Progress Toward Safer Rail Tank Cars Transporting Flammable Liquids: 2025 Report

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About the Bureau of Transportation Statistics

About This Report

Project Manager
Carl Cloyed, *Mathematical Statistician*, *Office of Data Development and Standards*

Major Contributors
Joseph McGill

Editor
Mikki Stacey

Visual Information Specialist
Alpha Wingfield

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Abstract
This annual report addresses Section 7308(b) of the Fixing America's Surface Transportation Act (FAST Act; P.L. 114–94; Dec. 4, 2015) by summarizing the rail tank car safety upgrades implemented between 2013 and 2024 by type of tank car and flammable liquid—as defined by the Association of American Railroads.

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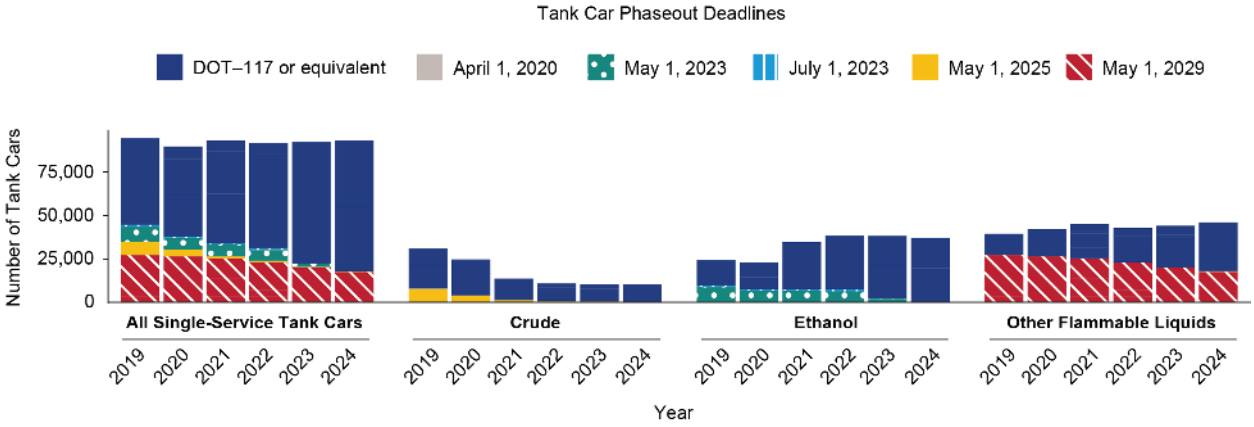
Executive Summary

This 2025 report summarizes the progress the railroad freight industry has made toward upgrading North American rail tank cars that transport Class 3 flammable liquids to meet DOT-117 specifications. Upgrades include a thicker, insulated or thermally protected tank;[1] a full-height head shield; and top and bottom valve-fitting protections.[2]

The Fixing America's Surface Transportation (FAST) Act [Public Law 114–94] established a rolling phase-out schedule for rail tank cars. This schedule is organized by the type of rail tank car and Class 3 flammable liquid or liquids carried (Figure 1). All rail tank cars that transported Class 3 flammable liquids in 2024 were compliant with the FAST Act phase-out schedule. Compliance with the next phase-out deadline, May 1, 2025, will be documented in more detail in next year's report. The number of rail tank cars built to DOT-117 specifications or retrofitted to DOT-117R specifications increased to 73 percent of all rail tank cars carrying Class 3 flammable liquids.

Figure 1. Rail Tank Cars by Class 3 Flammable Liquid and FAST Act Phase-out Deadline



Note: DOT-117 rail tank cars and other rail tank cars that meet DOT-117 specifications are listed as DOT-117 or equivalent because they do not have a phaseout deadline. Refer to Box B.
Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

The Bureau of Transportation Statistics (BTS) generated statistically sound estimates of rail tank cars produced to DOT-117 or DOT-117R specifications in 2025 based on a census of approriate rail tank car shops. The 2025 BTS survey of rail tank car shops projects that 3,546 new DOT-117 rail tank cars will be built and 890 existing rail tank cars will be retrofitted to DOT-117R specifications this year, totaling a projected 4,436 additional DOT-117 and DOT-117R rail tank cars added to the North American rail tank car fleet. An estimated 17,585 non-DOT-117 and non-DOT-117R rail tank cars need to be replaced over the next 5 years to meet all FAST Act deadlines. To meet this requirement, about 3,517 DOT-117 and DOT-117R rail tank cars need to be added to the fleet per year (17,585 rail tank cars/5 years). BTS' Tank Car Survey indicates this production rate is possible (Figure 2).

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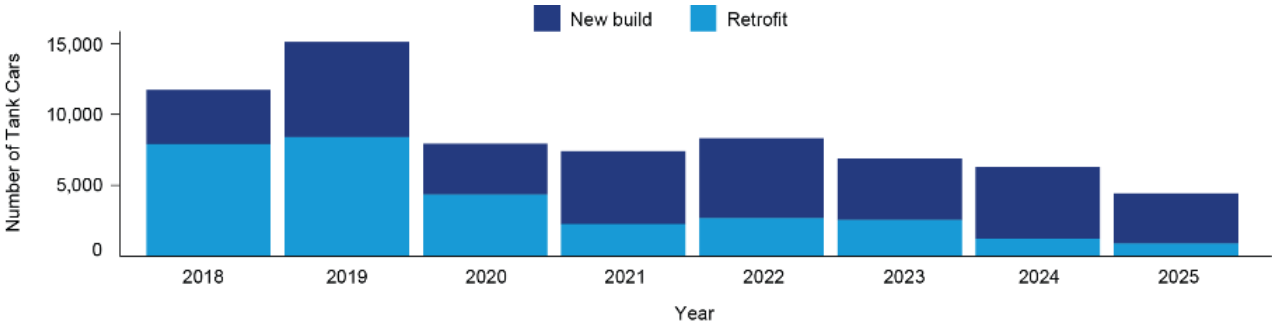
1 Existing rail tank cars retrofitted to DOT-117R specifications may continue in service with a 7/16-inch head and shell thickness.

2 For more information and illustrations, refer to https://tankcarresourcecenter.com/ [RSI 2017].

Figure 2. Projected New and Retrofitted DOT-117 Rail Tank Cars to Be Built Estimated From the Tank Car Survey



Source: BTS.

Preface: Requirements of Section 7308 of the Fixing America's Surface Transportation (FAST) Act

Section 7308 of the Fixing America's Surface Transportation (FAST) Act [Public Law 114–94] requires the U.S. Department of Transportation (USDOT) to collect and report data on rail tank cars transporting Class 3 flammable liquids (Box A). This legislation aims to track the railroad freight industry's progress toward upgrading the portion of the rail tank car fleet that transports Class 3 flammable liquids to DOT-117 specifications.

The DOT-117 specifications, finalized in 2015, specify the design characteristics of DOT-117 and DOT-117R rail tank cars. These characteristics include a thicker, insulated or thermally protected tank;[3] a full-height head shield; and top and bottom valve-fitting protections.[4] Thick-walled head shields are on both ends of the rail tank car to resist puncture in a derailment. The top and bottom valves, used to fill and empty the rail tank car, need to be protected from shearing off in a derailment to prevent release of flammable liquids.

