In the North Carolina study (3) it is reported that car drivers are seven times more likely to be fatally injured than truck drivers in large truck-car accidents.

b.) The source of H11b is reference 10 which derived its data from reference 2. Rates were reported on the number of fatal involvements per 1000 accident involvements by vehicle type. For passenger cars the rate was 1.98 fatal involvements per 1000 accident involvements, while for truck tractor and semi-trailer plus other truck combinations the fatal involvement rate was 6.27. Thus the combination truck fatal involvement rate was 3.17 times higher than the passenger car fatal involvement rate

Data Analysis.

a.) The Texas Fatal File gives the number of fatalities in each vehicle involved in an accident, but does not include the total number of occupants. In 61 fatal crashes between cars and tractor-trailers, 143 car occupants died and 2 tractor-trailer occupants were killed. Assuming two occupants per truck, the truck occupant death rate (number of dead per total number of occupants) was 1.6% and assuming 2-4 occupants per car, the car occupant death rate was between 17.8% and 28.4%. Under these assumptions, the occupant death rate in the cars was 11.1 to 17.8 times as high as in tractor-trailers.

In the USC study, there were 3 deaths among 2122 commercial vehicle occupants for a truck death rate of 0.1%. And there were 17 deaths among 1175 non-commercial vehicle occupants for a non-commercial vehicle death rate of 1.4%. Thus, the occupant death rate in the non-commercial vehicles was 14 times as high as in the commercial vehicles.

b.) H11b is based on the fatal involvements per 1000 accident involvements for trucks and cars. In Texas, this fatal involvement rate was 19.8 for tractor-trailers, 12.8 for large trucks, and 4.0 for cars. Thus the large truck fatal involvement rate was 3.2 times higher, and the tractor-trailer fatal involvement rate was 5.0 times higher than the passenger car rate. The data indicate H11b is correct.

Discussion.

a.) Occupant death rate (number killed per total number of occupants) in cars in fatal collisions of cars with large trucks was between 9 and 14 times as high as in trucks, based on most representative data available.

b.) H11b should be restated to reflect that a tractor-trailer or combination truck is three times more likely to be involved in a fatal accident than is a passenger car. Further, Texas accident data indicate the large truck fatal involvement rate (number of large trucks in fatal accidents per total number of vehicles in fatal accidents) was 3 times, and the tractor-trailer involvement rate was 5 times higher than the passenger car rate.

2.12 - HYPOTHESIS 12

> Passenger cars account for 82 percent of all accidents and 70 percent of all fatals while tractor-trailers account for 2-4 percent of all accidents but 7-8 percent of all fatals.

<u>Background</u>. This statement is almost identical to H1 and stems from reference 2. Based on accident reports from 19 states, passenger cars account for 82.0% of the motor vehicles involved in all accidents and 70.4% of the vehicles involved in all fatal accidents. Truck-tractor and semi-trailers and other truck combinations account for 2.6% of the vehicles in all accidents and 7.3% of the vehicles in all fatal accidents. Thus H12 is misleading in that the quoted figures refer to vehicles in accidents rather than only accidents; i.e., the percentages reflect vehicle involvement rate with respect to all vehicles in accidents, not with respect to all accidents.

Viewing this statement differently, reports (1) and (2) containing data from two different sources can be utilized to find involvement rates based on the miles traveled. For combination trucks the accident involvement rate is 13.95 vehicles in accidents per million miles of travel. This is compared to rates of 15.52 for non-combination trucks and 20.26 for passenger cars. Similarly for combination trucks the fatal accident involvement rate is 8.75 vehicles in fatal accidents per million miles of travel. This is compared to 3.33 for non-tractor-trailers and 4.00 for cars. Thus the fatal accident involvement rate for combination trucks is twice as large as that for passenger cars, while the accident involvement rate for cars is 1.5 times higher than for combination trucks. One can easily see how differing methods of calculating involvement from differing data sources distorts the data. However, in either approach, large trucks are over-represented in fatal accidents. This point cannot be ignored.

Data Analysis. Based on the Texas 5% Accident File and Fatal File, passenger cars account for 78.3% of the motor vehicles involved in all accidents and 61.2% of the vehicles involved in all fatal accidents. Thus H12 has a 10% higher estimate for cars in fatal accidents, but for all accidents the Texas data and H12 are in agreement. As stated in the analysis of H1, truck tractor and semi-trailers account for 2.0% of the vehicles involved in all accidents in Texas and 7.6% of the vehicles involved in all fatal accidents.

