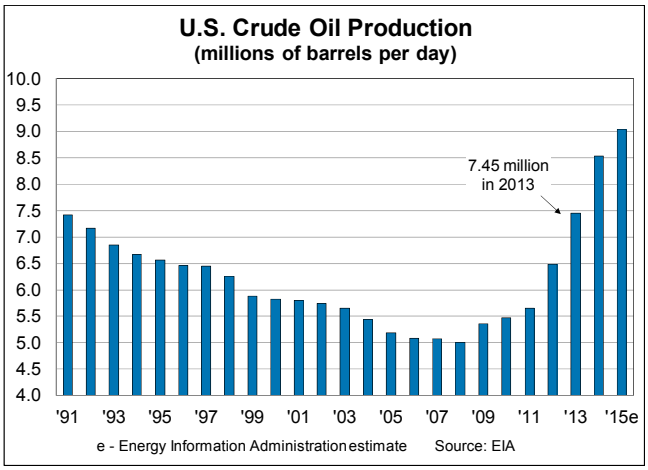
The Shale Revolution Has Led to Sharply Higher Crude Oil Production

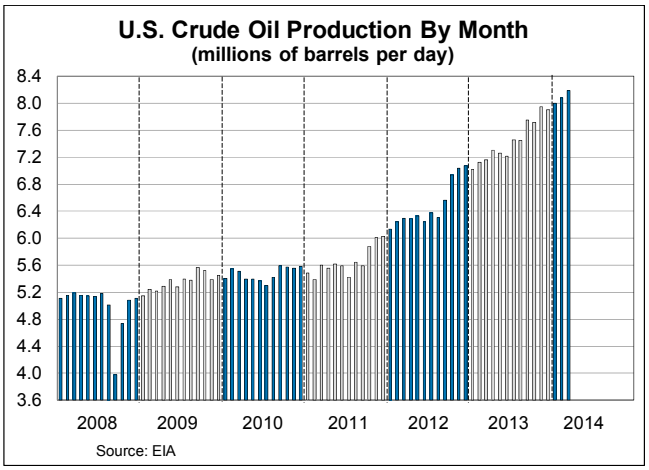
- Throughout the world, huge quantities of crude oil and natural gas are trapped in non-permeable shale rock. Over the past few years, technological advances — especially in hydraulic fracturing ("fracking") and horizontal drilling — along with higher crude oil prices have made recovery of much of this oil and gas economically feasible.



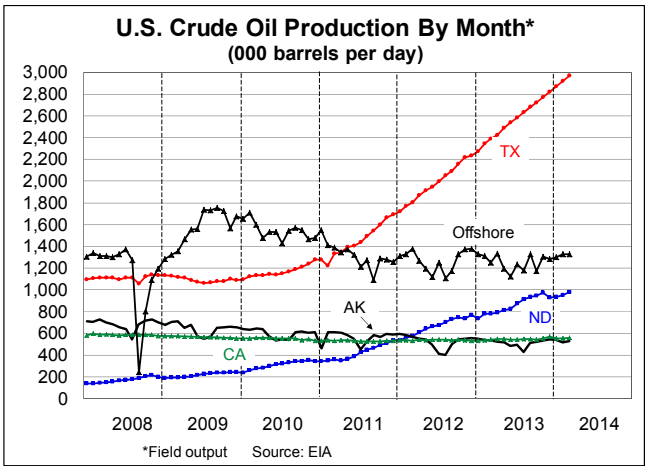
- To date, the most important U.S. shale deposits are Bakken, mainly in North Dakota; Barnett in Texas; and Marcellus in the east, especially in Pennsylvania and Ohio. Other key shale areas include Niobrara in Wyoming and Colorado, and Eagle Ford and Permian in Texas. Some areas contain more natural gas than crude oil; others contain more oil than natural gas. There are still many unknowns — including the long-term productivity of shale wells — but it's clear that, thanks to shale, economically recoverable U.S. gas and oil reserves are far higher than they were thought to be just a few years ago.

- U.S. crude oil production peaked in 1970 at 9.6 million barrels per day, but by 2008 had fallen to 5.0 million barrels as new production failed to keep pace with depletion of older fields. By 2013, though, U.S. crude oil production had rebounded to 7.45 million barrels per day, and according to Energy Information Administration projections, it will average 8.5 million barrels per day in 2014 and 9.0 million barrels per day in 2015.





- Much of the recent increase in crude oil production has been in North Dakota, where crude oil production rose from an average of 81,000 barrels per day in 2003 to nearly one million barrels per day by early 2014, making it the second-largest oil producing state. Crude oil output in Texas, the top crude oil producing state, was relatively flat from 2003 to 2009, but has skyrocketed since then, exceeding 2.9 million barrels per day by early 2014.



- It's hard to overstate the economic and security benefits associated with continued growth in domestic crude oil production. Over time, it will mean reductions in the nation's trade deficit of tens of billions of dollars every year, new and better employment opportunities for hundreds of thousands of Americans, and better economic development opportunities for regions all over the country. It will mean billions of dollars in new tax revenues. And it will mean less reliance on sources of oil from places in the world that are not secure and whose interests do not necessarily correspond well to those of the United States.

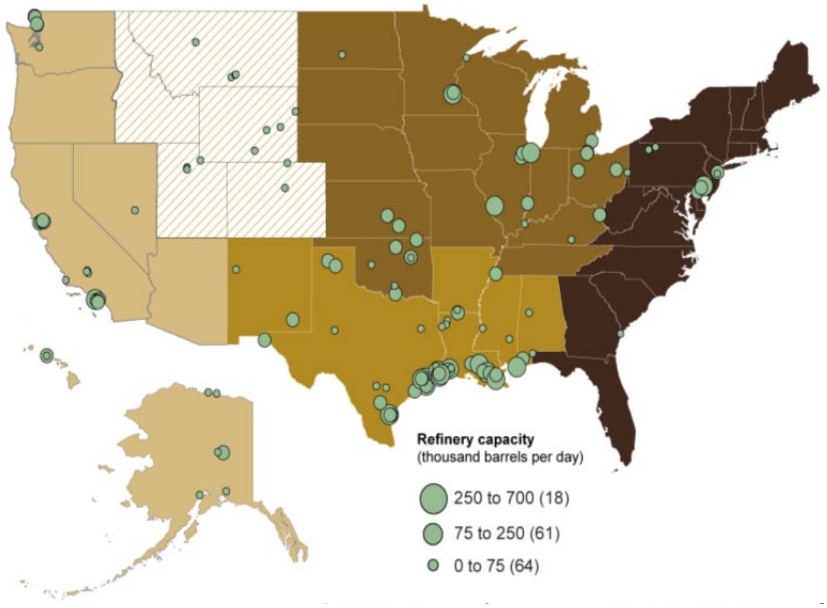
- The Peterson Institute, a well-respected, nonprofit, and nonpartisan research institution devoted to the study of international economic policy, recently found that, along with lower energy costs, the growth in domestic energy production should increase annual U.S. GDP growth between 0.09 and 0.19 percentage points through 2020. That adds up to hundreds of billions of dollars in higher GDP.

