

Large Truck Crash Causation Study Summary Tables

The Large Truck Crash Causation Study (LTCCS) is based on a three-year data collection project conducted by the Federal Motor Carrier Safety Administration (FMCSA) and the National Highway Traffic Safety Administration (NHTSA) of the United States Department of Transportation (DOT). LTCCS is the first-ever national study to attempt to determine the critical events and associated factors that contribute to serious large truck crashes so agencies within DOT and others can implement effective countermeasures to reduce the occurrence and severity of these crashes. The study is now available on the web at: <http://www.ai.fmcsa.dot.gov/LTCCS>.

For further information about the study please see the [Study Methodology](#) and database [User's Manual](#) available on the web.

To provide a brief introduction to the study results we have provided the following summary tables, which provide a high level overview of the study results. The tables have been organized into two categories representing “Un-weighted” and “Weighted” results, with the specifics detailed below.

Throughout the study materials and the website summary tables, "truck" refers to a vehicle designed, used, or maintained primarily for carrying property, with a gross vehicle weight rating or gross combination weight rating of more than 10,000 lbs.

Unweighted Data

The tables in the “Un-weighted Data” section provide the actual study results for the table’s subject area.

Table 1 - Crashes by Vehicle Count

This table shows the number of crashes in the study sample cases by the total number of vehicles involved in each crash. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Vehicle Count	Crash Count	Percentage
One	241	25%
Two	488	51%
Three or More	234	24%
Total	963	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 2 - Crashes by Severity Level

This table shows the number of crashes in the study sample cases by the highest injury severity level of any individual involved in the crash. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Crash Severity	Crash Count	Percentage
K – Fatal	221	23%
A – Incapacitating injury	277	29%
B – Non-incapacitating injury	465	48%
Total	963	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 3 - Crashes by Roadway Type

This table shows the number of crashes in the study sample cases by type of roadway on which the crash occurred. For crashes involving multiple roadway types, e.g. intersections, the roadway type is determined from the perspective of the vehicle associated with the critical reason for the crash. The critical reason is the reason for the critical event. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Roadway Type	Crash Count	Percentage
Rural	350	36%
Principal arterial – Interstate	109	11%
Principal arterial – other	78	8%
Minor arterial	62	6%
Major collector	26	3%
Minor collector	31	3%
Local	37	4%
Unknown	7	1%
Urban	609	63%
Principal arterial – Interstate	344	36%
Principal arterial – Freeways and Expressways	63	7%
Principal arterial – other	78	8%
Minor arterial	44	5%
Collector	22	2%
Local	58	6%
Unknown	4	0%
Total	963	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 4 - Crashes by Crash Type

This table shows the number of crashes in the study sample cases by crash type, e.g. rear-end, head-on, etc. Crash type is determined from the perspective of the truck. The crash type of crashes involving two or more trucks is determined from the perspective of the truck assigned the critical reason. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Crash Type	Crash Count	Percentage
Rear – end	231	24%
Roadside Departure	158	16%
Sideswipe, Same Direction	111	12%
Turn Across or Into Path	94	10%
Intersecting Vehicles, Straight	64	7%
Rollover	61	6%
Hit Object in Road	43	5%
Sideswipe, Opposite Direction	42	4%
Head-On	34	4%
No Impact – includes incidents such as fire or immersion	12	1%
Backing	7	1%
Other – principally trucks not involved in first harmful event, or cargo spills	106	11%
Total	963	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 5 – All Trucks by Vehicle Configuration

This table shows the number of trucks in the study sample cases grouped by truck configuration. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Vehicle Configuration	Number	Percentage
Single Unit Trucks		
Two Axles	124	11%
Three Axles or more	157	14%
Axles Unknown	2	0%
Combination Trucks		
Truck Tractor – Bobtail	29	3%
Truck pulling Trailer(s)	40	4%
Tractor pulling Trailer	697	62%
Tractor pulling Two Trailers	54	5%
Other/Unknown/Missing		
Other/Unknown/Missing	20	2%
Total	1123	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 6 – All Trucks by Cargo Body Type

This table shows the number of trucks in the study sample cases by type of truck cargo body. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Cargo Body Type	Number	Percentage
Van	515	46%
Closed van	383	34%
Refrigerated van	105	9%
Open top van	27	2%
Dump	184	16%
Dump (rear)	164	15%
Bottom dump/hopper bottom	20	2%
Flatbed	163	15%
Flatbed	122	11%
Flatbed with sides	21	2%
Low boy	11	1%
Flatbed with equipment	9	1%
Tank	71	6%
Tank-liquid	56	5%
Tank-dry bulk	14	1%
Tank-compressed gas	1	0%
Other	190	17%
Garbage/refuse	44	4%
Cement mixer	24	2%
Pole/logging	12	1%
Auto carrier	6	1%
Livestock carrier	5	0%
Other – includes tow trucks, etc.	49	4%
Bobtail Unit – no cargo body	28	3%
Not Inspected/Unknown	22	2%
Total	1123	100%