Discussion. The hypothesized statement is generally correct except the percentages reflect vehicle involvement with respect to all vehicles in accidents, not with respect to all accidents. Utilizing involvement rates based on accidents per million miles of travel, the fatal involvement rate for cars is 4.0 and the accident rate is 20.3 while the fatal involvement rate for combination trucks is 8.8 and the accident rate is 15.5. In either approach large trucks are over-represented in fatal accidents.

2.13 - HYPOTHESIS 13

> Trucks are twice as likely to be involved in a crash per mile driven than cars.

Background. This statement is attributed to a report (9) by HSRI concerning the highway safety effects of the energy crisis on U.S. toll roads. Five (Maine, Ohio, Kansas, Pennsylvania and New York) of 26 possible toll roads were studied in order to fully represent the U.S. interstate system of roads. Large trucks were separately defined for each toll road but generally included tractor-trucks in excess of 20,000 GVW.

Accident involvement rates (number of accident involvements per 100 million miles of travel) were calculated for passenger cars and large trucks for 1973 and 1974 both separately for each road and combined for all five roads. The report indicates that large trucks have an accident involvement higher than cars, but both rates have decreased since the onset of the energy crisis. The rate for cars has decreased from 141.5 involvements per 100 million miles to 99.3, while the rate for large trucks has decreased from 151.0 to 125.0. Thus the ratio of large truck to car accident involvement per 100 million miles has increased from about 1.1 in 1973 to 1.3 in 1974. In other words, large trucks are likely to be involved in slightly more crashes per mile driven than cars for U.S. interstate type roads; but not twice as likely.

The overrepresentation by trucks in two vehicle accidents could be due to many factors particularly maneuvering capabilities and driver actions. It is useful to note also that the energy crisis did not cause a reduction in truck traffic, and truck speeds decreased an average of only 4.3 mph as compared to car speeds that decreased 8.2 mph on the average.

Data Analysis. No data are available in the Texas files to adequately evaluate this statement. In the USC study, however, truck exposure to risk was calculated, but no information was obtained on cars. Annual average daily traffic counts and truck volume counts were determined along with truck accident counts for state, U.S., and interstate highways during the given study period. Accident involvement rates (number of accident involvements per 100 million miles) obtained were as follows:

Vehicle (GVW >10,000 lbs.)	Rate
Single Unit	130
Tractor and Semi-Trailer	240
Truck and Full-Trailer	250
Tractor and Semi-Trailer and Trailer	290
TOTAL	210

These rates are slightly larger than those obtained in the toll road study (9) where large truck involvement rates were between 125 and 150 and car rates were between 100 and 140.

Discussion. Toll road data (9) indicate large trucks are likely to be involved in slightly more crashes per mile driven than cars for U.S. interstate type roads; but not twice as likely. USC data indicate over-involvement in accidents by large trucks in the California area, but H13 cannot be effectively evaluated with this data set until car exposure rates are available for comparison.

2.14 - HYPOTHESIS 14

> About half of all fatal accidents involving trucks are single-vehicle incidents, usually driving off the road into immovable objects.

Background. This statement comes from the Maryland report (5) on the series of 150 fatal crashes involving tractor-trailers. Only nineteen (12.7%) of these accidents were single-vehicle collisions and no mention is made of the number of accidents resulting from driving off the road. Thus H14 is not verified by this report. The Texas Large Truck File report (6) on 1973 data shows that out of 56,561 vehicles involved in 32,014 large truck accidents, 17.3% (75) of the 433 fatal accidents involve single vehicle incidents. Again no mention is made of hits against fixed objects for these types of accidents.

Data Analysis. The 1974 Texas Large Truck File shows that 17.4% (69) of the 397 fatal large truck accidents and 17.1% (49) of the 286 fatal tractor-trailer accidents involve single-vehicle incidents. Of the large truck single-vehicle fatal accidents, 37.7% involved a collision with a fixed object, 49.3% were rollover or ran-off-the road and 13% involved a collision with an animal or were non-collision accidents. For the tractor-trailer single-vehicle fatal accidents, 34.7% were against fixed objects, 46.9% were rollover or ran-off-the road and 18.4% involved a collision with an animal or were non-collision accidents.