The FAST Act mandates that USDOT provide an annual status report to Congress that presents the following information, required in Section 7308(b) [Public Law 114–94]:

- Total number of rail tank cars modified or retrofitted to meet the DOT-117R specification or equivalent
- Total number of rail tank cars built to meet the DOT-117 specification or equivalent
- Total number of rail tank cars used or likely to transport Class 3 flammable liquids using different tank car types that have either been modified or have not been modified

Furthermore, the FAST Act mandates that USDOT provide projected numbers of new builds (i.e., DOT-117 rail tank cars) and retrofits (i.e., DOT-117R rail tank cars) by rail tank car shops for the current year that satisfy Section 7308(c). Section 7308(c) requires the Bureau of Transportation Statistics (BTS) to:

> [C]onduct a survey of tank car facilities modifying tank cars to the DOT–117R specification, or equivalent, or building new tank cars to the DOT–117 specification, or equivalent, to generate statistically valid estimates of the anticipated number of tank cars those facilities expect to modify to DOT–117R specification, or equivalent, or build to the DOT–117 specification, or equivalent. [Public Law 114–94]

This annual report addresses Section 7308(b) by summarizing the progress of rail tank car safety upgrades from 2013 through 2024 by type of rail tank car and Class 3 flammable liquid—as defined by the Association of American Railroads (AAR). Refer to Box B for more detail on the types of rail tank cars referenced in this report.

Prior annual reports are on the BTS website: http://www.bts.gov/tankcarreports [BTS 2024].

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3 Existing rail tank cars retrofitted to DOT-117R specifications may continue in service with a 7/16-inch head and shell thickness.

4 For more information and illustrations, refer to https://tankcarresourcecenter.com/ [RSI 2017].

Box A. What is a Class 3 Flammable Liquid?

The following definitions can be found in the Code of Federal Regulations Title 49, Part 173:

A *flammable liquid* (Class 3) is a liquid with a flash point of not more than 60°C (140°F) or any material in a liquid phase with a flash point at or above 37.8°C (100°F) that is intentionally heated and offered for transportation or transported at or above its flash point in a bulk packaging. This includes liquids such as refined petroleum products, crude oil, and ethanol.

Class 3 flammable liquids are designated by four-digit United Nations (UN) numbers or North American (NA) numbers, used to identify hazardous materials worldwide and are required for the shipment of hazardous materials. In all, there are over 400 UN or NA numbers that fall within Class 3 flammable liquids.

Flash point is the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Packing Groups are identified in the federal hazardous materials regulations and determine how a flammable liquid must be prepared for transport. Crude oil and ethanol are packing group Ⅰ and the 400 liquids in the "other" category are a mix of packing groups Ⅰ, Ⅱ, and/or Ⅲ. Packing group Ⅰ liquids are the most dangerous, and packing group Ⅲ liquids are less dangerous. Packing group Ⅲ liquids have a higher flash point than packing group Ⅱ liquids, and they are both higher than packing group Ⅰ liquids.

Box B. Rail Tank Car Types and Definitions

DOT-111: A nonpressurized rail tank car with a shell thickness of 7/16 inches. These tank cars can carry hazardous and nonhazardous liquids. These tank cars are not required to have head shields or top fittings protection. DOT-111 tank cars have pressure relief valves that offer some protection in some fires.

DOT-117 (TC-117 in Canada): A nonpressurized rail tank car with a shell thickness of 9/16 inches and insulating material that provides thermal protection. DOT-117 tank cars have a skin that holds the insulation and thermal protection in place and doubles as additional protection from punctures. These tank cars have protected top fittings, a full-height head shield, and a bottom outlet valve with an enhanced handle designed to prevent the tank car from emptying its contents in an incident. All the enhancements are designed to protect the tank from punctures and the valves from damage. DOT-117R tank cars are retrofitted to meet DOT-117 specifications, but they may continue in service with a shell thickness of 7/16 inches.

CPC-1232: A voluntary, industry-sponsored specification for rail tank cars carrying petroleum crude oil and ethanol. This specification includes additional safety features compared to DOT-111 tank cars. Cars ordered after October 2011 for the transport of crude oil or ethanol must meet this industry specification. CPC-1232 tank cars are equipped with a pressure-relief valve, more extensive top fittings than DOT-111 tank cars, and a full-height or half-height head shield. The shell of non-jacketed tank cars must be 1/2 of an inch thick, and the shell of jacketed tank cars must be 7/16 of an inch thick.

Box B. Rail Tank Car Types and Definitions Continued

DOT-105:* A pressurized rail tank car that has additional safety features than what is required on DOT-111 nonpressurized tank cars, including head shields to help prevent punctures, relief values, and thermal insulation.

DOT-112:* A pressurized rail tank car that has additional safety features than what is required on DOT-111 nonpressurized tank cars, including tank head puncture resistance systems, thermal protection, and fitting and valve protections.

DOT-114:* A pressurized rail tank car that has additional safety features than what is required on DOT-111 nonpressurized tank cars, including additional insulation, head protection, and coupler safety eequipment. Few of these cars actively operate in the fleet carrying Class 3 flammable liquids.

DOT-120:* A pressurized rail tank car that has additional safety features than what is required on nonpressurized tank cars. Few of these tank cars actively operate in the fleet carrying Class 3 flammable liquids.

DOT-115:* A nonpressurized rail tank car similar to a DOT-111 tank car but with an inner container surrounded by an outer shell. The inner container may house multiple compartments. Relatively few of these tank cars actively operate in the fleet carrying Class 3 flammable liquids.

DOT-211:* A nonpressurized rail tank car similar to a DOT-111 tank car. Few of these tank cars actively operate in the fleet carrying Class 3 flammable liquids.

Head shield: Located at the ends of the rail tank car, this 1/2-inch-thick steel shield provides extra protection in the event of an incident to prevent an adjacent car from puncturing the tank car.

Jacketed versus non-jacketed rail tank cars: Jacketed rail tank cars have a layer of insulation and/or thermal protection between the tank shell and jacket that stabilizes the temperature of the liquid contained in the tank car and/or reduces the conductivity of heat from outside sources to the contents of the tank car.

Single service versus multiple service: Rail tank cars may make one or more trips in a year. If they carry the same liquid for all their trips, then they are a single-service car. If a tank car is cleaned between trips and carries different liquids, then they are in multiple service for that year.

Top and bottom fittings and valves: Rail tank cars have valves on the top and bottom for the purposes of loading and unloading liquids. The top valve is surrounded by a steel structure to prevent damage to the top valve in a release. The bottom valve has a specialized handle that is intended to prevent an unintended release.

*Indicates rail tank car types included in the “other” category for analysis purposes in this report.
Note: DOT-105, DOT-112, DOT-114, and DOT-120 rail tank cars that are grouped because they are pressurized and exceed the DOT-117 specification. These tank cars also carry other non-class 3 hazardous materials. DOT-115 and DOT-211 tank cars are grouped because they do not typically carry crude oil or ethanol.

1. Fleet Composition of Rail Tank Cars Carrying Class 3 Flammable Liquids

1.1. KEY FINDINGS

The following are key findings from the Tank Car Analysis:

- In 2024, 101,116 rail tank cars carried Class 3 flammable liquids—a 0.2-percent increase from 2023.
- The share of ethanol carried by new or retrofitted DOT-117 cars increased from 94.3 to 99.9 percent from 2023 to 2024. The jacketed and non-jacketed DOT-111 and non-jacketed CPC-1232 rail tank cars carrying ethanol were phased out in 2023. The remainder of ethanol shipments were in jacketed CPC-1232 (18 rail tank cars, or less than 0.1 percent) or other rail tank cars (15 rail tank cars, or less than 0.1 percent) that do not meet the DOT-117 specification. Jacketed CPC-1232 rail tank cars cannot carry ethanol after May 1, 2025.
- Rail tank car shops certified to build or retrofit rail tank cars to the DOT-117 specifications expect to build 3,546 rail tank cars and retrofit 890 rail tank cars in 2025, for a total of 4,436 rail tank cars with DOT-117 and DOT-117R specifications added to the fleet.
- The number of rail tank cars used to transport Class 3 flammable liquids increased slightly from 2023 to 2024, with 247 (0.2 percent) more rail tank cars carrying Class 3 flammable liquids in 2024. This shift was the smallest change in rail tank cars carrying different types of Class 3 flammable liquids since 2018.

