

2003 National Truck Fleet and Bus Fleet Safety Surveys: Final Report

Contact:
Richard Gruberg
richard.gruberg@dot.gov
(202) 366-2959

Analysis Division, Office of Research and Analysis
Federal Motor Carrier Safety Administration
U.S. Department of Transportation

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2003 National Truck Fleet and Bus Fleet Safety Surveys: Final Report

Executive Summary

This report presents findings from the 2003 National Truck Fleet and Bus Fleet Safety Surveys, conducted by the Federal Motor Carrier Safety Administration (FMCSA) during the summer and fall of 2003. In the two studies, nontargeted (random) inspections were used to estimate driver and vehicle out-of-service (OOS) rates for both buses and large trucks regulated by FMCSA, based on Level 1 (i.e., full driver and vehicle) inspections. The “OOS rate” is defined here as the proportion of vehicles operating on the Nation’s highways with at least one violation of the FMCSA regulations severe enough to require the vehicle to be placed out-of-service either for a prescribed period of time (in the case of driver-related violations) or until vehicle defects are corrected (in the case of vehicle-related violations).

For the 2003 National Truck Fleet Safety Survey, inspections were conducted at fixed weigh stations (permanent facilities) and at various nonfixed (makeshift) inspection sites on major highways. For the 2003 Bus Fleet Safety Survey, inspections were conducted at major tour bus and charter bus destination sites and at intercity bus terminals across the country.

For the 2003 National Truck Fleet and Bus Fleet Safety Surveys, 2,835 truck inspections were conducted in 10 States, and 834 bus inspections (651 at destination sites and 183 at intercity terminals) were conducted in 25 States. For the truck survey, data collection began in late summer 2003 and continued into the fall. Data collection for the bus survey began in July 2003 and continued throughout the summer; in a few States, data collection took place in the fall.

For the truck survey, States were selected on the basis of geographic location and participation and cooperation in previous studies, so that the major geographic regions of the country would be represented. The 10 States participating in the study were California, Colorado, Connecticut, Georgia, Illinois, Maryland, New Jersey, New Mexico, North Carolina, and Washington. The participating States were requested to perform nontargeted inspections at both fixed and nonfixed locations in order to capture a representative sample of trucks traveling on the Nation's highways. Inspectors were also asked to estimate the daily volumes of truck traffic passing through each site (both fixed and nonfixed locations) for use in the estimation of national OOS rates, where locations with heavier truck volumes were weighted more heavily.

For the bus survey, the tour bus and charter bus destination sites and intercity bus terminals initially selected were the same sites that were used in the 2001 National Bus Fleet Safety Survey. Sites that were found to be nonviable in 2001 were eliminated, and substitute locations were used when possible. Destination sites were required to have a volume of at least 16 buses per day in order to be eligible for selection, and intercity terminals were required to have a volume of at least 11 arrivals per day.

The estimated vehicle OOS rate from the 2003 truck survey was 28 percent, and the estimated driver OOS rate was 5 percent (weighted national estimates). The estimated vehicle and driver OOS rates from the 2003 survey of tour bus and charter bus destination sites were 26 percent and 3 percent, respectively. For the intercity bus terminal survey, the numbers of buses and drivers in the final sample were considered too small to support national estimates of OOS rates.

In both the truck and bus samples, an association was found between the presence of driver OOS violations and the presence of vehicle OOS violations. In the truck survey, inspections that found at least one vehicle OOS violation were nearly two times more likely to find a driver OOS violation than were inspections that found no vehicle OOS violations. Conversely, inspections that found at least one driver OOS violation were more than 1.5 times more likely to find a vehicle OOS violation than were inspections

that found no driver OOS violations. In the bus survey, inspections that found at least one vehicle OOS violation were four times more likely to find a driver OOS violation than were inspections that found no vehicle violations, and inspections that found at least one driver OOS violation were nearly three times more likely to find a vehicle OOS violation than were inspections that found no driver violations.

Brake-related violations were the most common type of OOS violation found in both the truck and bus surveys, constituting roughly 40 percent of all OOS violations (both vehicle and driver) in the truck sample, 25 percent in the tour/charter bus destination sample, and 35 percent in the bus terminal sample of intercity coaches. The most common driver OOS violations found were “No Record of Duty Status” and “Failure to Retain Logs for 7 Days,” which together constituted 48 percent of all driver OOS violations in the truck sample and 70 percent of all driver OOS violations in the bus destination sample.

Results from the 2003 truck survey are reasonably consistent with the results of previous surveys. The 1996 National Truck Fleet Safety Survey, which was the most comprehensive OOS rate survey conducted before 2003, produced a weighted national estimate of 29 percent, as compared with the 28-percent weighted rate for vehicle OOS violations in the 2003 survey. The 1996 truck survey also produced a weighted estimate for the national driver OOS rate that was similar to the 5-percent rate in the 2003 survey.

The OOS rates estimated from the 2003 truck survey track closely with the rates derived from all Level 1 inspections conducted for FMCSA in 2003 and maintained in the Agency’s Motor Carrier Management Information System (MCMIS). The similarity of the results suggests that the routine targeting of vehicles during the inspection process has not, historically, contributed a significant bias to OOS rates calculated from MCMIS inspection data. Likewise, their similarity suggests that conducting inspections primarily at fixed weigh stations does not contribute a significant bias to the MCMIS OOS rates. To the extent that such bias is minimal, the OOS rates calculated from MCMIS Level 1 inspection data accurately reflect the safety fitness of the trucks and drivers that operate on our highways and are regulated by FMCSA.