Discussion. For fatal accidents involving large trucks (GVW over 10,000 lbs.) or tractor-trailers, 13%-17% are single vehicle incidents. Of these single vehicle fatalities, 35%-38% involve hits against fixed objects, while 46%-49% are rollovers or ran-off-the road types. Thus H14 appears overstated.

2.15 - HYPOTHESIS 15

> The crashworthiness of tractors has decreased since the hood and extra distance between the driver and the front bumper are now gone.

Background. This statement is difficult to evaluate since crashworthiness data are not generally available on tractor types for most accidents. In one reference (11), however, it is reported without supporting data that a tremendous number of losses in lives and injuries in the last 5 or 6 years are directly associated with the design of the cab.

Data Analysis. There is no provision for data on tractor type in the Texas police accident reports. The limit on truck lengths is 45 feet for single unit trucks and 65 feet for combination trucks, with longer units requiring special permits. With these length restrictions the relation between number of cab-over and conventional power units in operation would be interesting to compare.

Little additional information is attainable from the USC study. It is reported that 48.4% of the trucks in accidents included cab-over type power units while 51.6% were accounted for by conventional power units. Unfortunately no accident data was reported on these cab types.

Discussion. The conclusion here is that there is potential data available, at least at USC, to effectively determine the crashworthiness of tractors of the cab-over-engine type versus conventional. The data currently released, however, only indicate both types are about equally involved in accidents in California. No information is attainable on crash severity comparisons.

2.16 - HYPOTHESIS 16

> Larger trucks are more likely to be involved in single vehicle crashes than smaller trucks or passenger cars.

Background. The source for this statement is the North Carolina report (3) based on 5,653 large trucks, 855 intermediate trucks, 14,943 small trucks, and 218,730 cars. Non-single vehicle crashes included multi-vehicle accidents, bicycle accidents, train accidents, animal accidents, and pedestrain accidents. Also included were single vehicle accidents that turned into multi-vehicle accidents. Involvement in single vehicle accidents included 19.4% (1,097) of the larger trucks, 14.4% (123) of the intermediate trucks, 10.0% (1,493) of the small trucks, and 13.0% (28,520) of the cars. Thus H16 is valid in that in North Carolina in 1973 larger trucks were more likely to be in single vehicle crashes than small trucks or passenger cars.

Data Analysis. Based on the Texas 5% Accident File and Fatal File, involvement in single vehicle accidents included 28.8% of the tractor-trailers, 23.5% of the large trucks, 15.9% of the small trucks, and 13.3% of the passenger cars. Thus the larger trucks were more likely to be involved in single vehicle crashes than the smaller trucks and passenger cars.

Discussion. The hypothesized statement is correct. Involvement in single vehicle accidents include approximately 20%-23% of large trucks, 10%-15% of small trucks, and 13% of passenger cars.

2.17 - HYPOTHESIS 17

> If the truck hits another vehicle, the driver's chances of surviving are excellent, since the other, usually smaller vehicle acts as an energy attenuating device. But if the truck goes off the road in a single vehicle incident, the driver's chances of surviving are not much better than if he were in a car.

Background. This hypothesized statement stems from the North Carolina report (3). In single vehicle crashes it is reported that the proportion of drivers sustaining a fatal injury does not differ greatly between large trucks (1.3%) and cars (1.2%). This could result from either comparable protection for trucks and cars in serious single vehicle crashes, or relatively more serious single vehicle crashes for trucks. Thus if a truck driver is in a single vehicle incident, the driver's chances of surviving are not much better than if he were in a car.

If a large truck collides with a car, the car driver is seven times more likely to be fatally injured than the truck driver, and about five times more likely to be seriously injured. Thus H17 is correct in that a truck driver's chances of surviving a large truck-car collision are excellent.

Data Analysis. In single vehicle crashes in Texas in 1974 the proportion of drivers sustaining a fatal injury was 0.9% for large trucks, 1.1% for tractor-trailers, and 0.8% for passenger cars. (Table 3). Thus if a truck driver is in a single vehicle incident, the driver's chances of surviving are not much better than if he were in a car. In collisions between cars and large trucks or tractor-trailers the car driver is 27 times more likely to be fatally injured than the truck driver and about 6 times more likely to be seriously injured. The data in Texas support H17.