Source: Large Truck Crash Causation Study – Un-weighted data

Table 7 – All Trucks by Pre-Crash Movement

This table shows the number of trucks in the study sample cases by pre-crash movement of each truck. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Pre-Crash Movement	Number	Percentage
Traveling in Lane	803	72%
Going Straight at steady speed	609	54%
Stopped in traffic lane	109	10%
Decelerating in traffic lane	59	5%
Accelerating in traffic lane	19	2%
Starting in traffic lane	7	1%
Negotiating a Curve	168	15%
Turning	35	3%
Turning left	19	2%
Turning right	15	1%
Making a U-turn	1	0%
Other	117	10%
Successful avoidance maneuver to a previous critical event	40	4%
Changing lanes	33	3%
Passing or overtaking another vehicle	12	1%
Merging	7	1%
Backing up (other than for parking position)	6	1%
Disabled or parked in travel lane	1	0%
No driver present ¹	11	1%
Other	6	1%
Unknown	1	0%
Total	1123	100%

Notes:

¹ Examples of "No driver present" include: 1) A driver outside his disabled truck which was then struck from behind, 2) A driver outside his truck which had previously suffered a rollover and was then struck in the undercarriage by a passenger vehicle, 3) A driverless truck being towed counted as one of the vehicles in the crash.

Source: Large Truck Crash Causation Study – Un-weighted data

Table 8 – All Trucks by Critical Pre-Crash Event

This table shows the number of trucks in the study sample cases by critical pre-crash event. The critical pre-crash event is the event which made the crash unavoidable. Percentages are rounded to the nearest whole number with values less than .5 percent rounded to zero.

Critical Pre-Crash Event	Number	Percentage
Vehicle Loss-of-Control Due to:	145	13%
Blow out/flat tire	7	1%
Disabling vehicle failure (e.g. wheel fell off)	7	1%
Non-disabling vehicle problem (e.g. hood flew up)	5	0%
Poor road conditions (Puddle, pot hole, ice, etc.)	5	0%
Traveling too fast for conditions	86	8%
Jackknife Event	12	1%
Cargo Shift	13	1%
Other cause of control loss	10	1%
Vehicle Traveling:	239	21%
Over the lane line on left side of travel lane	43	4%
Over the lane line on right side of travel lane	30	3%
Off the edge of the road on the left side	28	3%
Off the edge of the road on the right side	60	5%
End departure	1	0%
Turning left at intersection	28	3%
Turning right at intersection	19	2%
Crossing over (passing through) intersection	26	2%
This vehicle decelerating	4	0%
Other Motor Vehicle in Lane:	283	25%
Other vehicle stopped	68	6%
Traveling in same direction with low steady speed	29	3%
Traveling in same direction while decelerating	49	4%
Traveling in same direction with higher speed	123	11%
Traveling in opposite direction	13	1%
In crossover	1	0%
Other Motor Vehicle Encroaching into Lane From:	233	21%
Adjacent lane (same direction) over left lane line	43	4%
Adjacent lane (same direction) over right lane line	53	5%
Opposite direction – over left lane line	70	6%
Opposite direction – over right lane line	1	0%
Crossing street, turning into same direction	1	0%
Crossing street, across path	46	4%
Crossing street, turning into opposite direction	15	1%
Driveway, turning into same direction	1	0%
Driveway, across path	1	0%
Driveway, turning into opposite direction	2	0%
Pedestrian, Pedalcyclist, or other NonMotorist:	31	3%

Critical Pre-Crash Event	Number	Percentage
Pedestrian in roadway	24	2%
Pedestrian approaching roadway	1	0%
Pedalcyclist or other nonmotorist in roadway	6	1%
Object or Animal:	5	0%
Animal in roadway	1	0%
Object in roadway	4	0%
Other:	187	17%
Not involved first harmful event ¹	163	15%
Other	24	2%
Total	1123	100%

Notes:

¹ Cases categorized as "Not involved first harmful event" are those in which the truck was not involved in the first harmful event in the crash sequence. The term First Harmful Event refers to the first event of the crash to cause damage or injury.

Source: Large Truck Crash Causation Study – Un-weighted data

Weighted Data

During the three-year study period of the project, FMCSA estimated that there were approximately 141,000 large trucks involved in fatal, incapacitating, and non-incapacitating injury crashes. Each of the 963 LTCCS study cases was assigned a sampling weight (based on the probability of selection into the sample for the site associated with the case) that allows for national estimates of total truck crashes, broken down by various characteristics for these 141,000 trucks.

The summary tables in the following section illustrate the weighted results for the subject areas presented. The estimates presented may differ from true values because they are based on a probability sample of crashes and not a census of all crashes. The size of these differences may vary depending on which sample of the crashes is the focus of each particular table and analysis.

Table 9 - All Trucks by Crash Type

This table gives the weighted number of vehicles in study sample cases by crash configuration. In determining crash configuration crashes are first categorized by *Vehicle Count* – one vehicle, two vehicles, or three or more vehicles.

The term *Passenger Vehicle* refers to automobiles, pickup trucks, vans, and sport utility vehicles. The term *Other* includes buses, motorcycles, and construction equipment other than trucks. For crashes involving three or more vehicles, the crash configurations are determined by the first two vehicles to collide.