Transporting Crude Oil by Rail

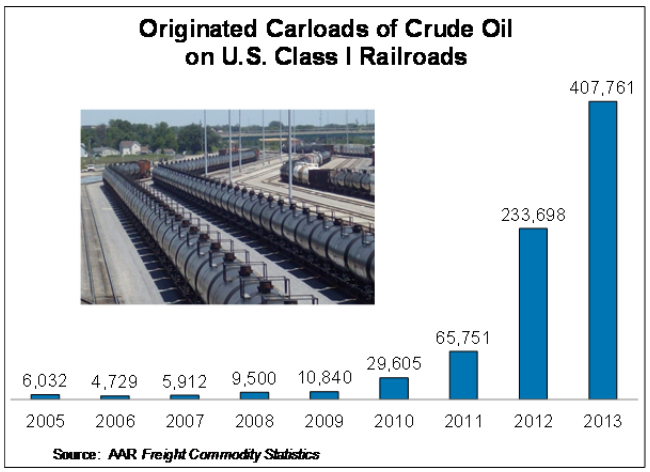
As indicated above, the growth in domestic crude oil production represents a tremendous opportunity for our nation to move closer to energy independence and to benefit in many other ways. Our nation can't take full advantage of our new crude oil resources without railroads.

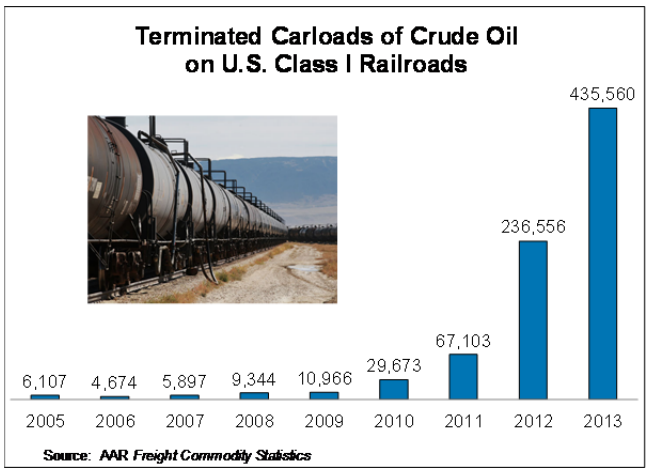
- Crude oil has little value unless it can be transported to refineries, but most U.S. refineries are located in traditional crude oil production areas (Texas, Oklahoma) or on the coasts where crude oil transported by tanker is readily accessible (California, Washington, New England, Gulf of Mexico), rather than near up-and-coming production areas like North Dakota. In part because it takes so long to obtain the necessary permits to build new refineries, it's basically impossible for refineries to come on line quickly near the new production areas.

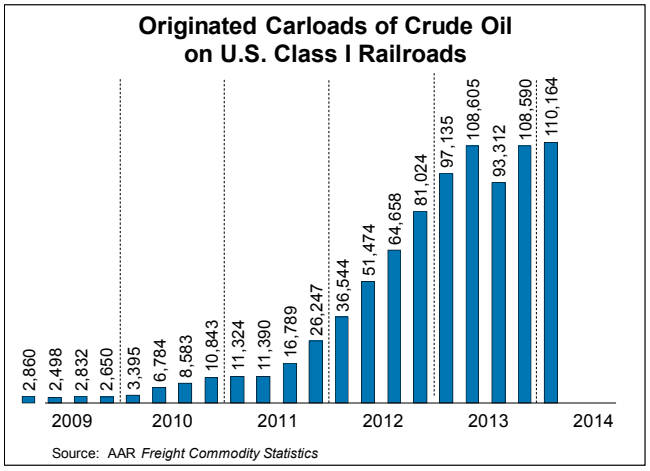
U.S. Crude Oil Refineries

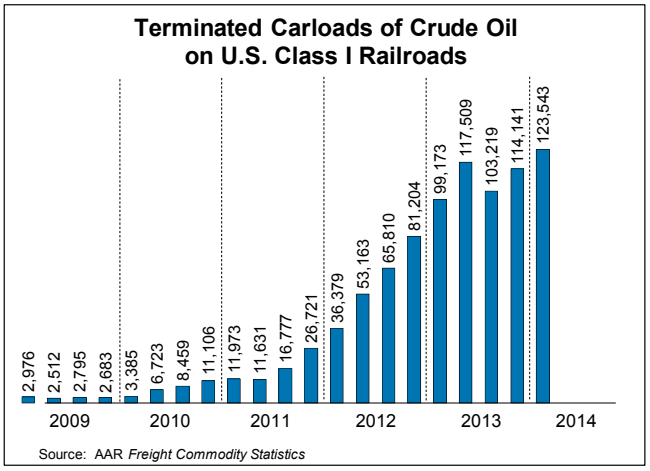


- Historically, most crude oil has been transported via pipelines. However, in places like North Dakota that have seen huge increases in crude oil production, the existing pipeline network lacks the capacity to handle the higher production. Railroads have the capacity and flexibility to fill this gap.
- Relatively small amounts of crude oil have long been transported by rail, but in recent years the increase in rail crude oil movements has been enormous. Originated carloads of crude oil on U.S. Class I railroads (including the U.S. Class I subsidiaries of Canadian railroads) rose from 9,500 in 2008 to 233,698 in 2012 to 407,761 in 2013. In the first quarter of 2014, they totaled 110,164, higher than in any previous quarter.
- Terminated rail carloads of crude oil on Class I railroads, which includes carloads that may have originated on a non-Class I railroad in the United States or on a railroad in Canada that then headed south, totaled 435,560 in 2013.
- North Dakota, and the Bakken region more generally, have accounted for the vast majority of new rail crude oil originations. According to estimates from the North Dakota Pipeline Authority, close to 700,000 barrels per day of crude oil were moving out of North Dakota by rail as of early 2014, equivalent to more than 60 percent of North Dakota's crude oil production.
- There has clearly been significant growth in U.S. crude oil rail traffic, but one must be careful not to overstate crude oil's importance. Given that crude oil accounted for just 1.4 percent of total Class I originated carloads in 2013, it's not plausible to claim that crude oil has "crowded out" other rail traffic to a significant degree.