Discussion. In single vehicle collisions the proportion of drivers sustaining a fatal injury does not differ greatly between large trucks (0.9%-1.3%) and cars (0.8%-1.2%). However, in car-large truck collisions the car driver is 7-27 times more likely to be fatally injured and 5-6 times more likely to be seriously injured.

2.18 - HYPOTHESIS 18

> Trucks are inherently more unsafe because they are driven many more miles than other vehicles.

Background. This statement implies that trucks are inherently more unsafe, in the sense that they are more heavily involved in all accidents and in all fatal accidents because trucks have such high exposure, i.e., they are driven more miles per vehicle than other types of vehicles. Stated differently, trucks are over-involved in accidents because of their over-involvement in total miles driven. Based on reference 1, combination trucks account for 3.7% of the total travel of cars and trucks. Yet truck-tractors represent only 1% of the cars and trucks registered in the U.S. Also as has been stated previously, such trucks account for 2.6% of all vehicles in accidents and 7.3% of all vehicles in fatal accidents.

In the Maryland study (4) it is stated that the much higher mileage of tractor-trailers at least partially accounts for their higher total involvement in fatal crashes, though not for their pattern involvement. Other factors include the speed differentials, the greater mass of the tractor-trailer, the lack of easy maneuverability of the larger truck, vehicle defects, driver culpability and braking ability.

Data Analysis. No data are available in the Texas file or USC study to evaluate this statement.

Discussion. This statement is too encompassing. Large trucks appear over-involved in accidents and in miles traveled but the former does not necessarily cause the latter. Tractor-trailers are over-involved in crashes partially, but not totally, because they are driven many more miles than other vehicles.

2.19 - HYPOTHESIS 19

Speed differentials lead to increased risk of crash.

Background. This statement is based on speed data obtained in report 9. Accident data were acquired on toll roads for 1973 and 1974. Car speeds decreased 8.2 mph on the average, while truck speeds decreased an average of 4.3 mph. The speed differentials between cars and trucks decreased from 6.0 mph to 2.1 mph. At the same time vehicle miles were reduced 12.2% while single vehicle accident involvement was reduced 37.8%, two-vehicle involvement 43.2% and total involvement 40.3%. Speed accounted for much of the decrease in observed reduction, far in excess of that expected from a simple volume adjustment. It follows that decreases in speed differentials on toll roads do partially account for decreases in the risk of crash. Whether this can be generalized to all roads remains open to question.

Data Analysis. In Texas the Transportation Planning Division of the State Department of Highways and Public Transportation annually conducts speed surveys at 31 locations throughout the state. The average speed for cars in 1973 was 65.3 and in 1974 it was 57.1. Thus car speeds decreased 8.2 mph on the average. For large trucks (3 or more axles) the average speed was 58.9 in 1973 and 56.1 in 1974. Thus large truck speeds decreased an average of 2.8 mph. The speed differentials between cars and large trucks decreased from 6.4 mph in 1973 to 1.0 mph in 1974. For single-unit trucks (panel, pickup, other) the average speed was 60.2 in 1973 and 55.4 in 1974. Thus single-unit truck speeds decreased an average of 4.8 from 1973 to 1974.

At the same time, the total number of accidents in Texas decreased 6.5% with car involvement decreasing about 1% and large truck involvement increasing about 0.2%. There is not enough information to assess what effect the decrease in speed differential had on the risk of crash but the data indicate it may have partially accounted for the decrease in accidents.

Discussion. Available data indicate a decrease in speed differentials may partially account for decreases in risk of crash. However, the degree of association between the two variables has not been determined.

2.20 - HYPOTHESIS 20

Other vehicles underride trucks in about 10 percent of car-truck crashes.

Background. Little information is available on vehicle underrides. In the Maryland report (4) concerned with 150 fatal tractor-trailer crashes some type of underride was mentioned in 9 (8.9%) of 101 collisions with cars, with rear underriding occurring in 5 (5%) cases. In the 1972 Bureau of Motor Carrier Safety file (a collection of 52,799 reports of involvements of interstate trucks in collision, provided yearly by interstate carriers) there are 2,908 (5.5%) cases in which a truck struck a car in the rear, and 2,406 (4.6%) cases in which a car struck a truck in the rear. There is no direct evidence of underride or non-underride in these cases. The data also include some straight trucks in addition to tractor-trailers.