Crash Configuration *Other* includes all trucks not involved in the initial collision. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Vehicle Count	Crash Configuration	Number	Percentage
1	Truck Only	38,000	27%
2	Truck-Passenger Vehicle	50,000	35%
2	Truck-Truck	14,000	10%
2	Truck-Other Vehicle	1,000	1%
3+	Truck-Passenger Vehicle	15,000	11%
3+	Truck-Truck	8,000	6%
3+	Truck-Other Vehicle	***	0%
3+	Other	15,000	11%
Total		141,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 10 - All Trucks by Driver Age

This table shows the estimated number of trucks involved in study sample cases nationwide by age of driver. All numbers for weighted data are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Age Category	Number	Percentage
16 – 20	1,000	1%
21 – 24	6,000	4%
25 – 29	13,000	9%
30 – 34	17,000	12%
35 – 39	19,000	14%
40 – 44	19,000	13%
45 – 49	26,000	19%
50 – 54	17,000	12%
55 – 59	9,000	7%
60 – 64	5,000	3%
65 – 69	4,000	3%
Seventy or Older	1,000	1%
Age Unknown	4,000	3%
Total	141,000	100%

Source: Large Truck Crash Causation Study – Weighted data

Table 11 - All Trucks by Critical Pre-Crash Event

This table shows the estimated number of trucks involved in crashes nation-wide. Counts of trucks are organized by the critical pre-crash event. The critical pre-crash event is the event which made the crash unavoidable. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Pre-Crash Event	Number	Percentage
Vehicle Loss-of-Control Due to:	22,000	16%
Blow out/flat tire, (specify blow out/flat, location/make)	1,000	1%
Disabling vehicle failure (e.g., wheel fell off)	1,000	1%
Non-disabling vehicle problem (e.g., hood flew up)	***	0%
Poor road conditions (Puddle, pot hole, ice, etc.)	***	0%
Traveling too fast for conditions	14,000	10%
Jackknife Event	1,000	1%
Cargo Shift	2,000	2%
Other cause of control loss	1,000	1%
Vehicle Traveling:	35,000	25%
Over the lane line on left side of travel lane	5,000	4%
Over the lane line on right side of travel lane	5,000	4%
Off the edge of the road on the left side	6,000	4%
Off the edge of the road on the right side	9,000	7%
End departure	***	0%
Turning left at intersection	3,000	2%
Turning right at intersection	2,000	1%
Crossing over (passing through) intersection	5,000	4%
This vehicle decelerating	1,000	0%
Other Motor Vehicle in Lane:	35,000	25%
Other vehicle stopped	8,000	6%
Traveling in same direction with low steady speed	3,000	2%
Traveling in same direction while decelerating	6,000	4%
Traveling in same direction with higher speed	13,000	9%
Traveling in opposite direction	4,000	3%
In crossover	***	0%
Other Motor Vehicle Encroaching into Lane From:	24,000	17%
Adjacent lane (same direction) – over left lane line	5,000	4%
Adjacent lane (same direction) – over right lane line	7,000	5%
Opposite direction – over left lane line	6,000	4%
Opposite direction – over right lane line	***	0%
Crossing street, turning into same direction	***	0%
Crossing street, across path	4,000	3%
Crossing street, turning into opposite direction	2,000	1%
Driveway, turning into same direction	***	0%

Critical Pre-Crash Event	Number	Percentage
Driveway, across path	***	0%
Driveway, turning into opposite direction	***	0%
Pedestrian, Pedalcyclist, or other NonMotorist:	2,000	2%
Pedestrian in roadway	1,000	1%
Pedestrian approaching roadway	***	0%
Pedalcyclist or other nonmotorist in roadway	1,000	0%
Object or Animal:	1,000	1%
Animal in roadway	***	0%
Object in roadway	1,000	0%
Other:	22,000	15%
Not involved first harmful event ¹	20,000	14%
Other	2,000	1%
Total	141,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

¹ Cases categorized as “Not involved first harmful event” are those in which the truck was not involved in the first harmful event in the crash sequence. The term First Harmful Event refers to the first event of the crash to cause damage or injury.

Source: Large Truck Crash Causation Study – Weighted data

Table 12 - All Trucks by Critical Pre-Crash Event – Trucks Assigned Critical Reason