- Assuming, for simplicity, that each rail tank car holds about 30,000 gallons (714 barrels) of crude oil, the 407,761 carloads of crude oil originated by U.S. Class I railroads in 2013 was equivalent to just under 800,000 barrels per day moving by rail. As noted above, according to EIA data, total U.S. domestic crude oil production in 2013 was 7.45 million barrels per day, so the rail share was around 11 percent of the total.

Advantages of Transporting Crude Oil by Rail

Pipelines have traditionally transported most crude oil, but in recent years railroads have become critical players. In addition to the critical fact that railroads provide transportation capacity in many areas where pipeline capacity is insufficient, railroads offer a number of other advantages for transporting crude oil:

- Geographical flexibility. By serving almost every refinery in the United States and Canada, railroads offer market participants enormous flexibility to shift product quickly to different places in response to market needs and price opportunities. Railroads deliver crude oil to terminals not only in Louisiana and other places in the Gulf region, but also to the East Coast and the West Coast.

- Responsiveness. Rail facilities can almost always be built or expanded much more quickly than pipelines and refineries can be. Essentially, railroads are the only transportation

mode that can invest in facilities quickly enough to keep up with production growth in the emerging oil fields.

- Efficiency. As new rail facilities are developed, railroads are involved every step of the way. For example, at origin and destination sites, railroad economic development and operations teams help facility owners decide where to locate assets and ho w to lay out rail infrastructure on the site to maximize efficiency.

  Railroads also help crude oil customers find ways to load and unload tank cars more quickly and reduce en-route delays. Promoting unit train shipments is often a key part of this process. Unit trains are long trains (usually at least 50 and sometimes more than 100 cars) consisting of a single commodity. These trains use dedicated equipment and generally follow direct shipping routes to and from facilities designed to load and unload them efficiently — say, from a gathering location near oil production areas to an unloading terminal at or near a refinery. A unit train might carry 85,000 barrels of oil and be loaded or unloaded in 24 hours.

- Underlying infrastructure. Over the past few years, railroads have invested hundreds of millions of dollars on tracks, locomotives, terminals, and more to enhance their ability to transport crude oil.

- Product purity. Consumers of crude oil often desire a specific type of crude oil. Shipping crude by rail allows "pure barrels" to be delivered to destination in ways that are not always possible with pipelines.

Even as more pipelines are built or expanded, railroads will continue to provide a set of advantages — especially flexibility — that will enable them to continue to play a key role in the petroleum-related market long into the future.

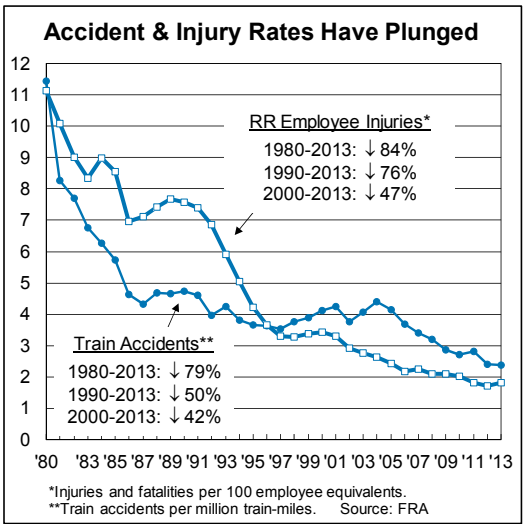
Moving Crude Oil Safely

Railroads devote enormous resources to enhancing the safety of moving crude oil by rail. Rail actions in this regard fall into three broad categories: accident **prevention**, accident **mitigation**, and **emergency response**.

Accident Prevention

Railroads' overall safety record, as measured by Federal Railroad Administration (FRA) data, has been trending in the right direction for decades. In fact, based on the three most common rail safety measures, recent years have been the safest in rail history: the train accident rate in 2013 was down 79 percent from 1980 and down 42 percent from 2000; the employee injury rate was down 84 percent from 1980 and down 47 percent from 2000; and the grade crossing collision rate was down 81 percent from 1980 and down 42 percent from 2000.

Railroads are proud of these achievements, but they know the pursuit of safety never ends. The rail industry's goal is zero accidents, which is why railroads are always looking for ways to prevent accidents, including through the following means:



- Reinvestments. One of the most important ways railroads have reduced accidents is through **significant and consistent investments back into their networks**. Despite a weak economy, railroads have invested far more back into their networks over the past five years — nearly $115 billion — than in any five-year period in history. One of the major aims of these investments is to make the rail network more robust, so that the industry's decades-long record of declining accident rates continues. In fact, for many of these investments, improving safety is the primary reason the investments are made.

- Technological advancements. Railroads are constantly incorporating new technologies to improve rail safety, including sophisticated detectors along tracks that identify defects on passing rail cars; specialized inspection cars that identify defects in tracks and the ground underneath the tracks; and sophisticated systems that combine data from a variety of sources to produce "vehicle condition reports" on individual rail cars so that poorly performing cars can be identified before accidents occur. Many railroad-related technological advancements are developed at the Transportation Technology Center, Inc. in Pueblo, Colorado, a subsidiary of the Association of American Railroads that is widely considered to be the finest rail research facility in the world.

- Defect detectors. By July 2014, railroads will ensure that specialized track side "hot box" detectors are installed at least every 40 miles along routes with trains carrying 20 or more cars containing crude oil. These detectors help prevent accidents by measuring if wheel bearings are generating excessive heat and therefore are in the process of failing.

- Routing model. Several years ago, the rail industry and several federal agencies jointly developed the Rail Corridor Risk Management System (RCRMS), a sophisticated statistical routing model designed to help railroads analyze and identify the overall safest and most secure routes for transporting highly hazardous materials. The model uses a minimum of 27 risk factors — including hazmat volume, trip length, population density along the route, availability of alternate routes, and emergency response capability — to assess the overall safety and security of rail routes. No later than July 1, 2014, major U.S. railroads will begin using the RCRMS for trains carrying at least 20 carloads of crude oil.