1.2. BACKGROUND: HAZARDOUS MATERIALS RULE OF 2015

Several high-profile incidents prompted the U.S. and Canadian governments to reexamine the safety standard that governs the transport of Class 3 flammable liquids.[5] USDOT's Pipeline and Hazardous Materials Safety Administration (PHMSA) and Federal Railroad Administration issued a final rule on May 8, 2015, intending to make transporting Class 3 flammable liquids safer. This rule, Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains (HM-251), includes regulations to upgrade cars transporting Class 3 flammable liquids and operating in high-hazard flammable trains.[6]

The FAST Act includes additional provisions to make the transport of hazardous materials safer by phasing out rail tank cars built to DOT-111 specifications from transporting Class 3 flammable liquids and then finally prohibiting those cars from transporting any Class 3 flammable liquid by 2029. Most notably, by 2025, petroleum crude oil must only be carried in DOT-117 or DOT-117R rail tank cars. Cars that do not meet these safety specifications may switch to carrying commodities other than Class 3 flammable liquids or be retired. After the HM-251 rule was issued in May 2015, Congress passed the FAST Act legislation in December 2015, which further revised the phase-out timeline originally set in HM-251. In response to the FAST Act, PHMSA

[5] For more information on the incidents, refer to https://tankcarresourcecenter.com/tankcar101/ [RSI 2024].

[6] A high-hazard flammable train is defined as "a single train transporting 20 or more loaded tank cars containing Class 3 flammable liquid in a continuous block or a single train carrying 35 or more loaded tank cars of a Class 3 flammable liquid throughout the train" [PHMSA 2015].

revised its rule so the phase-out dates in HM-251 matched the FAST Act via the HM-251C rule,[7] eliminating any confusion as to when the phase-out must occur [PHMSA 2016]. Table 1 lists the current dates. Figure 1 shows the proportion of rail tank cars currently meeting DOT-117 specifications as well as the proportions that will be phased-out on a rolling basis. This figure shows the proportion of all rail tank cars that meet current phase-out guidelines (i.e., new DOT-117 rail tank cars or existing rail tank cars modified to the DOT-117R specifications). Figure 1 shows 10,410 rail tank cars carried petroleum crude oil in 2024. Of these rail tank cars, 10,280 (including DOT-117 and retrofit DOT-117R rail tank cars and rail tank cars classified as "Others"[8]) met the phase-out dates outlined in the FAST Act. An additional 148 Jacketed CPC-1232 rail tank cars in use in 2024 are expected to be retrofitted or repurposed before the May 1, 2025 phase-out deadline. Of those 148 Jacketed CPC-1232 rail tank cars, 130 were used to transport crude oil and 18 were used to transport ethanol in 2024.

Table 1. FAST Act Phase-out Schedule and Status for Rail Tank Cars Carrying Class 3 Flammable Liquids

Class 3 flammable liquid type	Rail tank car type	Date for phase-out	Number of rail tank cars carrying Class 3 flammable liquids	
			2023	2024
Crude	Non-Jacketed DOT-111	1-Jan-18	0	0
	Jacketed DOT-111	1-Mar-18	0	0
	Non-Jacketed CPC-1232	1-Apr-20	0	0
	Jacketed CPC-1232	1-May-25	407	130
Ethanol	Non-Jacketed DOT-111	1-May-23	1,835*	0
	Jacketed DOT-111	1-May-23	20*	0
	Non-Jacketed CPC-1232	1-Jul-23	224*	0
	Jacketed CPC-1232	1-May-25	19	18
Other flammable liquids packing group I	Non-Jacketed DOT-111	1-May-25	55	55
	Jacketed DOT-111	1-May-25	6	5
	Non-Jacketed CPC-1232	1-May-25	30	25
	Jacketed CPC-1232	1-May-25	0	0
Other flammable liquids packing group II/III	Non-Jacketed DOT-111	1-May-29	8,665	7,828
	Jacketed DOT-111	1-May-29	3,537	3,074
	Non-Jacketed CPC-1232	1-May-29	5,066	4,400
	Jacketed CPC-1232	1-May-29	2,465	2,050
Multiple-service flammable liquids	Non-Jacketed DOT-111	—	971	734
	Jacketed DOT-111	—	105	83
	Non-Jacketed CPC-1232	—	1,721	1,219
	Jacketed CPC-1232	—	272	87

*Rail tank cars that were used to transport Class 3 flammable liquids before the listed phase-out date.
—Not applicable.
Note: Rail tank cars that carry different fluids in a year are classified as multiple-service liquids and do not have a single phase-out date because each fluid has a different date. For more on packing groups, refer to Box A.
Source: Data from PHMSA [2016], Railinc's TRAIN II® [n.d.a], and Railinc's Umler® [n.d.b].

7 For the full text of the Hazardous Materials: FAST Act Requirements for Flammable Liquids and Rail Tank Cars (HM-251C), refer to https://www.federalregister.gov/documents/2016/08/15/2016-19406/hazardous-materials-fast-act-requirements-for-flammable-liquids-and-rail-tank-cars [PHMSA 2016].

8 Other rail tank cars include DOT-105, DOT-112, DOT-114, and DOT-120 rail tank cars, which are pressurized and already exceed the DOT-117 specification, and DOT-115 and DOT-211 rail tank cars, which do not typically carry crude oil or ethanol, but may carry other Class 3 flammable liquids.

1.3. CURRENT FLEET COMPOSITION AND USE (SECTION 7308(B))

This section analyzes the use of all rail tank cars that carried Class 3 flammable liquids based on data received from AAR.

1.3.1. Data Sources

To provide a complete picture of the rail tank cars carrying Class 3 flammable liquids, BTS uses data from AAR, which maintains two databases:

- Umler® (Universal Machine Language Equipment Register) is an inventory of individual rail tank cars (active or scheduled to be built) and their specifications, such as tank wall thickness, types of valves, and so on [Railinc n.d.b].
- TRAIN II® (TeleRail Automated Information Network) is a comprehensive listing of railcar movements [Railinc n.d.a].

These AAR databases comprise information on all rail tank cars in North America. Each rail tank car has a unique identification number, and the car owner is required to identify its specifications as well as track commodities transported over the North American rail network. Only rail tank cars with shipments carried entirely within the United States or that start or end in the United States are included in this report.

1.3.2. Analysis Results

Between 2013 and 2024, the number of rail tank cars carrying Class 3 flammable liquids has varied. Numerous factors, such as the following, determine whether a rail tank car will be used to transport Class 3 flammable liquids:

- Demand for each Class 3 flammable liquid
- North American pipeline capacity for transporting crude oil as an alternative to rail tank cars

The size of the fleet of rail tank cars carrying Class 3 flammable liquids is also affected by the number of rail tank cars that carry multiple flammable liquid types over the course of a year, which reduces the need for additional rail tank cars.

By the end of the phase-out period in 2029, all Class 3 flammable liquids are expected to be carried in rail tank cars that meet or exceed the DOT-117 or DOT-117R specifications. There were no phase-out deadlines in 2024, but there was a deadline on May 1, 2025 that will be reported on next year. The industry continues to adhere to all phase-out deadlines that have already passed.