A question that remains unanswered is why both the OOS rates from the National Truck Fleet Safety Survey and the unweighted rates from MCMIS vary dramatically from State to State. One possibility is that the disparities arise from differences in the inspection procedures employed in different States; if this is the case, such disparities may be contributing a bias both to the MCMIS estimates and to the truck survey estimates.

The results of the 2003 National Bus Fleet Safety Survey differ somewhat from the results of some of FMCSA's earlier surveys. For the tour/charter bus component, the weighted national average driver OOS rate calculated from the 2003 survey results (3 percent) is consistent with those from the 1999 and 2001 surveys (3 percent and 4 percent, respectively); however, the weighted vehicle OOS rate from the 2003 survey (26 percent) differs from both the 1999 and 2001 results (23 percent and 13 percent, respectively). The weighting methodology used for the tour/charter bus component of the 2003 bus survey was different from, and may be more accurate than, the methodologies used for the 1999 and 2001 surveys.

The weighted national estimate of the driver OOS rate from the tour/charter bus component of the 2003 bus survey is comparable with the rate obtained from MCMIS, using all 2003 Level 1 inspection data for buses, motor coaches, and school buses (driver OOS rate of 3 percent in both cases). Although the driver OOS rate from the 2003 intercity bus terminal sample is slightly higher (5 percent), it is an unweighted estimate and should not be viewed as nationally representative. In contrast, the vehicle OOS rates calculated from the 2003 bus survey are considerably higher than the corresponding rates calculated from MCMIS data. The unweighted national estimate of the average vehicle OOS rate for all passenger buses based on 2003 Level 1 inspection data from MCMIS is 15 percent, as compared with a weighted estimate of 26 percent from the 2003 tour bus sample and an unweighted estimate of 23 percent from the intercity bus sample.

Introduction

This report presents findings from the 2003 National Truck Fleet and Bus Fleet Safety Surveys, conducted by the Federal Motor Carrier Safety Administration (FMCSA) during the summer and fall of 2003. In these studies, commercial motor vehicles were randomly selected for roadside inspections at both fixed and nonfixed locations in order to assess their level of compliance with the Federal Motor Carrier Safety Regulations (FMCSRs). Nontargeted inspections were used to estimate driver and vehicle out-of-service (OOS) rates for both buses and large trucks regulated by FMCSA, based on Level 1 (i.e., full driver and vehicle) inspections. In this report, the OOS rate is defined as the proportion of vehicles operating on the Nation's highways with at least one FMCSR violation severe enough to require the vehicle to be placed out-of-service either for a prescribed period of time (in the case of driver-related violations) or until vehicle defects are corrected (in the case of vehicle-related violations).

For the 2003 National Truck Fleet Safety Survey (TFSS), inspections were conducted at fixed weigh stations (permanent facilities) and at various nonfixed (makeshift) inspection sites on major highways. For the 2003 National Bus Fleet Safety Survey (BFSS), inspections were conducted at major tour bus and charter bus destination sites and at intercity bus terminals across the country.

Background

Since the mid-1950s, the U.S. Department of Transportation (DOT), in conjunction with State enforcement authorities, has routinely inspected commercial motor vehicles in operation on U.S. highways. Currently the inspections are performed as part of FMCSA's Motor Carrier Safety Assistance Program (MCSAP). Inspections take place at permanent and portable truck weigh stations, port of entry facilities, carrier terminals, hazardous waste stations, and other locations. They are conducted in accordance with standards developed by the Agency in cooperation with the Commercial Vehicle Safety Alliance

(CVSA). The inspection standards provide national uniform inspection procedures and criteria for identifying OOS violations.

Five different kinds of inspection are performed under MCSAP. The most comprehensive is the Level 1 inspection, as used in this study, which involves a full examination of the vehicle and an inspection of all driver records. The results of all MCSAP-sponsored inspections are uploaded into an FMCSA data management system, the Motor Carrier Management Information System (MCMIS).

Vehicles are frequently targeted for inspection under the MCSAP program. For example, whenever a cursory auditory and visual examination of a vehicle entering an inspection site reveals potential violations, the vehicle is inspected. In addition, many MCSAP inspectors have remote access to FMCSA's Inspection Selection System (ISS) software package, which allows them to enter a carrier's U.S. DOT Number and receive a recommendation as to whether the vehicle should be inspected, based on the carrier's inspection history and safety record. Consequently, the totality of inspections maintained in MCMIS are not a random sample and, generally, do not provide a reliable basis for calculating "true" OOS rates for the national truck and bus fleets regulated by the Agency.

Beginning as far back as 1969, representatives of the trucking industry have alleged that published DOT data on roadside inspections are not representative of the true state of vehicles on the road. In response, DOT began conducting controlled studies to determine whether its published OOS rates differed substantially from rates based on a statistical sample of trucks. The first such study, implemented during the summer of 1971, involved a random sample of 1,172 trucks. The study found that 28 percent of the trucks inspected had OOS violations.