- Inspections. FRA regulations dictate the types and frequencies of inspections railroads must perform. The FRA-mandated inspection regime is comprehensive and thorough. New FRA regulations regarding inspections for internal rail defects became effective on March 25th. Railroads have agreed that, going forward, for main line tracks on which trains carrying at least 20 carloads of crude oil travel, they will perform at least one more internal rail inspection each calendar year than the new FRA regulations require. In addition, railroads will conduct at least two automated comprehensive track geometry

inspections each year on main line routes over which trains with 20 or more loaded cars of crude oil are moving, something FRA regulations do not currently require.

- Speed restrictions. In August 2013, railroads self-imposed a 50-mph speed limit for trains carrying 20 or more carloads of crude oil. Beginning no later than July 1, 2014, if a train is carrying at least 20 cars of crude oil and at least one of those cars is an older "DOT-111" car (these cars are discussed further below), that train will travel no faster than 40 mph when travelling within one of the 46 nationwide "high threat urban areas" designated by the Department of Homeland Security.

- Train braking. As of April 1, 2014, trains operating on main line tracks carrying at least 20 carloads of crude oil have been equipped either with distributed power locomotives (i.e., locomotives placed in locations other than the front of the train) or with two-way telemetry end-of-train devices. These technologies allow train crews to apply emergency brakes simultaneously from both the head end and locations further back in the train in order to stop the train faster.

Accident Mitigation

In addition to their efforts to prevent accidents from occurring, railroads have taken, and continue to take, numerous steps to mitigate the consequences of accidents should they occur.

- Many of these mitigation efforts focus on increased federal tank car safety and design standards. The total North American tank car fleet consists of about 335,000 cars. Railroads themselves own less than 1 percent of these cars; nearly all are owned by rail customers and leasing companies. The dozens of distinct types of tank cars are differentiated by characteristics (pressure or general service, insulated or non-insulated, how much they can carry, and so on) that make them suitable or not suitable for carrying specific commodities.

- U.S. federal regulations pertaining to tank cars are set by the Pipeline and Hazardous Materials Safety Administration (PHMSA). Transport Canada performs a similar role in Canada. In addition, the AAR Tank Car Committee sets rail industry standards regarding how tank cars used in North America are designed and constructed.[1] These standards are often above and beyond federal standards.

- The rail industry has long supported increased tank car safety standards. For example, in March 2011, the AAR petitioned PHMSA to adopt more stringent requirements for new tank cars used to transport certain types of hazardous materials, including crude oil. These tougher standards called for more puncture resistance through the use of a thicker tank car shell or a jacket, extra protective half-height (at a minimum) "head shields" at

[1] The AAR Tank Car Committee is comprised of railroads, rail car owners, rail car manufacturers, and rail hazmat customers, with active participation from the U.S. DOT, Transport Canada, and the National Transportation Safety Board (NTSB)

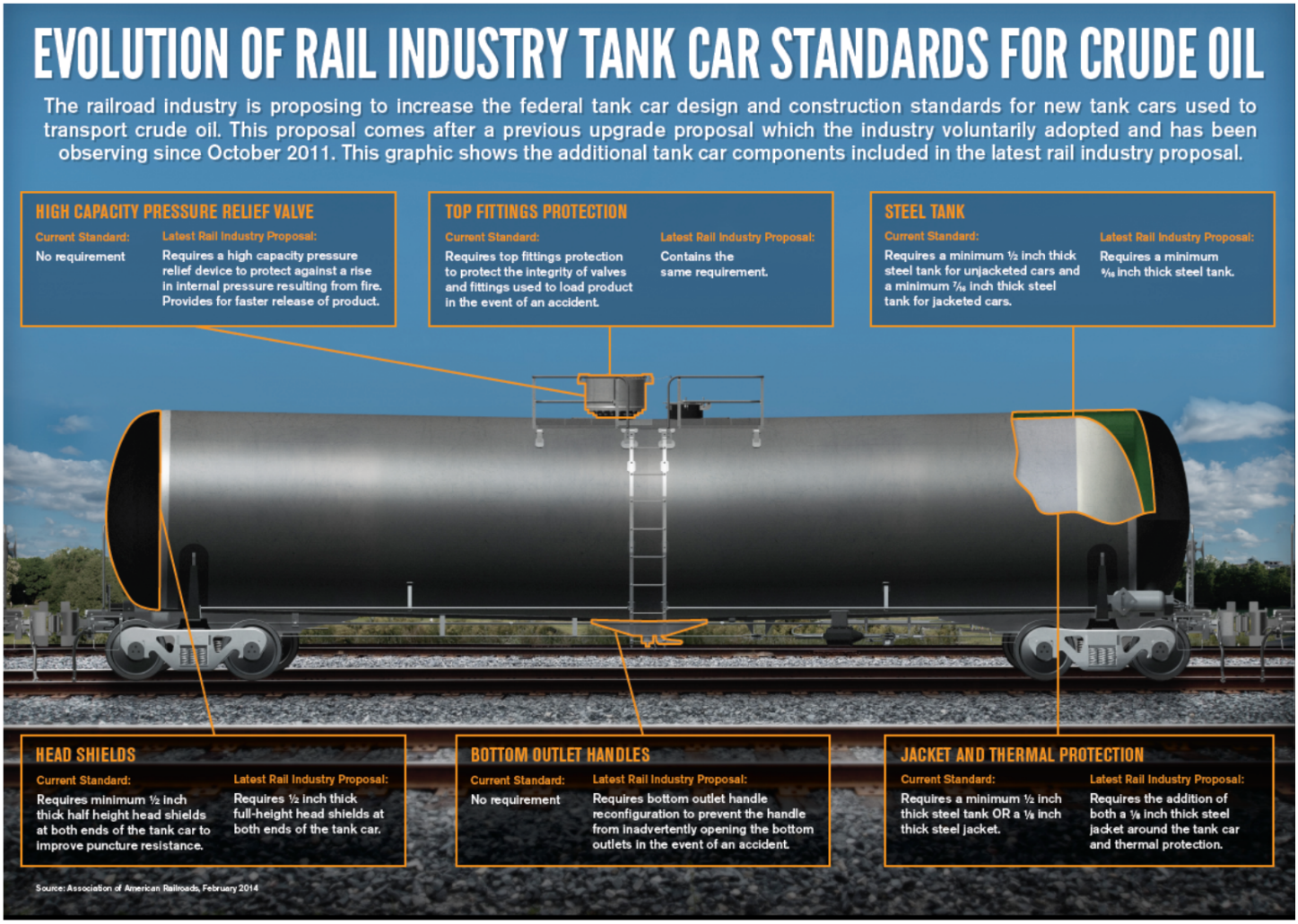
both ends of tank cars, and additional protection for the fittings on the top of a car that enable access to the inside of the car.