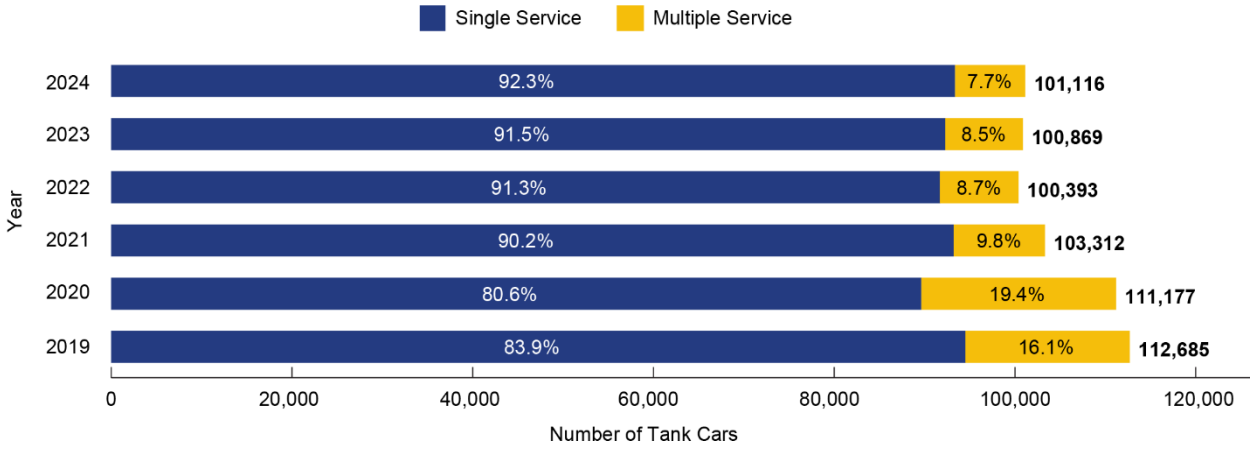
As shown in Figure 3, the total fleet of rail tank cars that actively carry Class 3 flammable liquids has fluctuated from 2019 to 2024, and findings include the following:

- In 2024, 101,116 rail tank cars carried Class 3 flammable liquids. This increase of 0.2 percent from 2023 is a similar rate of increase from the previous year, when there was a 0.5-percent increase in the population of rail tank cars carrying Class 3 flammable liquids from 2022. In fact, the number of rail tank cars has been stable for the last 4 years, ranging between 103,312 in 2021 and 100,393 in 2022. This stabilization in the

number of rail tank cars carrying Class 3 flammable liquids has occurred after a small decrease from 2019 and 2020 (111,177 and 112,685 rail tank cars, respectively).

- The percentages of rail tank cars carrying multiple fluids was down to 7.7 percent in 2024 compared to 8.5 percent in 2023.
- The number of rail tank cars carrying multiple fluids in a year decreased to 7,743 in 2024 (Figure 4), the lowest number of rail tank cars carrying multiple fluids in both number of cars and as a percentage of all rail tank cars carrying hazardous materials since data collection began in 2013, when 6,972 rail tank cars carried multiple fluids. This trend of decreasing the number and percentage of rail tank cars carrying multiple fluids has continued since 2020, when it reached a high of 21,526 rail tank cars after 6 years of increasing numbers.

Figure 3. Rail Tank Cars by Percentage of Single and Multiple Flammable Liquid Service: 2019–2024

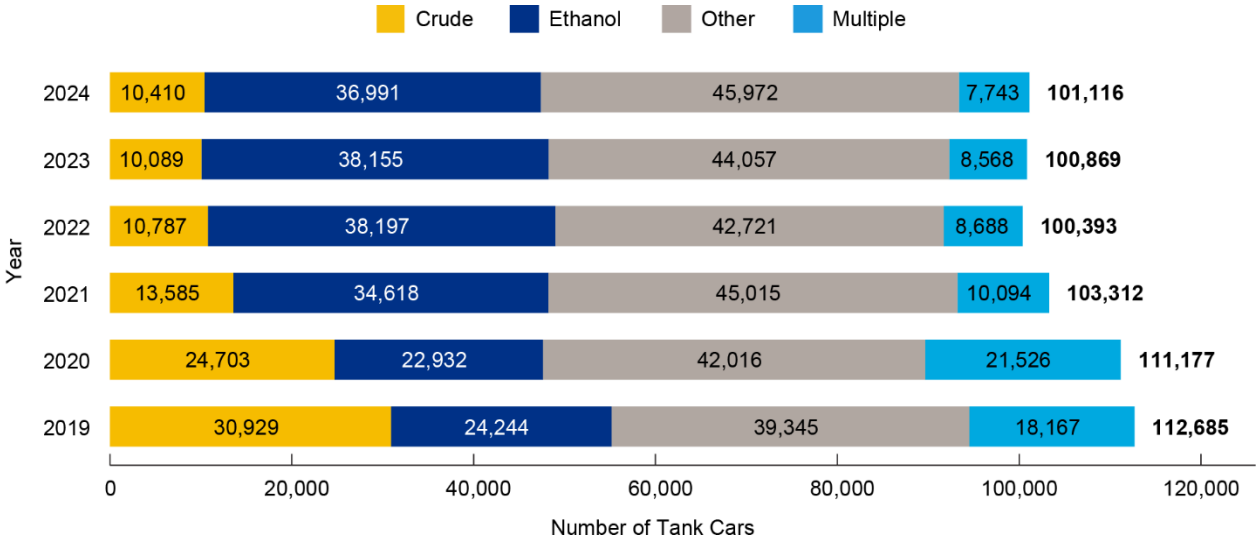


Note: A change was made in how the single-service and multiple-service rail tank cars are counted between the 2018 and 2019 reports, causing the numbers to vary slightly, however, they are not substantively different.
Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

From 2019 to 2024, the mix of fluids carried by train also changed as follows (Figure 4):

- The number of rail tank cars carrying crude oil increased from 10,089 in 2023 to 10,410 in 2024, a 3.2-percent increase. This value is a 66.3-percent decline from the high of 30,929 in 2019.
- While the number of rail tank cars that carried crude oil and ethanol varied little from 2023 to 2024, the number of single-service rail tank cars carrying other Class 3 flammable liquids in 2024 increased by 4.3 percent from 2023.
- The number of rail tank cars carrying ethanol has been relatively steady from 2013 to 2020, with an average of 24,264. This value increased to 38,197 rail tank cars in 2022 and 38,155 in 2023. Although staying relatively stable in 2024 at 36,991 rail tank cars, this value was a 3.1-percent decrease from 2023.
- In 2024, the number of cars in the fleet carrying other Class 3 flammable liquids increased 4.3 percent compared to 2023.

