

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



HWY23FH014

SAFETY RESEARCH GROUP (RE-10)

Specialist's Data Report
May 3, 2024

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A CRASH

Location: Philadelphia, Pennsylvania
Date: June 11, 2023
Time: 6:17 a.m. Eastern Daylight Time

B SAFETY RESEARCH GROUP (RE-10)

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C SUMMARY

Please refer to the Crash Incident and Summary Report, which is available in the docket for this crash.

D DATA REQUEST

In July 2023, the NTSB Office of Highway Safety (OHS) requested data in support of its investigation of a combination vehicle fire and Interstate 95 (I-95) overpass collapse that occurred in Philadelphia, Pennsylvania, on June 11, 2023. The combination vehicle, a truck-tractor in combination with a tank-trailer, hauling about 8,500 gallons of gasoline overturned and caught fire, causing the northbound lanes of I-95 to collapse and significantly damaging the southbound lanes. Specifically, OHS requested data on the frequency of crashes involving truck-tractors operating in combination with cargo tank-trailers, as well as the number of these fatal crashes that also involved rollovers and fires.

E DATA SOURCES EVALUATED

Fatality Analysis Reporting System

The National Highway Traffic Safety Administration (NHTSA) manages the Fatality Analysis Reporting System (FARS), which contains data on motor vehicle traffic

crashes involving a fatal injury.¹ This report examines published FARS data for the years 2017-2021.

F METHODOLOGY

FARS data were analyzed to determine the frequency of fatal crashes involving specified truck-tractor and crash characteristics. Analyses focused on vehicles that were listed as truck-tractors involved in fatal motor vehicle crashes. This population of truck-tractors was further broken down to examine truck-tractors that were operating in combination with a cargo tank body type. Additionally, the number of truck-tractors in combination with a cargo tank-trailer was also examined by hazardous material class number. The prevalence of these vehicles in rollover crashes, fires, and rollover crashes with fires was calculated. Annual frequencies of these events were identified for the years 2017-2021.

G RESULTS

Table 1 shows the total number of truck-tractors that were involved in fatal crashes between 2017 and 2021. The 5-year average for the number of truck-tractors involved in fatal crashes was 2,771. The table further breaks down the number of truck-tractors involved in fatal crashes where a rollover or a fire also occurred. Over the 5-year period, an average of 300 truck-tractors experienced a rollover and an average of 201 truck-tractors experienced a fire in fatal crashes annually.

Table 1. Truck-tractors involved in all fatal crashes and occurrence of rollovers and fires, 2017-2021.

Vehicle/Crash Characteristic	Year					5-Year Total	5-Year Average ^a
	2017	2018	2019	2020	2021	2017-2021	2017-2021
Truck-Tractors in Fatal Crashes	2,743	2,700	2,756	2,566	3,091	13,856	2,771
Truck-Tractor Rollovers in Fatal Crashes	305	290	282	261	361	1,499	300
Truck-Tractor Fires in Fatal Crashes	202	214	211	172	204	1,003	201

^a The 5-year average numbers listed in this column have been rounded to the nearest whole number.

Figure 1 displays the total number of truck-tractors that were involved in fatal crashes for the years 2017-2021, as well as the number of these truck-tractors that experienced a rollover or a fire during those crashes. The number of truck-tractors involved in crashes has remained relatively consistent, with a dip occurring in 2020 and a subsequent increase in 2021. Over the 5 years of data about 10.8% of truck-

¹ For more information, see NHTSA's "[Fatality Analysis Reporting System \(FARS\)](#)" webpage.

tractors involved in a fatal crash had a rollover (1,499 out of 13,856) and about 7.2% had a reported vehicle fire (1,003 out of 13,856).