In 1995, DOT decided to reassess the baseline OOS rate for the national truck fleet by means of a random sample. A total of 11 States participated in the study, which was implemented in the summer of 1996. The 1996 survey involved more than 10,000 truck

inspections, including some 1,300 inspections of trucks carrying hazardous materials (HM). The estimated OOS rates from the study were 5 percent for drivers and 29 percent for vehicles.

The truck fleet survey was repeated in 1998, but only State-level estimates were produced from the survey data at that time. Because only 4 percent of the data came from inspections in the Northeast, the sample was not considered nationally representative. Subsequently, truck inspection data from the 1998 survey were used to derive unweighted estimates of 27 percent and 7 percent for national vehicle and driver OOS rates, respectively.

In 1999 and again in 2001, the Agency conducted similar surveys for buses, using both tour/charter bus destination sites and intercity bus terminals to perform inspections. The 1999 survey, involving 295 bus inspections at destination sites and 142 inspections at intercity bus terminals, yielded vehicle and driver OOS rates for tour buses of 23 percent and 3 percent, respectively, and vehicle and driver OOS rates for intercity buses of 18 percent and 9 percent, respectively. The 2001 survey, which involved 611 bus inspections at destination sites and 151 inspections at intercity bus terminals, yielded vehicle and driver OOS rates for tour buses of 13 percent and 4 percent, respectively, and vehicle and driver OOS rates for intercity buses of 18 percent and 0.3 percent, respectively. As indicated by these data, the results of FMCSA's bus fleet safety surveys have been less consistent over time than the results of its truck fleet surveys.

For the 2003 TFSS and BFSS, 2,835 truck inspections were conducted in 10 States, and 834 bus inspections (651 at destination sites and 183 at intercity terminals) were conducted in 25 States. For the truck survey, data collection began in late summer 2003 and continued into the fall. Data collection for the bus survey began in July 2003 and continued throughout the summer; in a few States, data collection took place in the fall.

Methodology

Truck Survey

For the 2003 TFSS, States were selected on the basis of geographic location and participation and cooperation in previous studies, so that the major geographic regions of the country would be represented. The 10 States participating in the study were California, Colorado, Connecticut, Georgia, Illinois, Maryland, New Jersey, New Mexico, North Carolina, and Washington.

The participating States were requested to perform nontargeted (random) inspections both at weigh stations (permanent facilities) and at nonfixed (makeshift) inspections sites on major highways in order to capture a representative sample of trucks traveling on the Nation's highways. Inspectors were also asked to estimate the daily volumes of truck traffic passing through each site (both fixed and nonfixed locations) for use in the estimation of national OOS rates, where locations with heavier truck volumes were weighted more heavily. Table 1 shows the numbers of inspections requested and achieved in each State.

Table 1. 2003 National Truck Fleet Safety Survey: Inspections Requested and Achieved by State and Location Type

State	Inspections Requested			Inspections Achieved		
	Fixed Sites	Nonfixed Sites	Total	Fixed Sites	Nonfixed Sites	Total
California	200	150	350	409	30	439
Colorado	100	60	160	100	88	188
Connecticut	150	80	230	156	147	303
Georgia	150	80	230	255	242	497
Illinois	150	80	230	179	85	264
Maryland	150	80	230	*	*	236
New Jersey	100	80	180	119	83	202
New Mexico	100	60	160	152	132	284
North Carolina	200	150	350	77	74	151
Washington	50	80	230	175	96	271
Total	1,350	900	2,350	1,622	977	2,835

*For Maryland, inspection data could not be separated by type of site.

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet Safety Survey.

As shown in Table 1, FMCSA did not receive estimates of daily traffic volumes at the truck inspection locations in Maryland. In addition, roughly one-half of the truck inspection data received from New Jersey did not include traffic volume information. Therefore, OOS rates calculated from the survey data for those two States were not weighted by truck volume. National estimates of vehicle and driver OOS rates were calculated by taking a weighted average of all the estimated OOS rates from the participating States, using 2003 estimates of large truck vehicle miles traveled (VMT) in each State as the weighting factors.

Bus Survey

A total of 648 inspections at tour/charter bus destination sites throughout the country were performed for the 2003 BFSS, as well as 183 inspections at intercity bus terminals. The tour bus destination sites and intercity bus terminals initially selected were the same sites selected for the 2001 bus fleet survey. (For the 2001 survey, separate master lists of tour bus destination sites with at least 16 buses per day and intercity bus terminals with at least 8 buses arriving per day had been developed. Based on those master lists, random samples of tour bus destination sites and intercity bus terminals were selected for the 2001 survey.)

Before the 2003 BFSS was implemented, FMCSA division offices throughout the country were asked to review the master list of tour bus destinations developed in 2001 and provide feedback on the viability of the sites listed in their States. Tour bus sites not expected to yield 16 buses were categorized as nonviable. Based on the feedback, a small number of site substitutions were made for previously selected sites that appeared nonviable in 2001. For each of the tour bus destinations selected in their States, MCSAP inspectors were instructed to inspect at least 16 buses. Table 2 shows the number of survey sites selected for the study, by State, and the number of inspections achieved at each site.

For both the truck and bus surveys, unweighted and weighted estimates of driver and vehicle OOS rates were produced. In addition, the data were used for various exploratory analyses.