- In July 2011, after it had become clear that PHMSA adoption of the AAR's proposal was not imminent, the Tank Car Committee adopted what the AAR had proposed to PHMSA as the basis for new industry standards for tank cars used to carry ethanol or crude oil. The new standards, referred to as "CPC-1232," apply to new tank cars ordered after October 1, 2011. To date, around 20,000 tanks cars have been built to this tougher CPC-1232 standard.
- More recently, in November 2013, the rail industry called on PHMSA to adopt standards even more stringent than CPC-1232 for new tank cars used to transport crude oil and ethanol. In November 2013, railroads expressed support for requiring that tank cars be equipped with jackets and thermal protection, full-height head shields, top fittings protections, and bottom outlet handles that will not open in a derailment.
- The November 2013 proposal also called for aggressively retrofitting or phasing out of tank cars used to transport crude oil or ethanol. The November 2013 proposal recognizes that input is needed from shippers and tank car manufacturers to determine the precise parameters of a phase-out program and to identify the retrofits that should be required.
- Since the November 2013 proposal, the rail industry has continued to evaluate what other standards might be appropriate enhance the safety of tank cars used to transport crude oil. For example, railroads now support strengthening tank cars used to transport crude oil with thicker, 9/16th inch shells (see the graphic on the next page).
- Approximately 228,000 tank cars are so-called "DOT-111" general service tank cars. Around 100,000 DOT-111 cars are used to transport crude oil or other flammable liquids. To the extent that DOT-111 cars are used to transport crude oil, the rail industry believes they should be retrofitted or replaced as described above.
- Under federal regulations, the entity "offering" crude oil to the railroad for transport (e.g., the oil producer) is responsible for properly classifying the oil based on its level of hazard. On February 25, 2014, the FRA issued an executive order requiring that crude oil from the Bakken region be tested to ensure that it is properly classified before it is transported by rail. Railroads support the pursuit of proper classification and labeling of petroleum crude oil in tank cars by shippers prior to transport. This is essential to ensuring that first responders are able to safely and appropriately respond in the event of an accident.

<u>Emergency Response</u>

Railroads have extensive emergency response functions, which work in cooperation with federal, state and local governments, to assist communities in the event of an incident involving crude oil or other hazardous materials:

- Railroads' emergency response efforts begin internally:
  - ✓ All the major railroads have teams of full-time personnel whose primary focus is hazmat safety and emergency response, as well as teams of environmental, industrial hygiene, and medical professionals available at all times to provide assistance during hazmat incidents.


EVOLUTION OF RAIL INDUSTRY TANK CAR STANDARDS FOR CRUDE OIL
The railroad industry is proposing to increase the federal tank car design and construction standards for new tank cars used to transport crude oil. This proposal comes after a previous upgrade proposal which the industry voluntarily adopted and has been observing since October 2011. This graphic shows the additional tank car components included in the latest rail industry proposal.
HIGH CAPACITY PRESSURE RELIEF VALVE
Current Standard:
No requirement
Latest Rail Industry Proposal:
Requires a high capacity pressure relief device to protect against a rise in internal pressure resulting from fire. Provides for faster release of product.
TOP FITTINGS PROTECTION
Current Standard:
Requires top fittings protection to protect the integrity of valves and fittings used to load product in the event of an accident.
Latest Rail Industry Proposal:
Contains the same requirement.
STEEL TANK
Current Standard:
Requires a minimum ½ inch thick steel tank for unjacketed cars and a minimum 7/16 inch thick steel tank for jacketed cars.
Latest Rail Industry Proposal:
Requires a minimum 9/16 inch thick steel tank.
HEAD SHIELDS
Current Standard:
Requires minimum ½ inch thick half height head shields at both ends of the tank car to improve puncture resistance.
Latest Rail Industry Proposal:
Requires ½ inch thick full-height head shields at both ends of the tank car.
BOTTOM OUTLET HANDLES
Current Standard:
No requirement
Latest Rail Industry Proposal:
Requires bottom outlet handle reconfiguration to prevent the handle from inadvertently opening the bottom outlets in the event of an accident.
JACKET AND THERMAL PROTECTION
Current Standard:
Requires a minimum ½ inch thick steel tank OR a ⅛ inch thick steel jacket.
Latest Rail Industry Proposal:
Requires the addition of both a ⅛ inch thick steel jacket around the tank car and thermal protection.
Source: Association of American Railroads, February 2014

- ✓ Railroads also maintain networks of hazmat response contractors and environmental consultants, strategically located throughout their service areas, who can handle virtually any air, water, waste or public health issue. These contractors, who are on call at all times, have multiple offices and equipment storage locations and a vast array of monitoring equipment, containment booms, industrial pumps, and other spill response tools and equipment.
- ✓ Railroads have comprehensive "standard of care" protocols that ensure that impacts to the community — such as evacuations — are addressed promptly and professionally.

- Each year, railroads actively train well over 20,000 emergency responders throughout the country. This training ranges from general awareness training to much more in-depth offerings. The precise parameters of these emergency response training programs vary from railroad to railroad, but in general they consist of a combination of some or all of the following aspects:
  - ✓ Safety trains. Several railroads utilize "hazmat safety trains" and other training equipment that travel from community to community to allow for hands-on training for local first responders.
  - ✓ Training centers. Several railroads operate centralized hazmat training sites where they train employees, first responders, customers, and other railroad industry personnel in all aspects of dealing with hazmat incidents.
  - ✓ Local firehouse visits. In aggregate, railroads visit hundreds of local firehouses each year to provide classroom and face-to-face hazmat training.
  - ✓ Table top drills. Railroads regularly partner with local emergency responders to conduct simulations of emergency situations in which general problems and procedures in the context of an emergency scenario are discussed. The focus is on training and familiarization with roles, procedures, and responsibilities.
  - ✓ Self-study training courses. Railroads make available self-study programs for emergency responders that allow students to learn proper procedures at their own pace. Some railroads also provide related web-based training on hazmat and general rail safety issues.
- Railroads also support our nation's emergency response capability through the Security and Emergency Response Training Center (SERTC), a world-class facility in Pueblo, Colorado, that is operated by the Transportation Technology Center, Inc. (TTCI). Since its inception in 1985, SERTC has provided in-depth, realistic, hands-on hazmat emergency response training to more than 50,000 local, state, and tribal emergency responders and railroad, chemical, and petroleum industry employees from all over the country. Most of the training at SERTC is advanced training that builds on basic training responders receive elsewhere. Instructors at SERTC average more than 30 years of emergency response experience.
- Many railroads regularly provide funding to emergency responders in their service areas to attend SERTC. In addition, the AAR recently announced that railroads will provide approximately $5 million by July 1, 2014, to develop a specialized crude-by-rail training and tuition assistance program for local first responders. The funds will be used to

design a curriculum at TTCI specifically devoted to crude oil emergency response, to provide tuition assistance for an estimated 1,500 first responders to attend TTCI for training, and to provide additional training to local emergency responders closer to home.