This table shows the estimated number of trucks involved in crashes nation-wide, in which the truck was assigned the critical reason for the crash. Counts of trucks are organized by the critical pre-crash event. The critical pre-crash event is the event which made the crash unavoidable. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Pre-Crash Event	Number	Percentage
Vehicle Loss-of-Control Due to:	22,000	28%
Blow out/flat tire, (specify blow out/flat, location/make)	1,000	1%
Disabling vehicle failure (e.g., wheel fell off)	1,000	2%
Non-disabling vehicle problem (e.g. hood flew up)	***	0%
Poor road conditions (Puddle, pot hole, ice, etc.)	***	0%
Traveling too fast for conditions	14,000	18%
Jackknife Event	1,000	2%
Cargo Shift	2,000	3%
Other cause of control loss	1,000	2%
Vehicle Traveling:	33,000	43%
Over the lane line on left side of travel lane	5,000	7%
Over the lane line on right side of travel lane	5,000	6%
Off the edge of the road on the left side	6,000	7%
Off the edge of the road on the right side	9,000	12%
End departure	***	0%
Turning left at intersection	2,000	3%
Turning right at intersection	1,000	1%
Crossing over (passing through) intersection	5,000	6%
This vehicle decelerating	***	0%
Other Motor Vehicle in Lane:	17,000	22%
Other vehicle stopped	8,000	11%
Traveling in same direction with low steady speed	3,000	4%
Traveling in same direction while decelerating	5,000	7%
Traveling in same direction with higher speed	***	0%
Traveling in opposite direction	***	0%
Other Motor Vehicle Encroaching into Lane From:	1,000	1%
Adjacent lane (same direction) – over left lane line	1,000	1%
Adjacent lane (same direction) – over right lane line	***	0%
Crossing street, across path	***	0%
Crossing street, turning into opposite direction	***	0%
Driveway, turning into opposite direction	***	0%
Pedestrian, Pedalcyclist, or other NonMotorist:	1,000	2%
Pedestrian in roadway	1,000	1%

Critical Pre-Crash Event	Number	Percentage
Pedalcyclist or other nonmotorist in roadway	1,000	1%
Object or Animal:	1,000	1%
Animal in roadway	***	0%
Object in roadway	1,000	1%
Other:	2,000	3%
Not involved first harmful event ¹	***	1%
Other	2,000	2%
Total	78,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

¹ Cases categorized as “Not involved first harmful event” are those in which the truck was not involved in the first harmful event in the crash sequence. The term First Harmful Event refers to the first damage or injury-producing event in the crash.

Source: Large Truck Crash Causation Study – Weighted data

Table 13 - All Trucks by Critical Reason

This table shows the estimated number of trucks involved in crashes nation-wide, in which the truck was assigned the critical reason for the crash. Counts of trucks are organized by critical reason. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Reason	Number	Percentage
Physical Driver Factor	9,000	12%
Sleep, that is, actually asleep	5,000	7%
Heart attack or other physical impairment of ability to act	3,000	4%
Other critical non-performance	***	0%
Unknown critical non-performance	***	1%
Driver Recognition Factor	22,000	29%
Inattention (i.e. daydreaming)	5,000	6%
Internal distraction	3,000	3%
External distraction	2,000	3%
Inadequate surveillance	9,000	12%
Unknown recognition error	4,000	5%
Driver Decision Factor	30,000	38%
Too fast for conditions to be able to respond to unexpected actions of other road users	7,000	9%
Misjudgment of gap or other's speed	2,000	3%
Following too closely to respond to unexpected actions	3,000	4%
False assumption of other road user's actions	1,000	2%
Illegal maneuver	4,000	5%
Inadequate evasive action, e.g. braking only, not braking and Steering	1,000	1%
Aggressive driving behavior	1,000	1%
Too fast for curve/turn	9,000	12%
Other Decision Factors	1,000	1%
Unknown decision error	***	0%
Driver Performance Factor	4,000	6%
Panic/Freezing	***	0%
Overcompensation	2,000	3%
Poor directional control, e.g. failing to control vehicle with skill ordinarily expected	2,000	3%
Unknown Driver Error	3,000	4%
Vehicle Related Factor	8,000	10%
Tires/wheels failed	1,000	1%
Brakes failed	1,000	1%
Steering failed	***	0%

Critical Reason	Number	Percentage
Cargo shifted	3,000	4%
Trailer attachment failed	***	0%
Suspension failed	1,000	1%
Body, doors, hood failed	***	0%
Degraded braking capability	2,000	3%
Transmission/engine failure	***	0%
Other vehicle failure	***	0%
Environment – Highway	2,000	2%
Signs/signals missing	1,000	1%
Road design – roadway geometry (e.g. ramp curvature)	***	0%
Road design – Other	***	1%
Slick roads (low friction road surface due to ice, loose debris, any other cause)	***	1%
Environment – Weather	***	0%
Fog	***	0%
Wind gust	***	0%
Glare	***	0%
Unknown reason for critical event	***	0%
Total	78,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 14 - All Trucks by Associated Factors