Table 2. 2003 National Bus Fleet Safety Survey: Sites Selected and Sample Sizes Achieved by State

State	Site Name	Number of Inspections Achieved	Tour Bus/ Charter Bus Destination Sites	Intercity Bus Terminals
AZ	Grand Canyon	30	X	
CA	Disneyland	16	X	
CA	Yosemite	13	X	
CA	Los Angeles	19		X
CO	Denver	40		X
CT	Foxwood	18	X	
DC	National Mall	11	X	
DC	DC Terminal	7		X
FL	Disneyworld	2	X	
FL	Universal Studios	5	X	
FL	Seaworld	9	X	
GA	Six Flags	16	X	
GA	Atlanta	8		X
IL	Six Flags	9	X	
LA	Bossier Casino	16	X	
MD	Six Flags	16	X	
MI	Greektown Casino	6	X	
MI	Detroit	8		X
MN	Metrodome	17	X	
MN	Minneapolis	7		X
MO	Branson	25	X	
NJ	Six Flags	52	X	
NJ	Atlantic City	115	X	
NJ	Atlantic City	8		X
NY	New York City	13	X	
NY	Flushing	5	X	
NY	Port Authority	8		X
NY	Albany	8		X
NY	Buffalo	8		X
OH	Cedar Point	20	X	
OH	King's Island	17	X	
OH	Cleveland	8		X
RI	Providence	8		X
SC	Hilton Head	21	X	
SD	Mt. Rushmore	10	X	
TN	Grand Ole Opry	40	X	
TX	Six Flags	40	X	
TX	Dallas	22		X
TX	McAllen	8		X
TX	Houston	8		X
UT	Bryce National Park	35	X	
WA	Seattle Airport	17	X	
WI	Miller Stadium	17	X	
WI	Milwaukee	8		X
WY	Yellowstone	37	X	

Source: Federal Motor Carrier Safety Administration, 2003 National Bus Fleet Safety Survey.

Results: Out-of-Service Rates

Truck Survey

Table 3 shows the raw unweighted OOS rates for each State participating in the 2003 TFSS, for both fixed and nonfixed inspection locations. Large disparities in the unweighted OOS rates can be seen across States. For example, Connecticut and Georgia have rather high unweighted OOS rates, whereas California's are considerably lower. It is not clear whether such discrepancies are a result of actual differences in the safety fitness of the vehicles and drivers from State to State, or can be explained by variations in inspection procedures in different States.

Table 3. 2003 National Truck Fleet Safety Survey: Unweighted OOS Rates by State and Type of Inspection Site

State	Drivers				Vehicles			
	Fixed Sites		Nonfixed Sites		Fixed Sites		Nonfixed Sites	
	Sample Size	Driver OOS Rate	Sample Size	Driver OOS Rate	Sample Size	Vehicle OOS Rate	Sample Size	Vehicle OOS Rate
CA	409	2%	30	0%	409	21%	30	7%
CO	100	2%	88	5%	100	22%	88	22%
CT	156	12%	147	6%	156	46%	147	57%
GA	255	8%	242	5%	255	37%	242	48%
IL	179	5%	85	6%	179	41%	85	18%
MD ^a	—	—	—	—	—	—	—	—
NJ	119	0%	83	2%	119	29%	83	24%
NM	152	6%	132	3%	152	34%	132	36%
NC	77	5%	74	5%	77	24%	74	26%
WA	175	3%	96	0%	175	28%	96	31%

^aFor Maryland, inspection data could not be separated by type of site.

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet Safety Survey.

There are also large discrepancies in the OOS rates calculated for fixed and nonfixed sites in several States, including Connecticut (both driver and vehicle), Georgia (vehicle only), Illinois (vehicle only), and California (vehicle only). In the case of California, the extremely low vehicle OOS rate for the nonfixed sites may be due to the small sample size (30 inspections). For the three other States, possible explanations for the disparity are less apparent, although small sample sizes may again play a role.

Weighted OOS rates for each State, using the estimated truck volume at each site as the weighting factor, are shown in Table 4, along with the 2003 Level 1 OOS rates from MCMIS for comparison. State-level weighted estimates from the survey track fairly closely with the MCMIS Level 1 OOS rates in most cases. As noted for Table 3, however, in some cases there are wide disparities in OOS rates from State to State.

Weighted national estimates of driver and vehicle OOS rates from the 2003 TFSS are shown in Table 5. For comparison, calendar year 2003 Level 1 driver and vehicle national OOS rates based on MCMIS data are also shown. To produce the estimates, the following steps were followed:

Table 4. 2003 National Truck Fleet Safety Survey: Weighted OOS Rates and 2003 MCMIS OOS Rates by State

State	Drivers			Vehicles		
	Fleet Survey		MCMIS	Fleet Survey		MCMIS
	Sample Size	Driver OOS Rate	Driver OOS Rate	Sample Size	Vehicle OOS Rate	Vehicle OOS Rate
CA	439	1%	2%	439	15%	21%
CO	188	5%	7%	188	26%	34%
CT	303	14%	13%	303	52%	49%
GA	497	9%	11%	497	35%	40%
IL	264	7%	8%	264	42%	38%
MD ^a	236	7%	6%	236	34%	34%
NJ ^a	202	1%	4%	202	27%	31%
NM	284	6%	6%	284	32%	28%
NC	151	7%	5%	151	31%	19%
WA	271	4%	3%	271	28%	24%

^aFor Maryland and New Jersey, only unweighted estimates are available.