It is interesting to note further that in reference 9, a report on data in Michigan, Denver, Los Angeles, and the BMCS file, it is shown that the frequency of car-into-truck rear-end fatal collisions is on the order of one per million persons per year.

Data Analysis. The Texas Accident Files do not contain data on the striking and struck vehicle, so it is not possible to determine the percentage of underride accidents. In the USC study, 10.1% of the accidents involved commercial vehicles colliding into the rear of non-commercial vehicles, and 5.7% involved non-commercial vehicles colliding into the rear of commercial vehicles. Thus, total possible underride is less than 6%, and override is less than 10%.

Discussion. The various data sources indicate that underride occurs in 5-6% and override in 5-10% of car-large truck crashes.

2.21 - HYPOTHESIS 21

Deaths-injuries per ton mile is an acceptable comparison criteria by mode of transportation.

Background. This criterion was originally proposed by the Bureau of Surface Transportation Safety of the National Transportation Safety Board in 1971. Ton-miles is a widely used measure of transportation and has been for many years. The ton-mile distribution among regulated freight carriers for 1974 is contained in reference 12.

Data Analysis. No comparison data was available in the Texas files or USC report to evaluate this hypothesis.

Discussion. The above rate appears acceptable given the available accident data. It is obvious that mode comparisons must consider the total miles traveled and the amount of cargo transported. If safety is the prime concern trucks are at a disadvantage since this mode of transportation requires exposure to many accident situations. If it were possible to adjust for this type of exposure,then the death rates would be more comparable.

3. CONCLUSIONS AND RECOMMENDATIONS

A summary of the findings and recommendations resulting from the large truck investigation presented in this report are given below. The recommendations include areas of research that need development if the true role of tractor-trailers in highway accidents is to be effectively determined.

1. In general, there is a need for more in-depth large truck accident studies including collecting better exposure information, more data on the effects of speed differentials and better data on the effects of different cab designs. Also needed are studies on methods of improving the investigating officer's collection techniques in large truck crashes.

2. Large trucks are overinvolved in accidents, particularly in fatal crashes, as compared to small trucks and passenger cars. Thus there is a definite need for accident researchers to separately report large and small truck involvements lest the overwhelming number of small trucks mask the true effects of large trucks in crashes.

3. In single vehicle incidents truck and car occupant injury severity are almost the same. However, large trucks are more involved (20% of their accidents) in such collisions than are small trucks or passenger cars.

4. It is much more dangerous to be in the car in a car-large truck collision than in the truck. The death rate for persons in the car in such collisions is at least 10 times higher than the rate for truck occupants. Truck driver deaths in such cases are rare. Also, the truckers are

more at fault mainly due to speeding, improper turns, and unsafe lane changes.

5. Rear-end collisions of trucks into cars are more frequent than cars into trucks. Also underride is a problem in 5-6% of car-truck collisions. The majority of pre-crash maneuvers by trucks involve braking.

6. Collecting comparative data on cars is needed to effectively compare car and truck defects. Safety defects are more frequently reported on trucks as compared to cars. Major defects include brakes, lighting, and tires. More attention should be given to truck and car inspection procedures. Trucks are more unstable than cars, particularly with respect to rollovers. Thus, better design changes may be needed.

7. It is difficult to compare different modes of transportation. More consistent and uniform data and better data collection systems are needed from all freight modes. Particularly important would be a better measure of exposure than deaths per ton-mile. While this criterion is presently used, it lacks in accounting for the various exposures of the different modes of transportation.

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F.DERAL MOTOR VEHICLE SAFETY STANDARDS