This table shows the estimated number of trucks involved in crashes nation-wide by specific factors associated with the particular crash in which that truck was involved. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Associated Factor	Number	Percentage
Driver		
Prescription Drug Use	37,000	26%
Traveling Too Fast For Conditions	33,000	23%
Unfamiliar with Roadway	31,000	22%
Over-the-Counter Drug Use	25,000	18%
Inadequate Surveillance	20,000	14%
Fatigue	18,000	13%
Illegal Maneuver	13,000	9%
Inattention	12,000	9%
Exterior Distraction	11,000	8%
Inadequate Evasive Action	9,000	7%
Aggressive Driving Behavior	9,000	7%
Unfamiliar with Vehicle	9,000	7%
Following Too Closely	7,000	5%
False Assumption of Others' Actions	7,000	5%
Under Pressure to Accept Additional Loads	6,000	4%
Conversation	5,000	4%
Under Pressure to Operate Even If Fatigued	4,000	3%
Misjudgment of Gap Distance	4,000	3%
In a Hurry Prior to Crash	4,000	3%
Illness	4,000	3%
Interior Distraction	3,000	2%
Illegal Drug Use	3,000	2%
Uncomfortable with Some Aspect of Vehicle or Load	4,000	3%
Self Induced Legal Work Pressure	3,000	2%
Required to Accept Short Notice Trips	3,000	2%
Work Schedule Pressure	3,000	2%
Upset Prior to Crash	3,000	2%
Alcohol Use	1,000	1%
Other Decision Factors – includes proceeding with obstructed view, stopping when not required to, and failing to yield, as well as others	13,000	9%
Other Physical Factors – includes hearing problems, prosthesis, paraplegia, strenuous activities, sleep apnea, as well as others	11,000	8%
Other Motor Carrier Work Pressure	9,000	6%
Other Recognition Factors – includes impending problem masked by traffic flow pattern, driver focused on extraneous	4,000	3%

Associated Factor	Number	Percentage
vehicle, and other recognition error		
Other Emotional Factors – includes clinical depression	1,000	1%
Vehicle		
Brake Deficiency	37,000	26%
Tire Deficiency	7,000	5%
Jackknife Event	7,000	5%
Overweight	7,000	5%
Cargo Shift	6,000	4%
Light Failure	5,000	3%
Brake Failure	5,000	3%
Cargo Securement	4,000	3%
Vehicle View Obstruction – includes obstruction related to load, vehicle design, or other factor	2,000	1%
Engine, Fuel System, or Exhaust Deficiency	2,000	1%
Transmission Failure	1,000	1%
Tire Failure	1,000	1%
Reflective Tape Missing/Obscured	1,000	1%
All Other Defects – includes suspension frame deficiency, and towing unit problem	5,000	4%
Environment		
Traffic Flow Interruption – includes work zones, roadway immersion, prior crash, and traffic congestion.	40,000	28%
Roadway Related Factors	29,000	20%
Stop Required Prior to Crash – includes stop required for traffic control device, and yield right of way requirement.	28,000	20%
Weather Related Factors	20,000	14%
Sight Obstructed by Road/Other Vehicle	6,000	4%
Other Traffic/Vehicle Factors – includes any factors not listed causing the driver to feel uncomfortable with surrounding traffic or the vehicle	7,000	5%
Other Vehicle Obscured (by Glare/Headlights, etc)	2,000	2%
Other Environmental Factors	1,000	0%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 15 - Trucks and Passenger Vehicles by Critical Pre-Crash Event – Vehicles Assigned Critical Reason

This table shows the estimated number of trucks and passenger vehicles involved in crashes nation-wide in which the truck or passenger vehicle was assigned the critical reason. Counts of vehicles are organized by critical pre-crash event. The critical pre-crash event is the event which made the crash unavoidable. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Pre-Crash Event	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
Vehicle Loss-of-Control Due to:	3,000	10%	6,000	16%
Blow out/flat tire	***	1%	1,000	2%
Disabling vehicle failure (e.g. wheel fell off)	***	0%	0	0%
Non-disabling vehicle problem (e.g. hood flew up)	***	0%	0	0%
Poor road conditions (Puddle, pot hole, ice, etc.)	***	0%	***	1%
Traveling too fast for conditions	2,000	7%	2,000	6%
Jackknife Event	1,000	2%	0	0%
Other cause of control loss	***	0%	2,000	5%
Unknown cause of control loss	0	0%	1,000	2%
Vehicle Traveling:	13,000	46%	21,000	58%
Over the lane line on left side of travel	4,000	13%	10,000	27%
Over the lane line on right side of travel	3,000	11%	2,000	4%
Off the edge of the road on the left side	***	0%	2,000	5%
Off the edge of the road on the right	***	1%	1,000	2%
Turning left at intersection	2,000	6%	4,000	10%
Turning right at intersection	1,000	3%	***	1%
Crossing over (passing through)	3,000	12%	3,000	9%
This vehicle decelerating	***	0%	***	0%
Other Motor Vehicle in Lane:	11,000	38%	8,000	23%
Other vehicle stopped	7,000	24%	3,000	7%
Traveling in same direction with low	1,000	3%	3,000	9%
Traveling in same direction while	3,000	10%	2,000	5%
Traveling in same direction with higher	***	0%	1,000	2%
Traveling in opposite direction	***	1%	***	0%

Critical Pre-Crash Event	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
Other Motor Vehicle Encroaching into Lane From:	***	2%	1,000	2%
Adjacent lane (same direction) – over left lane line	0	0%	***	0%
Adjacent lane (same direction) – over right lane line	***	0%	0	0%
Opposite direction – over left lane line	0	0%	***	1%
Crossing street, turning into same	0	0%	***	1%
Crossing street, across path	***	0%	0	0%
Crossing street, turning into opposite direction	***	1%	0	0%
Driveway, across path	0	0%	***	0%
Driveway, turning into opposite	***	1%	***	0%
Object or Animal:	0	0%	***	0%
Object in roadway	0	0%	***	0%
Other:	1,000	5%	1,000	2%
Not involved first harmful event ¹	***	0%	0	0%
Other	1,000	4%	1,000	2%
Total	29,000	100%	37,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

¹ Cases categorized as "Not involved first harmful event" are those in which the truck was not involved in the first harmful event in the crash sequence. The term First Harmful Event refers to the first event of the crash to cause damage or injury.