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet Safety Survey.

Table 5. Unweighted and Weighted National Estimates of OOS Rates from the 2003 National Truck Fleet Safety Survey and 2003 MCMIS Data

Source of National Estimate	Useable Observations	Driver OOS Rate	Vehicle OOS Rate
All 2003 TFSS Data, Unweighted	2,834 drivers 2,831 vehicles	5%	33%
2003 TFSS Data, Weighted	2,407 drivers 2,402 vehicles	5%	28%
2003 MCMIS Data	1,020,076 drivers 1,020,076 vehicles	5%	29%

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet Safety Survey and Motor Carrier Management Information System.

1. OOS rates were first calculated for each inspection site used in the study (sites with fewer than eight inspections or with zero OOS violations were pooled together).
2. Next, the total number of trucks passing through each site in an “out-of-service” condition was estimated by multiplying the percentage of trucks found to have OOS violations during the inspection period by the estimated truck volume for each location.
3. Next, the OOS rate for each State was estimated by summing the estimated numbers of trucks passing through each of the sites in an “out-of-service” condition (step 2, above) and dividing by the estimated total number of trucks passing through all sites, as shown in Table 4.
4. The weighted national estimate was then produced by taking a weighted average of the State OOS rates estimated in step 3, above, using estimates of large truck VMT in each of the States as the weighting factors. A more detailed description of the methodology used to produce the weighted, nationally representative estimates is provided in Appendix A.

The weighted national estimates from the 2003 TFSS are reasonably consistent with the 2003 Level 1 OOS rates obtained from MCMIS. The similarity of the TFSS and MCMIS results suggests that neither the targeting of vehicles for MCSAP inspections nor conducting the inspections primarily at fixed weigh stations (the primary source of inspection data feeding into MCMIS) contributes a significant bias to the OOS rates obtained from the MCMIS file.

A question that remains unanswered is why both the weighted OOS rates from the TFSS and the unweighted rates from MCMIS vary dramatically from State to State. For example, driver and vehicle OOS rates from California are consistently low, whereas driver and vehicle OOS rates from Connecticut are consistently high. One possibility is that the disparities arise from differences in the inspection procedures employed in different States; if this is the case, such disparities may be contributing a bias both to the MCMIS estimates and to the TFSS estimates.

Bus Survey

Table 6 shows the raw unweighted OOS rates for each inspection location in the 2003 BFSS. Overall estimates from the study, both unweighted and weighted (nationally representative), are shown in Table 7, along with the 2003 Level 1 OOS rates for buses from MCMIS for comparison. In the case of the bus terminal component of the sample, weighted estimates are not shown, because the sample size was too small to yield reliable weighted estimates.

State-level estimates were not produced for the bus study. For the truck study, State-level estimates were used to weight the data in order to arrive at a national estimate. Weighting by State VMT was considered necessary in the truck study because of the wide variation in truck VMT by State; for example, the estimate of 2003 large truck VMT in California is more than double that for any other State in the study. In the case of the bus study, however, variations in tour/charter bus VMT among the participating States were assumed to be less significant than variations in large truck VMT. In addition, State-level data on bus VMT are not readily available.

Nationally weighted estimates were produced for the tour/charter bus sample only, using the following steps:

1. OOS rates were first calculated for each inspection site used in the study.
2. Next, the total number of buses passing through each site in an “out-of-service” condition was estimated by multiplying the percentage of buses found to have OOS violations during the inspection period by the estimated bus volume (daily bus count) for each location.
3. The overall OOS rate was then estimated by summing the estimated numbers of buses passing through each of the sites in an “out-of-service” condition (step 2, above) and dividing by the estimated total number of buses passing through all sites, based on the daily bus counts.

Table 6. 2003 National Bus Fleet Safety Survey: Unweighted OOS Rates by State and Inspection Location