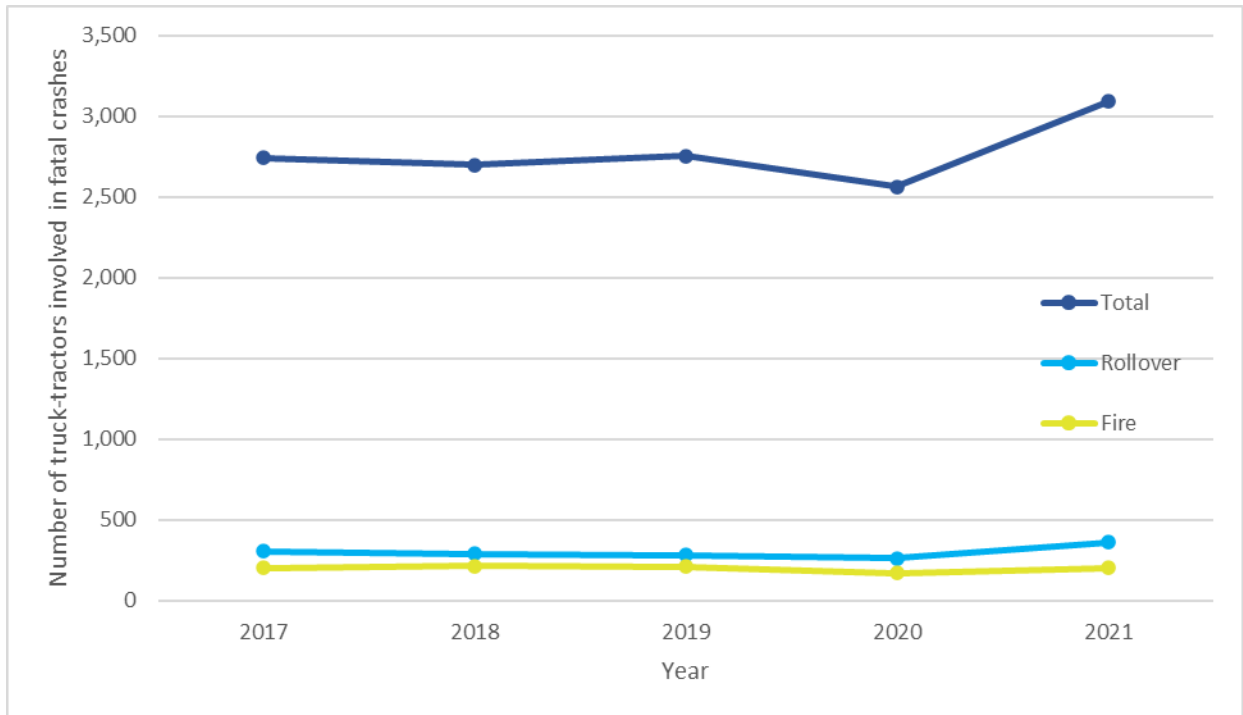


Figure 1. Truck-tractors involved in all fatal crashes and occurrence of rollovers and fires, 2017-2021.

Table 2 further analyzed the number of truck-tractors in combination with a cargo tank-trailer involved in fatal crashes. The table provides the occurrences of fires, rollovers, and rollovers with fires for these vehicles. It also further examines the subset of these vehicles designated as carrying Class 3 hazardous materials (defined as carrying flammable/combustible liquid). The highest annual number of vehicles involved in each of these crash categories occurred in 2021. However, there was no discernable trend in crash frequencies over this 5-year period.

Table 2. Truck-tractors in combination with a cargo tank-trailer involved in all fatal crashes and fatal crashes with specific crash characteristics, 2017-2021.

Vehicle/Crash Characteristic	Year					5-Year Total	5-Year Average ^a
	2017	2018	2019	2020	2021	2017-2021	2017-2021
Truck-Tractors in Combination with a Cargo Tank-Trailer in Fatal Crashes	304	309	298	219	336	1,466	293
Truck-Tractors in Combination with a Cargo Tank-Trailer Rollovers in a Fatal Crash	58	47	49	41	62	257	51
Truck-Tractors in Combination with Cargo Tank-Trailer Fires in a Fatal Crash	23	29	29	17	34	132	26
Truck-Tractors in Combination with a Cargo Tank-Trailer Rollover and Fire in a Fatal Crash	6	11	7	9	12	45	9
Truck-Tractors in Combination with a Cargo Tank-Trailer Carrying Hazmat Class 3 Materials Rollover and Fire in a Fatal Crash	1	5	2	5	6	21	4

^a The 5-year average numbers listed in this column have been rounded to the nearest whole number.

Table 3 displays the number of truck-tractors in combination with a cargo tank-trailer with a rollover and fire in a fatal crash by hazardous material class. The hazardous material classes were collapsed into the following categories: non-hazmat, flammable/combustible liquid (Class 3), and other hazardous materials (all other hazardous material classes). As expected, truck-tractors in combination with cargo tank-trailers that were not carrying hazardous materials had the lowest probability of a fire occurring after a rollover (11.8% of these vehicles had a fire following a rollover). Fires were most common after a rollover in truck-tractors in combination with cargo tank-trailers carrying Class 3 hazardous materials, with fires occurring in 30.6% of rollovers in a fatal crash. The odds ratio of a fire occurring after a rollover when Class 3 hazardous materials were being carried compared to non-hazardous materials was 3.32.² This can be interpreted as the odds of a fire occurring after a rollover involving a truck-tractor in combination with a cargo tank-trailer carrying Class 3 hazardous materials being more than three times greater than for a truck-tractor in combination with a cargo tank-trailer carrying non-hazardous materials.

² The *p*-value was less than 0.01. The *p* value can be interpreted as the percent likelihood that the observed value occurred by chance. Generally, any value less than 0.05 is considered statistically significant.

Table 3. Fire occurrence frequencies by hazardous material category for truck-tractors in combination with cargo tank-trailers involved in fatal crashes, 2017-2021.

Hazardous Materials Categories	Fire Occurrence Following a Rollover			
	Fire	No Fire	Total	Percent Resulting in Fire
Non-Hazmat	18	135	153	11.8%
Flammable/Combustible Liquid (Class 3)	19	43	62	30.6%
Other Hazardous Materials	8	34	42	19.0%

Submitted by:

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