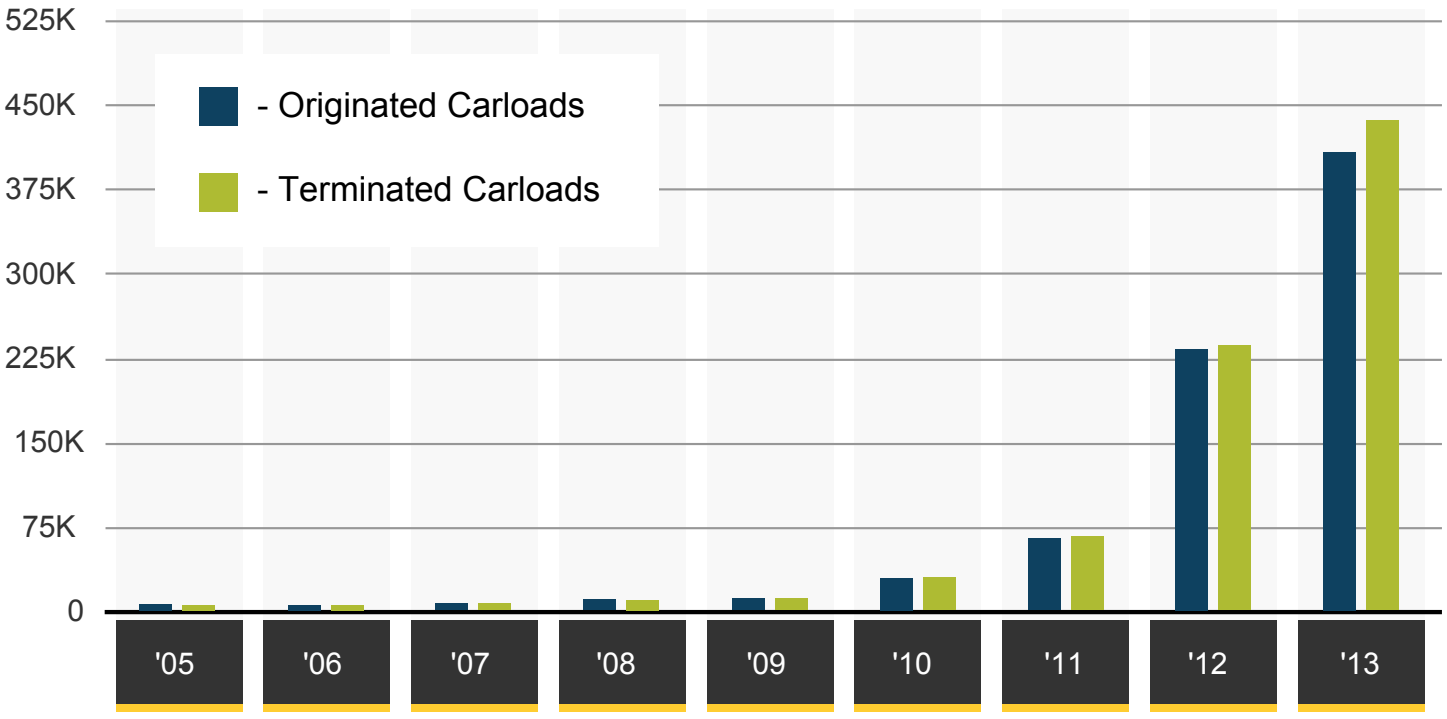
- For years, railroads have provided appropriate local authorities, upon request, with a list of the hazardous materials, including crude oil, transported through their communities. On May 7, 2014, the U.S. Department of Transportation issued an emergency order requiring railroads operating trains containing large amounts of Bakken crude oil to notify state emergency response commissions (SERCs) about these shipments. As noted above, railroads have for years worked with emergency responders and personnel to educate and inform them about the hazardous materials moving through their communities. These open and transparent communications will continue as railroads do all they can to comply with the emergency order.
- By July 1, 2014, railroads will also develop an inventory of resources for emergency responders along routes over which trains with 20 or more cars of crude oil operate. This inventory will include locations for the staging of emergency response equipment and contacts for the notification of communities. When the inventory is completed, railroads will provide the DOT with information on the deployment of the resources and will make the information available upon request to appropriate emergency responders.
- Emergency responders have control of railroad accidents in which hazardous materials are spilled, but railroads provide the resources for mitigating the accident. Railroads also reimburse local emergency agencies for the costs of materials the agencies expend in their response efforts.

Conclusion

- North America is experiencing an unprecedented boom in crude oil production. Among many other benefits, this means North America is likely to move closer to energy self-sufficiency. Railroads are playing a critical role in this energy renaissance, with rail shipments of crude oil growing in recent years due to the flexibility and other advantages that moving crude oil by rail offers.