State	Inspection Location	Daily Volume	Vehicles Inspected	Vehicle OOS Rate	Drivers Inspected	Driver OOS Rate
AZ	Grand Canyon	29	29	17%	30	0%
CA	Disneyland	50	15	7%	16	0%
CA	Yosemite	38	12	0%	13	0%
CA	Los Angeles Terminal	59	19	0%	0	—
CO	Denver Terminal	22	39	33%	11	0%
CT	Foxwood Casino	75	18	11%	18	17%
DC	National Mall	200	11	36%	11	0%
DC	DC Terminal	60	7	57%	7	0%
FL	Disneyworld	50	2	0%	2	0%
FL	Seaworld	50	5	20%	5	0%
FL	Universal	50	9	11%	9	0%
GA	Six Flags	60	16	50%	16	25%
GA	Atlanta Terminal	60	8	37%	8	13%
IL	Six Flags	9	9	89%	9	22%
LA	Bossier City	16	16	13%	16	0%
MD	Six Flags	25	16	25%	16	0%
MI	Greektown Casino	6	6	33%	6	0%
MI	Detroit Terminal	28	8	38%	8	0%
MN	Metrodome	7	17	6%	17	0%
MN	Minneapolis Terminal	21	7	57%	7	0%
MO	Branson	23	25	16%	25	4%
NJ	Atlantic City	900	115	29%	115	3%
NJ	Morey's Pier	20	3	0%	3	0%
NJ	Six Flags	50	52	19%	52	0%
NJ	Atlantic City Terminal	58	8	13%	8	0%
NY	NYC Attractions	100	13	23%	13	0%
NY	Flushing	25	5	0%	5	0%
NY	Port Authority	360	8	0%	8	13%
NY	Albany Terminal	65	8	63%	8	0%
NY	Buffalo Terminal	42	8	13%	8	0%
OH	Cedar Point	27	20	5%	20	0%
OH	King's Island	12	17	12%	17	12%
OH	Cleveland Terminal	26	8	25%	0	—
RI	Providence Terminal	31	8	0%	8	0%
SC	Hilton Head	25	21	0%	21	0%
SD	Mt. Rushmore	8	10	30%	10	0%
TN	Grand Ole Opry	50	40	13%	5	0%
TX	Six Flags	18	40	25%	21	14%
TX	Dallas Terminal	72	22	0%	0	—
TX	McAllen Terminal	71	8	0%	8	25%
TX	Houston Terminal	21	8	50%	8	13%
UT	Bryce Canyon	10	35	23%	35	0%
WA	Sea-Tac Airport	17	17	0%	17	0%
WI	Brewer's Stadium	17	17	0%	17	0%
WI	Milwaukee Terminal	15	8	13%	0	—
WY	Yellowstone	20	37	5%	37	3%

Source: Federal Motor Carrier Safety Administration, 2003 National Bus Fleet Safety Survey.

Table 7. Unweighted and Weighted Estimates of OOS Rates from the 2003 National Bus Fleet Safety Survey and 2003 MCMIS Data

Source of Estimate	Useable Observations	Driver OOS Rate	Vehicle OOS Rate
Bus Fleet Safety Survey			
<i>Tour/Charter Bus Sample</i>			
Unweighted (All Data)	597 drivers 648 vehicles	3%	19%
Weighted National Estimate	597 drivers 648 vehicles	3%	26%
<i>Intercity Bus Sample^a</i>			
Unweighted (All Data)	97 drivers 182 vehicles	5%	23%
2003 MCMIS Level 1 OOS Rates: Motorcoaches, Buses, School Buses	3,123 inspections	3%	15%

^aNo weighted national estimates were produced for this category due to the limited sample size.
Sources: Federal Motor Carrier Safety Administration, 2003 National Bus Fleet Safety Survey and Motor Carrier Management Information System.

As shown in Table 7, the driver OOS rates from the tour/charter bus component of the survey are similar to those calculated from all 2003 Level 1 bus inspections in MCMIS: a 3-percent driver OOS rate was estimated both for the tour/charter bus sample and for the 2003 MCMIS Level 1 inspections of buses, motor coaches, and school buses. A 5-percent driver OOS rate (unweighted) was estimated for the intercity bus component of the survey; however, the estimate should not be considered nationally representative. Vehicle OOS rates calculated from the 2003 BFSS data are considerably higher than those calculated from Level 1 MCMIS inspection data: 26 percent for the tour bus sample and 23 percent (unweighted) for the intercity bus sample, as compared with 15 percent for the Level 1 MCMIS inspection data for buses, motorcoaches, and school buses.

Comparison of the results from Table 5 and Table 7 shows that both the weighted and unweighted driver and vehicle OOS rate estimates for the tour/charter bus sample are similar to, but slightly lower than, those for the truck sample in the 2003 fleet surveys. The weighted driver OOS rate estimated from the tour/charter bus sample is 3 percent, compared with the estimate of 5 percent from the truck sample; and the weighted vehicle OOS rate from the tour/charter bus sample is 26 percent, compared with 28 percent from the truck sample. Only unweighted estimates of OOS rates were produced for the

intercity bus sample because of the limited number of inspections performed; however, the unweighted driver OOS rate for the intercity bus sample (5 percent) is the same as the weighted estimate for the truck sample. The unweighted vehicle OOS rate for the intercity bus sample is 23 percent.

Additional Data Analyses

In addition to the estimation of driver and vehicle OOS rates, several other exploratory analyses were performed on the truck and bus survey databases. Findings from two of these analyses—the association between driver and vehicle OOS violations and the most common OOS violations found—are discussed below.

Association Between Driver and Vehicle OOS Violations

In the truck sample and the tour/charter bus sample from the 2003 fleet safety surveys, associations were found between vehicle and driver OOS violations (Table 8). In the truck study, 7 percent of the inspections that found at least one vehicle OOS violation also found at least one driver OOS violation, whereas only about 4 percent of the inspections that found no vehicle OOS violations found at least one driver OOS violation (based on unweighted data). Thus, trucks with at least one vehicle OOS violation were nearly twice as likely as trucks with no vehicle OOS violations (7/4) to have a driver OOS violation. Conversely, 49 percent of the inspections that found at least one driver OOS violation also found at least one vehicle OOS violation, whereas only 32 percent of the inspections that found no driver OOS violations found at least one vehicle OOS violation. Hence, trucks with at least one driver OOS violation were more than 1.5 times as likely as trucks with no driver OOS violations (49/32) to have a vehicle OOS violation.