Source: Large Truck Crash Causation Study – Weighted data

Table 16 - Trucks and Passenger Vehicles by Critical Reason

This table shows the estimated number of trucks and passenger vehicles involved in crashes nation-wide in which the truck or passenger vehicle was assigned the critical reason. Counts of vehicles are organized by critical reason. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Reason	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
Physical Driver Factor	1,000	3%	6,000	16%
Sleep, that is, actually asleep	***	0%	4,000	10%
Heart attack or other physical impairment of ability to act	1,000	3%	2,000	6%
Other critical non-performance	***	0%	0	0%
Unknown critical non-performance	0	0%	***	0%
Driver Recognition Factor	10,000	35%	11,000	30%
Inattention (i.e. daydreaming)	2,000	7%	2,000	4%
Internal distraction	1,000	3%	3,000	9%
External distraction	2,000	6%	1,000	2%
Inadequate surveillance	5,000	19%	4,000	11%
Other recognition error	0	0%	***	1%
Unknown recognition error	***	1%	1,000	4%
Driver Decision Factor	12,000	43%	9,000	24%
Too fast for conditions to be able to respond to unexpected actions of other	4,000	13%	3,000	7%
Too slow for traffic stream	0	0%	***	0%
Misjudgment of gap or other's speed	1,000	5%	2,000	4%
Following too closely to respond to unexpected actions	2,000	6%	***	1%
False assumption of other road user's	1,000	3%	1,000	2%
Illegal maneuver	3,000	9%	3,000	7%
Inadequate evasive action, e.g. braking Only not braking and steering	***	1%	***	0%
Aggressive driving behavior	***	0%	***	1%
Too fast for curve/turn	1,000	3%	***	0%
Other Decision Factors	1,000	2%	***	0%
Unknown decision error	0	0%	***	0%
Driver Performance Factor	1,000	3%	3,000	8%
Panic/Freezing	***	0%	0	0%
Overcompensation	***	1%	2,000	6%
Poor directional control, e.g. failing to control vehicle with skill ordinarily	***	2%	1,000	3%
Unknown performance error	0	0%	***	0%
Unknown Driver Error	1,000	4%	3,000	10%
Vehicle Related Factor	2,000	8%	2,000	4%
Tires/wheels failed	***	1%	1,000	2%

Critical Reason	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
Brakes failed	***	1%	***	0%
Cargo shifted	***	1%	0	0%
Trailer attachment failed	***	0%	0	0%
Degraded braking capability	2,000	5%	0	0%
Transmission/engine failure	0	0%	***	0%
Other vehicle failure	0	0%	***	1%
Unknown vehicle failures	0	0%	***	0%
Environment – Highway	1,000	3%	***	1%
Signs/signals missing	1,000	3%	0	0%
View obstructed by other vehicles	0	0%	***	0%
Slick roads (low friction road surface due to ice, loose debris, any other cause)	***	1%	***	1%
Environment – Weather	***	0%	1,000	2%
Wind gust	0	0%	***	0%
Glare	***	0%	1,000	1%
Unknown reason for critical event	***	1%	2,000	4%
Total	29,000	100%	37,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 17 - Trucks and Passenger Vehicles by Associated Factors

This table shows the estimated number of trucks and passenger vehicles involved in crashes nation-wide by specific factors associated with the particular crash. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Associated Factor	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
Driver				
Prescription Drug Use	19,000	29%	23,000	35%
Over-the-Counter Drug Use	13,000	20%	7,000	11%
Unfamiliar with Roadway	13,000	19%	6,000	10%
Inadequate Surveillance	11,000	16%	9,000	14%
Traveling Too Fast For Conditions	10,000	15%	7,000	11%
Illegal Maneuver	8,000	12%	9,000	13%
Inattention	6,000	9%	6,000	9%
Exterior Distraction	5,000	8%	4,000	6%
Fatigue	5,000	7%	10,000	15%
Inadequate Evasive Action	4,000	7%	5,000	7%
False Assumption of Others Actions	4,000	6%	2,000	3%
Unfamiliar with Vehicle	4,000	5%	2,000	2%
Following Too Closely	3,000	5%	1,000	1%
Aggressive Driving Behavior	3,000	5%	6,000	9%
Misjudgment of Gap Distance	3,000	4%	2,000	4%
Self Induced Legal Work Pressure	2,000	4%	1,000	1%
Under Pressure to Accept Additional Loads	2,000	4%	0	0%
Required to Accept Short Notice Trips	2,000	3%	0	0%
Interior Distraction	2,000	2%	3,000	5%
Driver Upset Prior to Crash	1,000	2%	3,000	5%
Driver in a Hurry Prior to Crash	1,000	2%	3,000	4%
Under Pressure to Operate Even If Fatigued	1,000	2%	0	0%
Conversation	1,000	2%	2,000	3%
Illness	1,000	1%	5,000	8%
Illegal Drug Use	***	0%	4,000	7%
Alcohol Use	***	0%	6,000	9%
Other Physical Factors – includes hearing problems, prosthesis, paraplegia, strenuous activities, sleep apnea, as well as others	6,000	9%	6,000	8%
Other Motor Carrier Work Pressure	5,000	7%	***	0%
Other Decision Factors – includes proceeding with obstructed view, stopping when not required to, and failing to yield, as well as others	4,000	6%	5,000	8%
Other Recognition Factors – includes impending	3,000	4%	2,000	3%