Figure 4. Rail Tank Cars by Type of Flammable Liquid Carried: 2019–2024



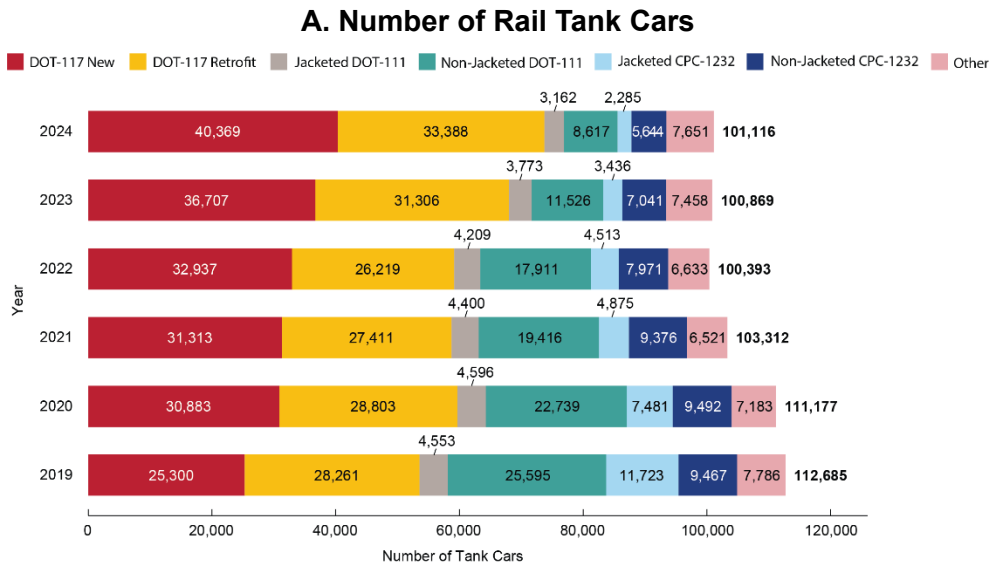
Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

From 2019 to 2024, the composition of the fleet also changed. Figure 5-A and Figure 5-B show the following:

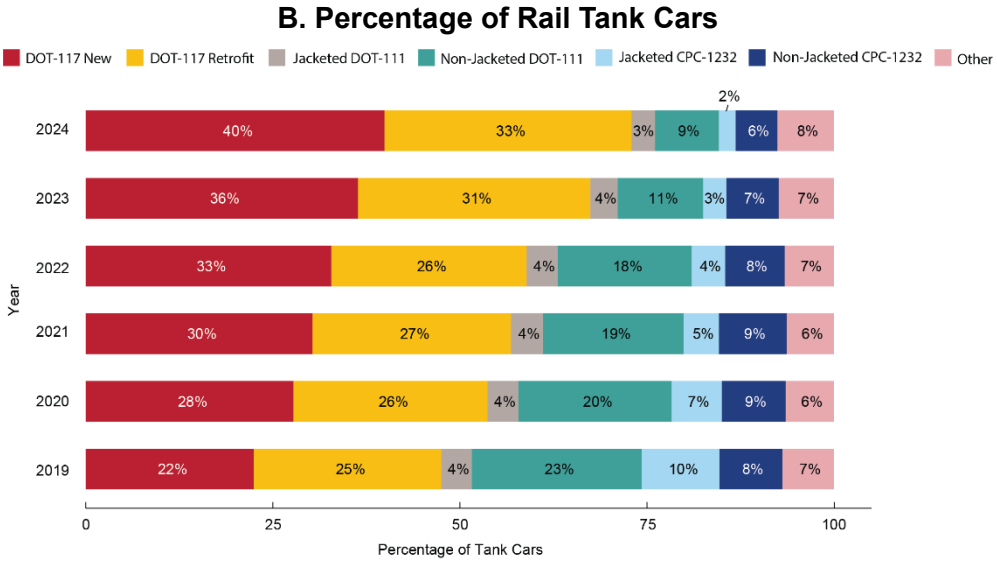
- The percentage of rail tank cars meeting the DOT-117 specifications continued to rise, from 67 percent in 2023 to 73 percent in 2024, the second largest increase since 2019 (Figure 5-B).
- The number of DOT-117 rail tank cars, including DOT-117R rail tank cars, increased from 53,561 rail tank cars in 2019 to 73,757 rail tank cars in 2024 (Figure 5-A).
- Jacketed and non-jacketed DOT-111, jacketed and non-jacketed CPC-1232, and other specification rail tank cars[9] declined between 2019 and 2024, from 52 percent of the fleet in 2019 to 27 percent in 2024.

[9] The grouping of Other Rail Tank Cars includes specifications of DOT-105, DOT-112, DOT-114, DOT-115, DOT-120, and DOT-211. Most of the rail tank cars (90 percent in 2021) in the Other Rail Tank Car category carrying any flammable liquids meet DOT-105, DOT-112, or DOT-120 specifications, which exceed the DOT-117 specification. Refer to Box A.

Figure 5. Fleet Composition of Rail Tank Cars Carrying Class 3 Flammable Liquids: 2019–2024



Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

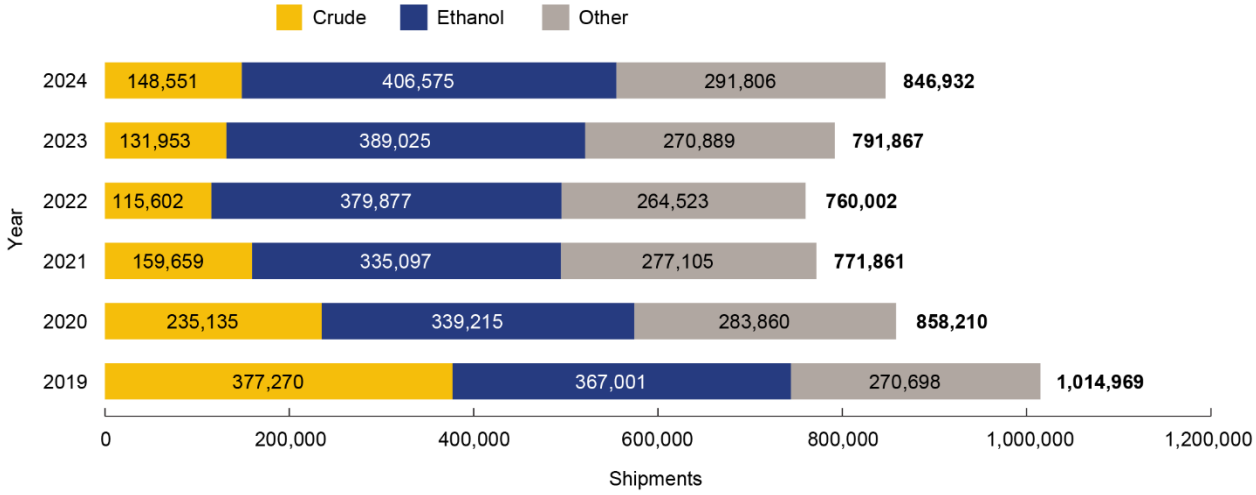


Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

The fleet of rail tank cars carries many shipments throughout the year. A shipment is defined as a carload movement that generates a waybill received from a rail customer, made by a single rail tank car from an origin to a destination. Any single rail tank car may carry one or many carloads in any given year. The total number of shipments, along with the mix of liquids needing transport, drives the active fleet size for the year. Demand is based on industry needs for Class 3 flammable liquid movements, primarily the crude oil and ethanol used for transportation, heating, and other essentials. Rail tank cars capable of carrying Class 3 flammable liquids are also capable of carrying other liquids. The following describes the number of shipments in each year from 2019 to 2024 by flammable liquid type (Figure 6):

- Shipments in 2024 increased from 2023, the second consecutive increase in shipments since 2019. The number of shipments increased 7.0 percent from 2023.
- Crude oil shipments increased in 2024, a 12.6-percent increase in shipments compared to 2023. This value is the second consecutive increase in crude oil shipments since 2019.
- Ethanol shipments were the highest since data collection began, with 406,575 shipments—an increase of 4.5 percent over 2023 shipments.
- From 2019 to 2024, fluctuations in the volume of shipments were attributable to fluctuations in crude oil and ethanol demand. The volume of shipments for crude oil varied from a high of 377,270 in 2019 to a low of 115,602 in 2022 and then increased to 148,551 in 2024. The volume of shipments for ethanol has steadily increased since 2021, from 335,097 in 2021 to 406,575 in 2024. The volume of shipments of other flammable liquids were comparably less variable and showed no discernable trend between 2019 and 2024.