ORIGINATED CARLOADS OF CRUDE OIL VS. **TERMINATED CARLOADS** OF CRUDE OIL

ON U.S. CLASS I RAILROADS



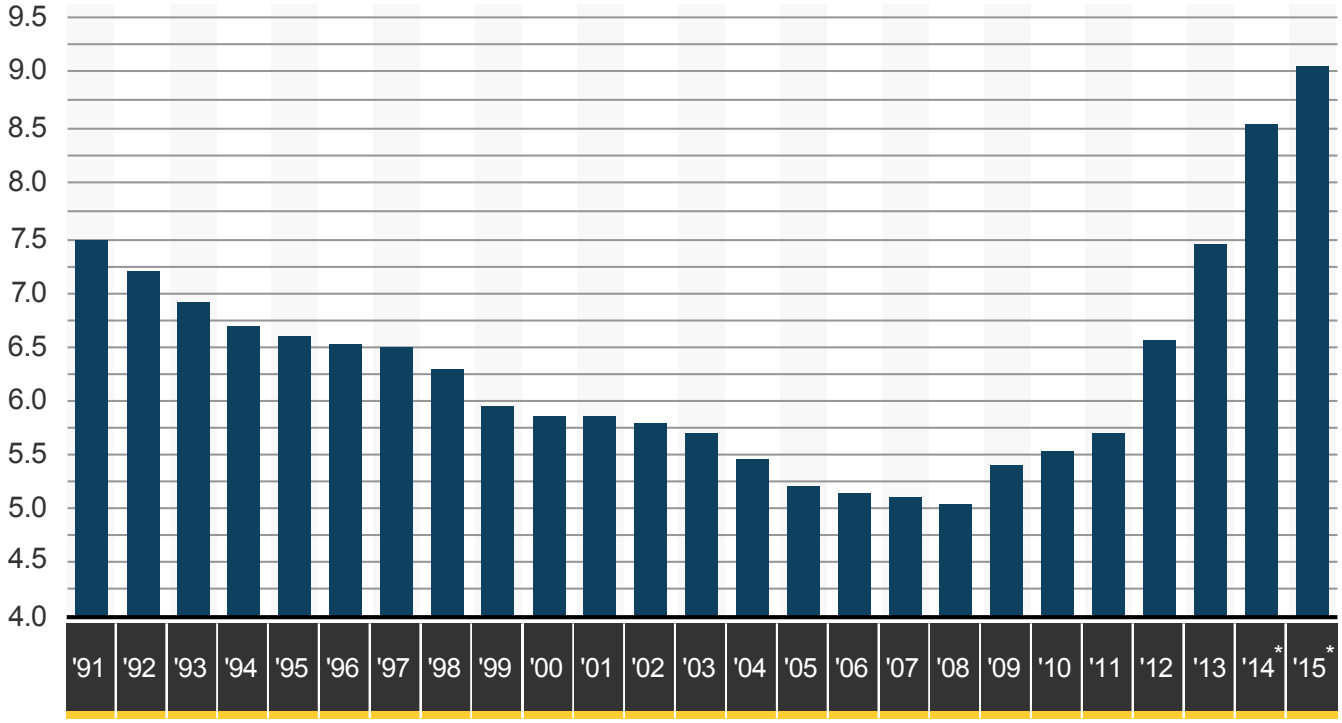
*Estimate based on preliminary data

Source: AAR, FRA

ASSOCIATION OF AMERICAN RAILROADS

U.S. CRUDE OIL PRODUCTION

MILLIONS OF BARRELS PER DAY



*Energy Information Administration estimate

Source: EIA

ASSOCIATION OF AMERICAN RAILROADS

A Commitment to Safety beyond Our Rails

Railroads play an integral role in the well-being of large and small towns throughout our nation, delivering the raw materials and finished goods American businesses and consumers need. More important than delivering economic prosperity is ensuring safety. Safety efforts of the rail industry extend far beyond the railroad's 180,000 employees and 140,000 mile rail network, reaching into the communities they serve.

Partnering with Our Communities

Railroads work closely with state and local leaders and emergency responders across their network to ensure that communities understand how railroads operate and are prepared in the event of an accident.

- **Routing.** As common carriers, railroads are required by law to transport hazardous materials. Railroads use a sophisticated statistical routing tool designed to determine rail routes that pose the least overall safety and security risk for the transportation of certain hazardous materials. This tool, developed in partnership with the Federal Railroad Administration (FRA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the Transportation Security Administration (TSA) and the Federal Emergency Management Agency (FEMA) uses 27 risk factors — including hazmat volume, trip length, population density along the route, and emergency response capability — to assess the safety and security of rail routes.

- **Information Sharing.** Railroads provide local authorities, upon request, with a list of the hazardous materials, including crude oil, transported through their communities. Railroads also equip train dispatchers and crews with information about hazmat on individual trains and detailed emergency response information specific to those materials.

- **Emergency Response Training.** Each year, thousands of emergency responders and railroad and shipper employees receive specialized training through individual railroad efforts and industry programs. The Security and Emergency Response Training Center (SERTC) at the AAR's Transportation Technology Center has trained more than 50,000 transportation, emergency response, chemical, government agency and emergency response employees and contractors from all over the world to safely handle accidents involving tank cars carrying hazardous materials. Railroads also support industry partnership such as TRANSCAER® (Transportation Community Awareness and Emergency Response) and Chemtrec (Chemical Transportation EmergencyCenter). TRANSCAER® is a voluntary national outreach effort that focuses on assisting communities to prepare for and respond to a possible hazardous material transportation incident. Chemtrec is a 24/7 resource for emergency responders that provides access to critical resources, such as chemical product, medical and toxicology experts, to assist in mitigation of incidents involving hazardous materials. Railroads train more than 20,000 emergency responders each year through their own efforts and through these industry partnerships.

- **Customer Best Practices.** The Non-Accident Release (NAR) Reduction Task Force was created in 1995 by the Association of American Railroads to reduce the number of NARs by promoting proper "securement" of tank cars and their safe handling in transportation by increasing awareness,

encouraging improved practices, gathering data and distributing findings. The NAR Reduction Task Force consists of railroads, shippers, railcar owners, trade associations, component suppliers and regulatory agencies from the United States and Canada.