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENTS
101 - Control Identification	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
102 - Transmission Shift Sequence	Yes	Applies to passenger cars, jultipurpose passenger vehicles, trucks and buses.
103 - Windshield Defrosting and Defogging	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
104 - Windshield Wiping and Washing	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
105 - Hydraulic Brake Systems	In Part	Applies to school buses equipped with hydraulic brakes. Over the road tractor-trailer combinations are air-braked equipped vehicles and as such are covered by MVSS 121.
106 - Brake Hoses	Yes	Applies equally to passenger cars, multipurpose passenger vehicles, trucks and buses.
107 - Reflecting Surfaces	Yes	Applies equally to passenger cars, multipurpose passenger vehicles, trucks and buses.
108 - Lighting	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
109 - Tires	No	See MVSS 119 for the standard that applies to tires for vehicles other than passenger cars.
110 - Tire Selection and Rims	No	See MVSS 120 for the standard that applies to tires for vehicles other than passenger cars.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENTS
111 - Rearview Mirrors	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
112 - Headlamp Concealment Devices	Yes	Applies equally to passenger cars, multi-purpose passenger vehicles, trucks and buses.
113 - Hood Latch Systems	Yes	Applies equally to passenger cars, multi-purpose passenger vehicles, trucks and buses.
114 - Theft Protection	No	Heavy duty vehicles are not subject to the "theft for joy-riding" type of theft that this standard is meant to and has fairly successfully stopped.
115 - Vehicle Identification Numbers	No	The comments under MVSS 114 are equally applicable here.
116 - Motor Vehicle Brake Fluids	Yes	Applies equally to passenger cars, multi-purpose passenger vehicles, trucks and buses.
117 - Retreaded Tires	Does Not Apply To New Vehicles	
118 - Power Operated Window Systems	No	The application of this standard has not been extended past passenger cars and multi-purpose passenger vehicles.
119 - New Pneumatic Tires	Yes	Applies to vehicles other than passenger cars.
120 - Tire Selection and Rims	Yes	Applies to vehicles other than passenger cars.
121 - Air Brake Systems	Yes	Applies to most vehicles equipped with air brakes.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENTS
122 - Brake Systems		
123 - Controls and Displays		Applies only to motorcycles.
124 - Accelerator Control Systems	Yes	Applies equally to passenger cars, multi-purpose passenger vehicles, trucks and buses.
125 - Warning Devices		Applies only to equipment thatis not designed to be permanently affixed to the vehicle.
126 - Truck Camper Loading		Applies only to slide-in campers.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENTS
201 - Occupant Protection in Interior Impact	NO	The tractor-trailer constitutes a greater mass than the passenger car. In collisions involving other vehicles or movable objects, the occupant of the heavy truck is generally subjected to less decelerative force than the passenger car occupant; hazards occasioned by interior projections are minimized. On the other hand, if the heavy-duty vehicle collides with an immovable barrier, far more energy is dissipated than any interior protection scheme could manage or absorb.
202 - Head Restraints	No	The heavy-duty vehicle occupant is not affected by, and indeed would hardly be aware of a rear end impact; therefore, a head restraint would serve little safety purpose.
203 - Impact Protection From The Steering Control System	No	See Comment on 201; the steering wheel in the heavy-duty vehicle is usually larger than in a passenger car, and the steering column is usually vertical or near vertical. Application of this standard to heavy duty vehicles would serve little safety purpose.
204 - Steering Control Rear Impact Displacement	No	See Comment on 201 and 203. In collisions, the steering column of the heavy-duty vehicle is seldom disturbed, as it is above the impact area.
205 - Glazing Material	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENT
206 - Door Locks and Door Retention Components	Yes, trucks	Applies to passenger cars, multipurpose passenger vehicles and trucks.
207 - Seating Systems	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
208 - Occupant Crash Protection	In Part	In heavy vehicles -- over 10,000 lbs GVWR -- the lap belt only is required. For reasons discussed above in connection with MVSS 201, occupants are generally not subjected to decelerative forces in which a torso restrain would be effective. The BMCS requires and enforces drivers seat belt use in vehicles under its jurisdiction.
209 - Seat Belt Assembly (Equipment Standard)	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
210 - Seat Belt Assembly Anchorages	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.
211 - Wheel Nuts, Discs and Hubcaps	No	Decorative projecting wheel nuts and similar components to which this standard is addressec are not used on heavy-duty vehicles.
212 - Windshield Mounting	No	Forces causing windshield mounting deformatior in heavy truck collisions are greater than can be contained by any practicable standard; furthermore, the availability of the windshield opening as a means of emergency egress probably outweighs any benefit derived from increased windshield retention in such vehicles.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENT
213 - Child Seating System (Equipment Standard)		
214 - Side Door Strength	No	This requirement has no logical application to heavy-duty vehicles. The doors are above normal line of impact with other vehicles.
215 - Exterior Protection	No	The mass of the large vehicle makes a performance standard aimed at minimizing damage in low-speed impacts completely impracticable.
216 - Roof Crush Resistance	No	This standard would have no logical extension to the heavier vehicle. The question of protection for occupants of the cabs in collisions or in rollovers certainly deserves study, but the problems are qualitatively completely different from those which must be faced with passenger cars.
217 - Bus Window Retention and Release	Buses Only	The question of "escape hatches" is under study by industry and government. See our comment in regard to Windhsield Retention.
218 - Motorcycle Helmets	No	This standard applies to manufacture of motorcylce helmets only.
219 - Windshield Zone Intrusion	In Part	This standard is limited to a particular type of vehicle configuration and has no practicable application to heavy trucks.
220 - School Bus Rollover Protection) 221 - School Bus Body Joint Strength) 222 - School Bus Passenger Seating) and Crash Protection		These standards apply only to school buses.