Associated Factor	Truck		Passenger Vehicle	
	Number	Percentage	Number	Percentage
problem masked by traffic flow pattern, driver focused on extraneous vehicle, and other recognition error				
Other Emotional Factors – includes clinical depression	1,000	1%	3,000	5%
Vehicle				
Brake Deficiency	16,000	25%	1,000	2%
Tire Deficiency	4,000	6%	1,000	2%
Overweight	3,000	5%	***	0%
Light Deficiency	3,000	5%	1,000	1%
Jackknife Event	2,000	4%	0	0%
Vehicle View Obstruction – includes obstruction related to load, vehicle design, or other factor	2,000	3%	1,000	1%
Brake Failure	1,000	2%	***	2%
Engine, Fuel System, or Exhaust Deficiency	1,000	2%	***	0%
Reflective Tape Missing/Obscured	1,000	1%	0	0%
Transmission Failure	***	1%	1,000	1%
Cargo Securement	***	1%	***	0%
Cargo Shift	***	1%	0	0%
Tire Failure	***	0%	1,000	1%
All Other Defects – includes suspension frame deficiency, and towing unit problem	2,000	2%	1,000	1%
Environment				
Traffic Flow Interruption – includes work zones, roadway immersion, prior crash, and traffic congestion.	16,000	24%	16,000	25%
Stop Required Prior to Crash – includes stop required for traffic control device, and yield right of way requirement.	14,000	21%	16,000	25%
Roadway Related Factors	11,000	16%	10,000	16%
Weather Related Factors	9,000	14%	9,000	14%
Sight Obstructed by Road/Other Vehicle	5,000	7%	3,000	5%
Other Traffic/Vehicle Factors – includes any factors not listed causing the driver to feel uncomfortable with surrounding traffic or the vehicle	2,000	4%	2,000	3%
Other Vehicle Obscured (by Glare/Headlights, etc)	2,000	3%	1,000	2%
Other Environmental Factors	***	1%	1,000	1%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 18 - Trucks in One-Vehicle Crashes by Critical Pre-Crash Event - Trucks Assigned Critical Reason

This table shows the estimated number of trucks involved in one-vehicle crashes in which the truck was assigned the critical reason. Counts of trucks are organized by critical pre-crash event. The critical pre-crash event is the event which made the crash unavoidable. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Pre-Crash Event	Number	Percentage
Vehicle Loss-of-Control Due to:	18,000	49%
Blow out/flat tire	***	1%
Disabling vehicle failure (e.g. wheel fell off)	1,000	3%
Non-disabling vehicle problem (e.g. hood flew up)	***	1%
Poor road conditions (Puddle, pot hole, ice, etc.)	***	1%
Traveling too fast for conditions	12,000	33%
Jackknife Event	***	1%
Cargo Shift	2,000	6%
Other cause of control loss	1,000	3%
Vehicle Traveling:	16,000	42%
Over the lane line on left side of travel lane	***	1%
Over the lane line on right side of travel lane	***	1%
Off the edge of the road on the left side	5,000	15%
Off the edge of the road on the right side	9,000	24%
End departure	***	0%
Turning left at intersection	***	1%
Turning right at intersection	***	1%
Other Motor Vehicle in Lane:	1,000	2%
Traveling in same direction while decelerating	1,000	2%
Other Motor Vehicle Encroaching into Lane From:	***	1%
Adjacent lane (same direction) – over left lane line	***	1%
Adjacent lane (same direction) – over right lane line	***	0%
Pedestrian, Pedalcyclist, or other NonMotorist:	1,000	3%
Pedestrian in roadway	***	1%
Pedalcyclist or other nonmotorist in roadway	1,000	2%
Object or Animal:	1,000	2%
Animal in roadway	***	1%
Object in roadway	***	1%
Other:	1,000	2%
Other	1,000	2%
Total	37,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 19 - Trucks in One-Vehicle Crashes by Critical Reason