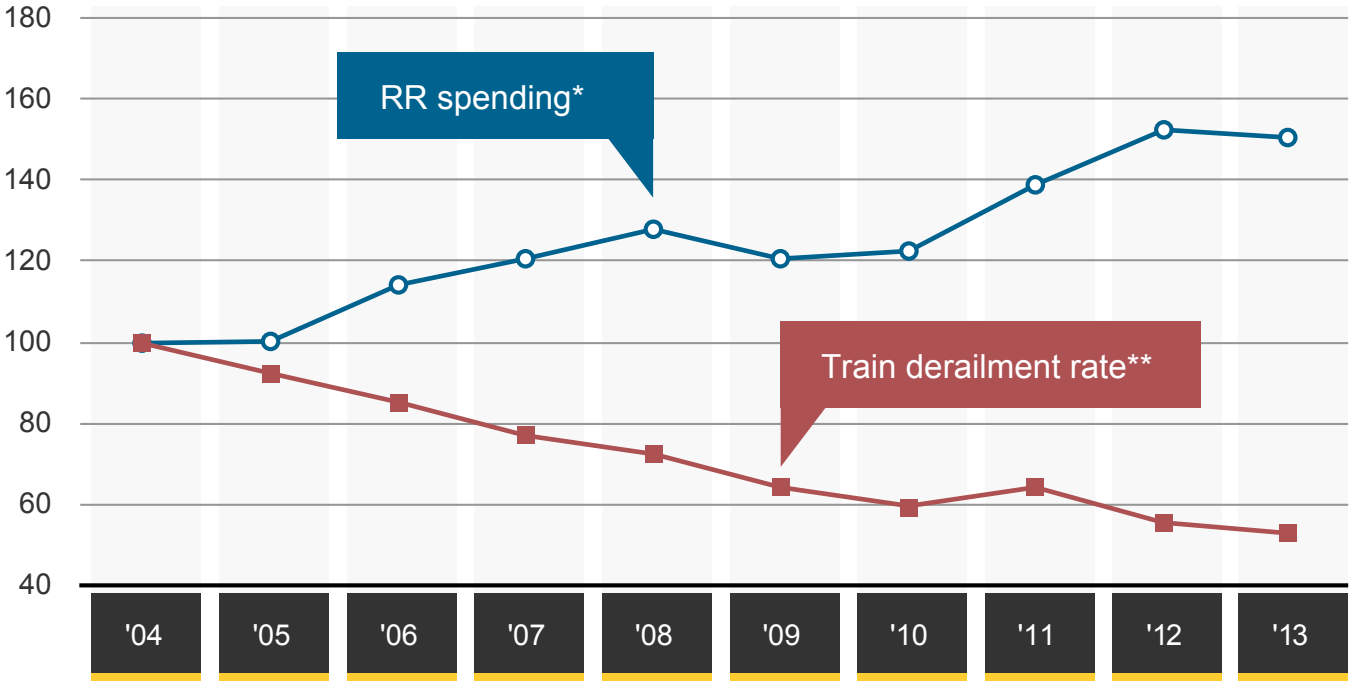
- **Community Response Planning.** Railroads actively participate in state emergency planning committees and state agency conferences on emergency response. They also help communities develop and evaluate their own emergency response plans. These activities include representatives from local fire and health departments, education institutions, industry organizations, transportation departments and the public.

- **Equipment Availability and Staging.** Railroads invest in equipment – including foam trailers – used to train emergency response personnel and respond to accidents involving hazardous materials. This equipment is strategically located throughout the network to ensure that it can arrive quickly at the scene of an accident.

- **Accident Response and Remediation.** In the rare case of a train accident, railroads swiftly implement their emergency response plans and work closely with first responders to help minimize casualties and property damage caused by the accident. They help provide services for any misplaced families to try to limit inconvenience and displacement. Typically, railroads reimburse local emergency response agencies for the cost of materials expended for accident response and environmental remediation.

HIGHER RAIL INVESTMENTS = FEWER DERAILMENTS

(2004 = 100)



*Capital spending + maintenance expenses on infrastructure and equipment

**Derailments per million train-miles

ASSOCIATION OF AMERICAN RAILROADS

Source: AAR, FRA

Railroad Industry Tank Car Fleet

Railroads generally do not own tank cars; the vast majority of tank cars are owned or leased by rail customers that use cars built specifically for the products they need to transport.

- There are 335,000 tank cars in the active fleet (pressure and non-pressure).
  - 228,000 of these tank cars are DOT-111s, which are non-pressure tank cars designed to carry a wide range of products including hazardous and non-hazardous materials.
  - Roughly 92,000 DOT-111 tank cars are used to move flammable liquids, such as crude and ethanol, with approximately 18,000 of those tank cars built to the latest industry safety standards.

Federal Oversight: Tank Car Regulations

In the United States, federal regulations pertaining to tank cars are set by the U.S. Department of Transportation's (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). Transport Canada performs a similar role in Canada.

Industry Oversight: Tank Car Standards

The AAR Tank Car Committee sets technical standards for how tank cars, including those used to move hazmat, are designed and constructed. Specifications for railroad tank cars trace their beginning to the Master Car Builders' Association in 1903. These specifications were later adopted by the Mechanical Division of the Association of American Railroads in 1931. After being incorporated into federal regulation, the AAR Tank Car Committee was delegated the authority to approve tank car designs, materials and construction by the federal government. Today, representatives of government agencies are invited to attend all Tank Car Committee meetings.

- The AAR Tank Car Committee is comprised of railroads, rail car owners, rail car manufacturers and rail hazmat customers, with active participation from the U.S. DOT, Transport Canada and the National Transportation Safety Board (NTSB).

- AAR Tank Car Committee standards often exceed federal standards.

Exceeding Federal Requirements: Industry Driven-Tank Car Safety Enhancements

The rail industry has for several years been aggressive in searching for ways to improve tank car safety beyond what is required by federal regulation.

March 2011 — AAR on behalf of the Tank Car Committee petitioned PHMSA to adopt the new standards for Packing Group I and II hazardous materials including:

- a thicker, more puncture-resistant shell or jacket;
- extra protective head shields at both ends of tank car, and
- additional protection for the top fittings.

July 2011 — In the absence of federal action from PHMSA, the AAR Tank Car Committee adopted the higher standards as requirements for new tank cars transporting crude oil and ethanol, ordered after October 1, 2011.

November 2013 — Freight railroads urged PHMSA to increase federal tank car safety by requiring all tank cars used to transport certain types of hazardous materials including crude oil be built to a higher standard and all existing cars be retrofitted to this higher standard or phased out of flammable service.

In comments responding to a PHMSA advanced notice of proposed rulemaking, AAR offered the following specific recommendations to PHMSA:

- Increase federal tank car design standards for new cars or retrofit existing cars to include:
  - an outer steel jacket around the tank car and thermal protection,
  - full-height head shields,
  - and high-flow capacity pressure relief valves;
- Require additional safety upgrades to those tank cars built since 2011, including:
  - installation of high-flow-capacity relief valves, and
  - design modifications to prevent bottom outlets from opening in the case of an accident;
- Aggressively phase out older-model tank cars used to move flammable liquids that cannot be retrofitted to meet new federal requirements.
- Eliminate the option for rail shippers to classify a flammable liquid with a flash point between 100 and 140 degrees Fahrenheit as a combustible liquid.