STANDARD	APPLICATION TO TRUCKS AND BUSES	COMMENT
301 - Fuel System Integrity	In Part (School Buses)	Most tractor-trailers are diesel powered and constructed to such configurations that this standard would not have an appropriate application. In addition, the BMCS has promulgated stringent requirements for fuel tanks and fuel systems.
302 - Flammability	Yes	Applies to passenger cars, multipurpose passenger vehicles, trucks and buses.

SAFETY REGULATIONS PROMULGATED BY THE BUREAU OF MOTOR CARRIER SAFETY

In addition to those Safety Standards that have been promulgated by the National Highway Traffic Safety Administration, over the years many have been promulgated by the Federal Highway Administration - Bureau of Motor Carrier Safety. Listed below are those in effect now.

PART 393 - PARTS AND ACCESSORIES NECESSARY FOR SAFE OPERATION

Subpart A - General

Sec.

393.1 Scope of the rules in this part.
393.2 Additional equipment and accessories.

Subpart B - Lighting Devices, Reflectors, and Electrical Equipment

393.11 Lamps and reflectors, small buses and trucks.
393.12 Lamps and reflectors, large buses and trucks.
393.13 Lamps and reflectors, truck tractors.
393.14 Lamps and reflectors, large semi-trailers and full trailers.
393.15 Lamps and reflectors, small semi-trailers and full trailers.
393.16 Lamps and reflectors, pole trailers.
393.17 Lamps and reflectors-combinations in driveaway-towaway operations.
393.18 Lamps on motor vehicles with projecting loads.
393.19 Requirements for turn signaling systems.
393.20 Clearance lamps to indicate extreme width and height.
393.22 Combination of lighting devices and reflectors.
393.23 Lighting devices to be electric.
393.24 Requirements for head lamps and auxiliary road lighting lamps.
393.25 Requirements for lamps other than head lamps.
393.26 Requirements for reflectors.
393.27 Wiring specifications.
393.28 Wiring to be protected.
393.29 Grounds.
393.30 Battery installation.
393.31 Overload protective devices.
393.32 Detachable electrical connections.
393.33 Wiring, installation.

Subpart C - Brakes

393.40 Required brake systems.
393.41 Parking brake system.
393.42 Brakes required on all wheels.
393.43 Breakaway and emergency braking.

Sec.	
393.44	Front brake lines, protection.
393.45	Brake tubing and hose, adequacy.
393.46	Brake tubing and hose connections.
393.47	Brake lining.
393.48	Brakes to be operative.
393.49	Single valve to operate air brakes.
393.50	Reservoirs required.
393.51	Warning devices and gauges.
393.52	Brake performance.

Subpart D - Glazing and Window Construction

393.60	Glazing in specified openings.
393.61	Window construction.
393.62	Window obstructions.
393.63	Windows, markings.

Subpart E - Fuel Systems

393.65	All fuel systems.
393.67	Liquid fuel tanks.
393.69	Liquefied petroleum gas systems.

Subpart F - Coupling Devices and Towing Methods

393.70	Coupling devices and towing methods, except for driveaway-towaway operations.
393.71	Coupling devices and towing methods, driveaway-towaway operations.

Subpart G - Miscellaneous Parts and Accessories

393.75	Tires.
393.76	Sleeper berths.
393.77	Heaters.
393.78	Windshield wipers.
393.79	Defrosting device.
393.80	Rear-vision mirrors.
393.81	Horn.
393.82	Speedometer.
393.83	Exhaust system location.
393.84	Floors.
393.85	[Reserved]
393.86	Rear end protection.
393.87	Flags on projecting loads.
393.88	Television receivers.
393.90	Buses, standee line or bar.