Similarly, in the bus study, 8 percent of the inspections in the tour/charter bus sample that found at least one vehicle OOS violation also found at least one driver OOS violation, but only 2 percent of the inspections that found no vehicle OOS violations found at least one driver OOS violation (based on unweighted data). Thus, tour/charter buses with at least

one vehicle OOS violation were four times as likely as buses with no vehicle OOS violations (8/2) to have a driver OOS violation. Conversely, 47 percent of the inspections that found at least one driver OOS violation also found at least one vehicle OOS violation, but only 18 percent of the inspections that found no driver OOS violations found at least one vehicle OOS violation. In this case, buses with at least one driver OOS violation were nearly three times more likely to have a vehicle OOS violation than were buses with no driver OOS violations (47/18).

Table 8. 2003 National Truck Fleet and Bus Fleet Safety Surveys: Association Between Driver and Vehicle OOS Violations

Source of Estimate	Driver OOS Rate		Vehicle OOS Rate	
	Inspections With No Vehicle OOS Violations Found (Unweighted)	Inspections With at Least One Vehicle OOS Violation Found	Inspections With No Driver OOS Violations Found (Unweighted)	Inspections With at Least One Driver OOS Violation Found
Truck Survey	4%	7%	32%	49%
Bus Survey Tour/Charter Bus Sample	2%	8%	18%	47%

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet and Bus Fleet Safety Surveys.

Most Common OOS Violations

The most common OOS violations found in the 2003 truck and bus safety surveys are listed in Table 9 (trucks), Table 10 (tour/charter buses), and Table 11 (intercity buses). Because similar violations were found in the three samples, the results are discussed together.

In both the truck and bus studies, brake-related violations were the most common type of OOS violation, accounting for 39 percent of all OOS violations (both vehicle and driver) in the truck survey sample (Table 9), 26 percent of all OOS violations in the tour/charter bus sample (Table 10), and 36 percent of all OOS violations in the intercity bus sample (Table 11). The most common driver OOS violations found were “No Record of Duty Status” and “Failure to Retain Logs for 7 Days,” which together constituted 48 percent of

all driver OOS violations in the truck study (Table 9) and 70 percent of all driver OOS violations in the tour/charter bus sample (Table 10).

Table 9. 2003 National Truck Fleet Safety Survey: Most Common Vehicle and Driver OOS Violations Found

Violation Code	Violation Description	Percentage of Total Violations Found	
		All Vehicle OOS Violations	All OOS Violations
Vehicle			
396.3A1BA	Brake Out of Adjustment	20%	19%
396.3A1B	Brakes (General)	8%	8%
396.3 (a) (1)	Inspection, Repair, and Maintenance	8%	8%
393.48 (a)	Inoperative/Defective Brakes	8%	7%
393.47	Inadequate Brake Lining	6%	5%
Driver			
395.8A	No Record of Duty Status	25%	2%
395.8K2	Failure to Retain Logs for 7 Days	23%	2%
393.23A2	No Valid Commercial Driver's License	8%	<1%
395.3A1	10 Hour Rule Violation	8%	<1%
395.8E	False Record of Duty Status	7%	<1%

Source: Federal Motor Carrier Safety Administration, 2003 National Truck Fleet Safety Survey.

Table 10. 2003 National Bus Fleet Safety Survey, Tour/Charter Bus Sample: Most Common Vehicle and Driver OOS Violations Found

Violation Code	Violation Description	Percentage of Total Violations Found	
		All Vehicle OOS Violations	All OOS Violations
Vehicle			
396.3 (a) (1)	Inspection, Repair, and Maintenance	14%	13%
396.3A1BA	Brake Out of Adjustment	14%	12%
396.3A1B	Brakes (General)	12%	11%
393.61 (b) (2)	No/Defective Emergency Exits	8%	7%
393.25 (f)	Stop Lamp Violations	4%	4%
393.51	Defective Brake Warning	4%	3%
Driver			
395.8K2	Failure to Retain Logs for 7 Days	40%	4%
395.8A	No Record of Duty Status	30%	3%
393.23A2	No Valid Commercial Driver's License	15%	1%
391.11B5	Commercial Driver's License From More Than One State	10%	1%

Source: Federal Motor Carrier Safety Administration, 2003 National Bus Fleet Safety Survey.

Table 11. 2003 National Bus Fleet Safety Survey, Intercity Bus Sample: Most Common Vehicle and Driver OOS Violations Found

Violation Code	Violation Description	Number of Violations Found	Percentage of Total Violations Found
Vehicle			
396.3A1BA	Brake out of Adjustment	18	31%
396.3A1	Inspection, Repair, and Maintenance	5	8%
396.3A1B	Brakes (General)	3	5%
393.209D	Steering System	3	5%
393.61B	Window Escape Inoperative	3	5%
393.25F	Stop Lamp Violations	3	5%
Driver			
391.11B5	Commercial Driver's License From More Than One State	4	7%

Source: Federal Motor Carrier Safety Administration, 2003 National Bus Fleet Safety Survey.

Discussion

Results from the 2003 TFSS are reasonably consistent with the results of previous surveys. The 1996 truck fleet survey, which was the most comprehensive OOS rate survey conducted before 2003, produced a weighted national estimate of 29 percent for the vehicle OOS rate, as compared to 28 percent in the 2003 TFSS. The 1996 truck survey also produced a weighted estimate for the national driver OOS rate that was similar to the 5-percent rate in the 2003 survey.