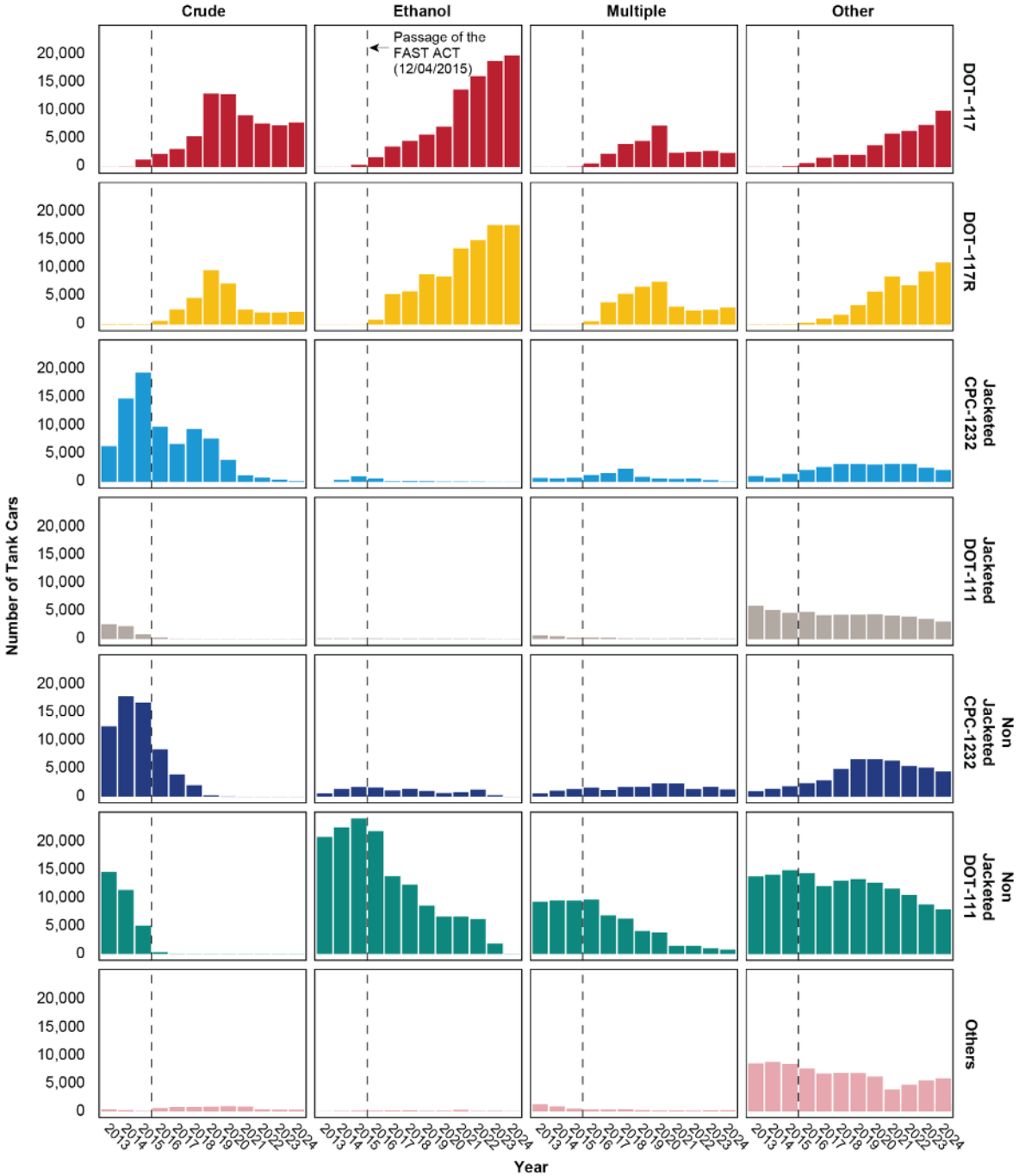
Figure 6. U.S. Shipments of Class 3 Flammable Liquids by Year and Fuel Type: 2019–2024



Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

Due to the length of the full FAST Act phase-out schedule, looking at the types of Class 3 flammable liquids rail tank car types carried is useful. The remainder of this report summarizes the specific types of rail tank cars carrying Class 3 flammable liquids between 2019 and 2024. Figure 7 shows a broader historical view of all the data from 2013 to the present report.

Figure 7. Trends in the Count of Rail Cars by Fuel Type and Type of Car: 2013–2024



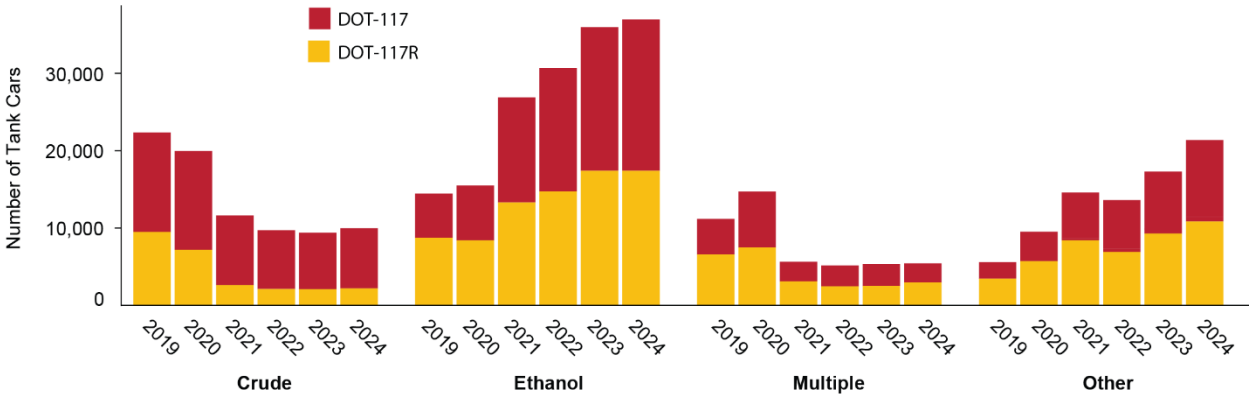
Note: The dashed lines indicate the passage of the FAST Act on December 4, 2015.
Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

1.3.2.1. DOT-117 Rail Tank Cars

DOT-117 rail tank cars are new or retrofitted tank cars that meet the technical and safety specifications finalized in the 2015 federal regulations. All rail tank cars carrying Class 3 flammable liquids are required to meet or exceed DOT-117 specifications at the end of the phase-out period in 2029. In 2015, fewer than 2,000 of these DOT-117 or DOT-117R rail tank cars were in use, but by 2024, 73,757 were in use carrying Class 3 flammable liquids as shown in Figure 8. Key findings include the following:

- DOT-117 and DOT-117R rail tank cars that carry Class 3 flammable liquids besides crude oil increased 8.8 percent from 2023 to 2024, from 58,627 to 63,774 rail tank cars.
- In 2024, the volume of crude oil shipments increased 12.6 percent from 2023 (Figure 6), and the number of DOT-117 rail tank cars (both new and retrofitted) carrying crude oil increased 3.1 percent.
- The percentage of new or retrofitted DOT-117 rail tank cars carrying crude among all DOT-117 rail tank cars in 2024 remained stable compared to 2023, at 13.5 percent in 2024 and 13.8 percent in 2023.