This table shows the estimated number of trucks nation-wide involved in one-vehicle crashes by critical reason. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Critical Reason	Number*	Percentage**
Physical Driver Factor	8,000	21%
Sleep, that is, actually asleep	5,000	13%
Heart attack or other physical impairment of ability to act	2,000	6%
Other critical non-performance	***	0%
Unknown critical non-performance	***	1%
Driver Recognition Factor	6,000	17%
Inattention (i.e. daydreaming)	2,000	6%
Internal distraction	1,000	4%
External distraction	***	1%
Inadequate surveillance	1,000	4%
Unknown recognition error	1,000	3%
Driver Decision Factor	13,000	34%
Too fast for conditions to be able to respond to unexpected actions of other road users	2,000	7%
Misjudgment of gap or other's speed	***	0%
Following too closely to respond to unexpected actions	***	0%
Illegal maneuver	***	0%
Aggressive driving behavior	1,000	2%
Too fast for curve/turn	9,000	23%
Other Decision Factors	***	1%
Driver Performance Factor	3,000	9%
Overcompensation	2,000	4%
Poor directional control, e.g. failing to control vehicle with skill ordinarily expected	2,000	4%
Unknown Driver Error	1,000	4%
Vehicle Related Factor	5,000	13%
Tires/wheels failed	***	1%
Brakes failed	***	1%
Steering failed	***	0%
Cargo shifted	3,000	7%
Suspension failed	1,000	2%
Degraded braking capability	1,000	2%
Environment - Highway	1,000	2%
Road design – roadway geometry (e.g. ramp curvature)	***	0%
Road design – other	***	1%

Critical Reason	Number*	Percentage**
Slick roads (low friction road surface due to ice, loose debris, any other cause)	***	1%
Environment – Weather	***	0%
Wind gust	***	0%
Unknown reason for critical event	***	0%
Total	37,000	100%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data

Table 20 - Trucks in One-Vehicle Crashes by Associated Factors

This table shows the estimated number of trucks nation-wide involved in one-vehicle crashes by specific associated factor. Weighted data numbers are rounded to the nearest 1000. Percentages are calculated on un-rounded estimates and rounded to the nearest whole number with values less than .5 percent rounded to zero. Totals and sub-totals are summed using unrounded estimates; therefore they may not appear to equal the sum of the relevant variables.

Associated Factor	Number	Percentage
Driver		
Traveling Too Fast For Conditions	18,000	48%
Unfamiliar with Roadway	11,000	30%
Driver Fatigue	11,000	28%
Prescription Drug Use	10,000	25%
Over-the-Counter Drug Use	7,000	18%
Inattention	5,000	12%
Inadequate Surveillance	4,000	10%
External Distraction	4,000	10%
Aggressive Driving Behavior	4,000	9%
Inadequate Evasive Action	3,000	8%
Illness	3,000	8%
Conversation	3,000	8%
Uncomfortable with Some Aspect of Vehicle or Load	3,000	7%
Under Pressure to Operate Even If Fatigued	2,000	7%
Under Pressure to Accept additional Loads	2,000	7%
Unfamiliar with Vehicle	2,000	7%
In a Hurry Prior to Crash	2,000	6%
Illegal Drug Use	2,000	6%
Work Schedule Pressure	2,000	4%
Illegal Maneuver	2,000	4%
Upset Prior to Crash	1,000	4%
Interior Distraction	1,000	3%
New Position	1,000	3%
Alcohol Use	1,000	2%
Self Induced Legal Work Pressure	1,000	2%
Required to Accept Short Notice Trips	1,000	2%
Pressure to Accept Loads with Little or No Notice	1,000	2%
Following Too Closely	1,000	2%
Misjudgment of Gap Distance	***	1%
False Assumption of Others Actions	***	0%
Other Decision Factors – includes proceeding with obstructed view, stopping when not required to, and failing to yield, as well as others	7,000	18%
Other Physical Factors – includes hearing problems, prosthesis, paraplegia, strenuous activities, and sleep apnea	3,000	9%

Associated Factor	Number	Percentage
Other Motor Carrier Work Pressure	2,000	5%
Other Recognition Factors – includes impending problem masked by traffic flow pattern, driver focused on extraneous vehicle, and other recognition error	1,000	2%
Other Emotional Factors – includes clinical depression	***	1%
Vehicle		
Brake Deficiency	15,000	39%
Cargo Shift	5,000	14%
Tire Deficiency	3,000	8%
Jackknife Event	4,000	9%
Cargo Securement	3,000	8%
Overweight	3,000	7%
Brake Failure	2,000	5%
Transmission Failure	1,000	2%
Tire Failure	1,000	2%
Engine, Fuel System, or Exhaust Deficiency	***	1%
View Obstruction – includes obstruction related to load, vehicle design, or other factor	***	1%
Light Deficiency	***	0%
All Other Defects – includes suspension frame deficiency, and towing unit problem	3,000	7%
Environment		
Roadway Related Factors	10,000	26%
Weather Related Factors	4,000	11%
Stop Required Prior to Crash – includes stop required for traffic control device, and yield right of way requirement.	4,000	10%
Traffic Flow Interruption – includes work zones, roadway immersion, prior crash, and traffic congestion.	3,000	7%
Sightline Obstructed	1,000	2%
Other Traffic/Vehicle Factors – includes any factors not listed causing the driver to feel uncomfortable with surrounding traffic or the vehicle	3,000	7%
Other Vehicle Obscured (by glare/headlights, etc)	***	0%
Other Environmental Factors	***	0%

Notes:

*** Weighted numbers lower than 500 are rounded to zero.

Source: Large Truck Crash Causation Study – Weighted data