Figure 8. DOT-117 (New and Retrofit) Rail Tank Cars by Liquid Type: 2019–2024



Source: BTS. Data from the Railinc datasets Umler® [n.d.b] and TRAIN II® [n.d.a] on rail tank car and annualized rail tank car movements between 2013 and 2024.

1.3.2.2. CPC-1232 Rail Tank Cars (Jacketed and Non-Jacketed)

The number of CPC-1232 rail tank cars decreased from 10,204 in 2023 to 7,929 in 2024. Figure 7 details how many jacketed and non-jacketed CPC-1232 rail tank cars were used to transport Class 3 flammable liquids. Key findings include the following:

- The phase-out date for non-jacketed CPC-1232 rail tank cars carrying ethanol was July 2023. No non-jacketed CPC-1232 rail tank cars carried ethanol in 2024. The next phase-out for CPC-1232 rail tank cars carrying ethanol will be jacketed CPC-1232 rail tank cars on May 1, 2025.
- Jacketed CPC-1232 rail tank cars carrying crude oil decreased 68 percent, dropping from 407 rail tank cars in 2023 to 130 in 2024. Non-jacketed CPC-1232 rail tank cars have not carried crude oil since 2020. Jacketed CPC-1232 rail tank cars carrying crude oil will be phased-out by May 1, 2025.
- Most (98 percent) CPC-1232 rail tank cars carried multiple fluids or Class 3 flammable liquids other than crude oil and ethanol. Of all the CPC-1232 rail tank cars, slightly less than 2 percent carried crude oil, and less than 0.1 percent carried ethanol.

1.3.2.3. DOT-111 Rail Tank Cars (Jacketed and Non-Jacketed)

Mandated in HM-251 (Table 1), non-jacketed DOT-111 rail tank cars are prohibited from carrying crude oil as of January 1, 2018. Jacketed DOT-111 rail tank cars are also prohibited from carrying crude oil as of March 1, 2018. Both deadlines were met. Prior to 2018, non-jacketed DOT-111 rail tank cars carrying crude oil had a significant presence in the fleet of rail tank cars that carry Class 3 flammable liquids as seen in Figure 7. Figure 5 and Figure 7 show more detail for the jacketed DOT-111 rail tank cars. Key findings include the following:

- The phase-out dates for DOT-111 rail tank cars carrying crude oil were in 2018. All 11,779 DOT-111 rail tank cars used to carry Class 3 flammable liquids in 2024 were transporting a flammable liquid other than crude oil.
- The phase-out date of jacketed and non-jacketed DOT-111 rail tank cars for ethanol was May 1, 2023, and no DOT-111 rail tank cars carried ethanol in 2024.
- In 2024, 22.5 percent fewer DOT-111 rail tank cars, both jacketed and non-jacketed, were in use compared to 2023.
- The number of DOT-111 rail tank cars carrying other Class 3 flammable liquids steadily declined between 2013 and 2024, from 19,627 to 10,962 (Figure 7). DOT-111 rail tank cars carrying other Class 3 flammable liquids in packing group Ⅰ, both jacketed and non-jacketed, will be phased out May 1, 2025. The remainder of the DOT-111 rail tank car fleet carrying other Class 3 flammable liquids in packing groups Ⅱ and Ⅲ will be phased out May 1, 2029.

1.3.2.4. Other Rail Tank Car Types

Several other rail tank car types exceed the DOT-117 specifications and can carry Class 3 flammable liquids. However, they are notably few, representing just 7.6 percent of the flammable liquid–carrying fleet in 2024. Therefore, for analysis purposes, they are grouped together and include DOT-105, DOT-112, DOT-114, DOT-115, DOT-120, and DOT-211 rail tank cars. In 2024, 95.5 percent of these other rail tank cars were DOT-105, DOT-112, or DOT-120 cars. In 2024, the “other” category comprised 7,651 rail tank cars, a 2.6-percent increase from the 7,458 rail tank cars in 2023. As seen in Figure 7, the majority of “other” rail tank cars transported flammable liquids other than crude oil or ethanol (95.9 percent).

2. Anticipated Number of Rail Tank Cars Meeting New Safety Specifications (Section 7308(c))

2.1. DATA SOURCES

Section 7308(c) requires USDOT to estimate the anticipated number of DOT-117 and DOT-117R rail tank cars for each year through 2029 by collecting data from rail tank car shops that build or retrofit rail tank cars. This data-collection program gathered information from rail tank car retrofitting and manufacturing facilities on planned and projected numbers of rail tank cars to be retrofitted or manufactured in 2025. Any facility identified with the capacity to build new DOT-117 rail tank cars or modify rail tank cars to DOT-117R specifications, as described in Section 7308(c) of the FAST Act, is included in the voluntary data-collection plan. Because not all rail tank car shops or facilities are capable or certified to build or retrofit rail tank cars to DOT-117 or DOT-117R specifications, AAR and the Railway Supply Institute (RSI)[10] assisted BTS in identifying facilities with the capabilities and certifications to build or retrofit rail tank cars to these specifications. In 2025, 138 rail tank car shops or facilities were identified for this data collection. The data collected from this annual program are summarized in the next sections.

2.2. RESPONSES FROM FACILITIES

Responses from U.S.-owned and/or -operated rail tank car shops revealed the following:

- In 2025, 3,546 new rail tank cars are expected to be built (Figure 2) to DOT-117 specifications.
- In 2025, 890 existing rail tank cars are expected to be retrofitted (Figure 2) to DOT-117R specifictions.
- A total of 105 (76 percent) shops responded to the survey out of the 138 shops identified to have the ability to build or retrofit rail tank cars to DOT-117 specifications.

Due to fluctuations in the business environment and market conditions, it is challenging for the facilities to predict the exact numbers of new rail tank cars that will be built or retrofitted to meet DOT-117 specifications in the coming year.

The data collected from this program will not match future counts of rail tank car movements in the AAR databases for the following reasons:

- Rail tank car movements account for all rail tank cars carrying Class 3 flammable liquids that carried a shipment, regardless of when they were built or retrofitted to meet a different specification.
- Newly built or retrofitted rail tank cars may enter service at any point in the year and may not be used immediately.
- Facilities that build or retrofit rail tank cars for the North American market outside the United States and are not owned by an American company are not included in the data collection.

[10] RSI is a trade association representing rail tank car manufacturers and facilities performing repairs and maintenance.

BTS did not receive responses from 33 rail tank car shops that have the ability to build new DOT-117 rail tank cars or retrofit existing cars to DOT-117R specifications. The projections listed here do not include rail tank cars that may be built or retrofitted by these 33 rail tank car shops, resulting in an underestimation of DOT-117 and DOT-117R rail tank car projections.

3. Conclusions

In 2024, 101,116 rail tank cars transported Class 3 flammable liquids—a 0.2-percent increase from 2023. Shipments of flammable liquids were up 7.0 percent overall, and crude shipments alone were up by 12.6 percent compared to 2023. In 2024, DOT-117 rail tank cars comprised over half the Class 3 flammable liquid fleet at 73 percent. Among the fleet of rail tank cars that met DOT-117 specifications in 2024, 54.7 percent (40,369 rail tank cars) were made as new rail tank cars, and 45.3 percent (33,388 rail tank cars) were retrofitted to DOT-117R specifications. In 2024, 67.8 percent of DOT-117 rail tank cars carried either crude oil or ethanol, and 58.6 percent of DOT-117R rail tank cars carried either crude oil or ethanol. Based on responses to the data collection, 105 responding shops plan to build or modify 4,436 rail tank cars during 2025 to meet DOT-117 or DOT-117R specifications.

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Appendix A. Rail Tank Car Movement Data Supporting This Report

Table 2 summarizes the rail tank car movement data used in this report.

Table 2. Summary of Rail Tank Car Movement Data

Fluid type	Rail tank car type	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Crude	DOT-117	0	84	1,303	2,925	5,788	10,040	22,349	19,959	11,625	9,718	9,386	9,983
Crude	Jacketed DOT-111	2,667	2,286	898	295	51	29	0	0	0	0	0	0
Crude	Non-jacketed DOT-111	14,388	11,230	4,980	302	5	0	0	0	0	0	0	0
Crude	Jacketed CPC-1232	6,252	14,589	19,150	9,659	6,658	9,208	7,580	3,832	1,154	738	407	130
Crude	Non-jacketed CPC-1232	12,266	17,534	16,470	8,258	3,899	1,979	208	27	0	0	0	0
Crude	Others	362	205	46	611	733	734	792	885	806	331	296	297
Ethanol	DOT-117	0	3	411	2,493	8,884	10,375	14,459	15,483	26,882	30,683	35,992	36,958
Ethanol	Jacketed DOT-111	143	147	152	149	103	102	109	102	94	80	20	0
Ethanol	Non-jacketed DOT-111	20,494	22,163	23,762	2,1477	13,643	12,146	8,480	6,541	6,531	6,122	1,835	0
Ethanol	Jacketed CPC-1232	0	336	957	586	123	164	142	87	72	49	19	18
Ethanol	Non-jacketed CPC-1232	507	1,334	1,709	1,570	1,069	1,378	986	626	776	1,210	224	0
Ethanol	Others	4	34	112	105	139	160	68	93	263	53	65	15
Multiple-service FL	DOT-117	0	2	34	1,190	6,187	9,409	11,171	14,728	5,629	5,143	5,337	5,435
Multiple-service FL	Jacketed DOT-111	700	518	280	305	254	174	149	113	150	171	105	83
Multiple-service FL	Non-jacketed DOT-111	9,141	9,360	9,321	9,516	6,757	6,185	4,023	3,722	1,407	1,392	971	734
Multiple-service FL	Jacketed CPC-1232	689	591	716	1,190	1,515	2,257	873	566	503	567	272	87
Multiple-service FL	Non-jacketed CPC-1232	509	1,044	1,299	1,562	1,170	1,696	1,719	2,280	2,259	1,309	1,721	1,219
Multiple-service FL	Others	1,249	855	453	324	315	380	232	117	146	106	162	185
Other FL*	DOT-117	0	14	139	974	2,627	3,845	5,582	9,516	14,588	13,612	17,298	21,381
Other FL	Jacketed DOT-111	5,870	5,151	4,627	4,785	4,202	4,269	4,295	4,381	4,156	3,958	3,543	3,079
Other FL	Non-jacketed DOT-111	13,575	13,864	14,697	14,153	11,914	12,813	13,092	12,476	11,478	10,397	8,720	7,883
Other FL	Jacketed CPC-1232	988	701	1,436	2,063	2,596	3,100	3,128	2,996	3,146	3,159	2,465	2,050
Other FL	Non-jacketed CPC-1232	963	1,361	1,806	2,344	2,834	4,862	6,554	6,559	6,341	5,452	5,096	4,425
Other FL	Others	8,383	8,653	8,287	7,499	6,626	6,710	6,694	6,088	5,306	6,143	6,935	7,154

FL = flammable liquid.

Appendix B. Annual Rail Tank Car Facilities Data-Collection Methodology

DATA SOURCES

Section 7308(c) requires USDOT to estimate the anticipated number of DOT-117 and DOT-117R rail tank cars for each year through 2029 by collecting data from rail tank car shops that build or retrofit rail tank cars. This data-collection program collects information from rail tank car retrofitting and manufacturing facilities on planned and projected numbers of rail tank cars retrofitted to DOT-117R specifications or manufactured to DOT-117 specifications in 2025. Any facility identified with the capacity to build new DOT-117 rail tank cars or modify existing rail tank cars to DOT-117R specifications, as described in Section 7308(c) of the FAST Act, was included in the voluntary data collection. Because not all rail tank car shops or facilities can or are certified to build or retrofit rail tank cars to the DOT-117 or DOT-117R specifications, AAR and RSI assisted BTS in identifying facilities with the capabilities and certifications to build or retrofit rail tank cars to the DOT-117 specification. AAR certifies the rail tank car shops to build and/or retrofit rail tank cars to the DOT-117 specification. The data collected from this effort are summarized in this report.

METHODOLOGY

The 2025 Tank Car Survey, conducted from May to August 2025, included U.S.-owned or -operated facilities, known as rail tank car shops, with the capability to retrofit and/or manufacture rail tank cars to DOT-117 specifications. In total, 138 rail tank car shops were identified and asked to respond to this voluntary questionnaire.

Rail tank car shops were contacted by U.S. mail. Follow-up calls and emails were made to nonrespondents. Respondents were asked to provide the number of DOT-117 rail tank cars they expected to build in 2025 as well as the number of rail tank cars to be retrofit to DOT-117R specifications from a previous rail tank car specification type (e.g., DOT-111).[11] For more information on the specifications, refer to Box B. As in the past, all information is collected with the assurance of confidentiality of the reported information. The information collected from this program is protected by the Confidential Information Protection and Statistical Efficiency Act of 2002; therefore, only aggregate statistics are provided in this report to ensure the confidentiality of individual participants and responses.

The data collected from this program will not match future counts of rail tank car movements in the AAR databases. Rail tank car movements account for all rail tank cars that carried a Class 3 flammable liquid shipment, regardless of when they were built or retrofitted to meet a different specification. Newly built or retrofitted cars may enter service at any point and may or may not enter service for that year. Furthermore, facilities outside the United States but in North America and not owned by an American company are not included in the data collection.

[11] Per the FAST Act, Section 7308(c): “The Secretary shall conduct a survey of tank car facilities modifying tank cars to the DOT-117R specification, or equivalent, or building new tank cars to the DOT–117 specification, or equivalent, to generate statistically- valid estimates of the anticipated number of tank cars those facilities expect to modify to DOT–117R specification, or equivalent, or build to the DOT–117 specification, or equivalent” [Public Law 114–94].

Responses to this voluntary data collection were obtained from 105 out of 138 identified facilities, or 76 percent. Because 33 rail tank car shops did not respond, these projections of newly built DOT-117 rail tank cars and retrofits to DOT-117R specifications underestimate the total projected numbers. Discerning the effects of nonresponses in this data collection is difficult given the variation in business operations of rail tank car shops and the lack of auxiliary information to gauge that extent. The rail tank car shops included in this data collection are varied in their capabilities as well as their industry reach geographically, across different modes of transport, and through supply-chain control. Some shops are part of larger corporations and others are standalone entities. Of the 138 facilities BTS surveyed, 81 percent of the respondents are part of corporations with two or more railcar shops. Of the 112 shops that are part of corporations with two or more locations, 82 percent reported. Of the 26 shops that are part of corporations with no more than one railcar location, 50 percent reported. Some rail tank car shops focus solely on repairs and retrofits with certifications from AAR to do that work, while others have the AAR-certified capability to build brand new cars.

The numbers reported in BTS' data-collection program are not equivalent to the actual numbers of new and retrofitted rail tank cars entering service. In the 7 years of data available (2018–2025), the numbers of DOT-117 rail tank cars built exceeded projections by 43, 36, and 55 percent for the first 3 years, while falling 5, 13, 11, and 38 percent below projections in 2021, 2022, 2023, and 2024. A comparison of actual retrofit DOT-117R cars and projections from this program shows both under and over performing projections with no discernable pattern.