The OOS rates estimated from the 2003 TFSS track closely with the rates derived from all 2003 Level 1 inspections in the MCMIS database. The similarity of the results suggests that the routine targeting of vehicles during the inspection process has not, historically, contributed a significant bias to OOS rates calculated from MCMIS inspection data. Likewise, their similarity suggests that conducting inspections primarily at fixed weigh stations does not contribute a significant bias to the MCMIS OOS rates. To the extent that such bias is minimal, the OOS rates calculated from MCMIS Level 1 inspection data accurately reflect the safety fitness of the trucks and drivers that operate on U.S. highways and are regulated by FMCSA.

A question that remains unanswered is why both the OOS rates from the 2003 TFSS and the unweighted rates from MCMIS vary dramatically from State to State. For example,

the unweighted vehicle OOS rate from more than 300 TFSS inspections conducted in Connecticut in 2003 was 52 percent, as compared with an unweighted vehicle OOS rate of 27 percent from more than 200 TFSS inspections in New Jersey. One possibility is that the disparities arise from differences in the inspection procedures employed in different States; if this is the case, such disparities may be contributing a bias both to the MCMIS estimates and to the truck survey estimates. More research is needed to determine whether variations in inspection protocols from State to State are in fact contributing to the large disparities.

The results of the 2003 BFSS differ somewhat from the results of some of FMCSA's earlier surveys. For the tour/charter bus component, the weighted national driver OOS rate calculated from the 2003 survey results (3 percent) is consistent with those from the 1999 and 2001 surveys (3 percent and 4 percent, respectively); however, the weighted vehicle OOS rate from the 2003 survey (26 percent) differs from both the 1999 and 2001 results (23 percent and 13 percent, respectively). In addition, the vehicle OOS rates calculated from the 2003 BFSS are considerably higher than the corresponding MCMIS rate for all passenger buses. The vehicle OOS rate based on 2003 Level 1 bus inspection data from MCMIS is 15 percent, as compared with a weighted estimate of 26 percent from the 2003 tour bus sample and an unweighted estimate of 23 percent from the intercity bus sample.

The weighting scheme used for the tour/charter bus component of the 2003 BFSS differs from the methodology that was used for the 1999 and 2001 surveys. For the 1999 and 2001 studies, it was assumed that the master list of tour bus destination locations (the sampling frame) was comprehensive. As a result, traditional sampling weights were developed, based on a stratified sampling design, using geographic region (Northeast, South, Midwest, and West) as the basis for stratification. That approach assumed that the sampling frame was not missing any popular tour bus destinations, and that the destination locations listed on the frame for each stratum were similar in terms of the types of buses they attracted. To the extent that either assumption was incorrect, the resulting estimates may have been inaccurate.

The weighting scheme used for the tour bus destination locations in the 2003 BFSS is based on a simpler methodology (simple random sampling from an infinite population) that makes fewer assumptions about the sampling frame or about the similarity of the locations being sampled.

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Under FMCSA's Motor Carrier Safety Assistance Program (MCSAP), the truck and bus inspection data used for these studies were collected by State and local commercial motor vehicle inspectors in Arizona, California, Colorado, Connecticut, the District of Columbia, Florida, Georgia, Illinois, Louisiana, Maryland, Michigan, Minnesota, Missouri, New Jersey, New Mexico, New York, North Carolina, Ohio, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, and Wyoming. Participation of States in the 2003 National Truck Fleet and Bus Fleet Safety Surveys was entirely voluntary, and FMCSA extends its appreciation to these states. Cleaning of the inspection data was performed under contract by IBM Business Consulting Services. IBM also performed many of the analyses discussed in this report, including analyses of the most common violations found and the calculation of driver and vehicle OOS rates for the bus study. OOS rates for the truck study were calculated by FMCSA analysts.

Appendix A

Methodology Used To Produce Weighted National Estimates

This appendix describes the methods used to compute the weighted, nationally representative OOS rates for the 2003 National Truck Fleet and Bus Fleet Safety Surveys, including: (1) estimation procedures for the truck survey, (2) estimation procedures for the tour/charter bus destination site component of the bus survey, and (3) estimation procedures for the intercity bus terminal component of the bus survey.

Truck Survey

For the truck survey, OOS rates were first estimated for each State, using the following formula:

$$(1) \quad R_i = (\sum V_{i,j} \times R_{i,j}) / \sum V_{i,j} \quad ,$$

where:

R_i = the estimated percentage of trucks in State i that are in out-of-service condition,

$R_{i,j}$ = percentage of inspections from site j in State i that resulted in an out-of-service order, and

$V_{i,j}$ = the estimated 8-hour truck volume for site j in State i .

Next, an overall national OOS rate was estimated, using a weighted average of the State rates calculated in Equation (1) above, with data on truck VMT in 2003 as the weighting factor:

$$(2) \quad R = (\sum VMT_i \times R_{i,j}) / \sum VMT_i \quad ,$$

where:

R = estimated national percentage of trucks that are in out-of-service condition, and

VMT_i = estimated truck vehicle miles traveled in State i during 2003.

Bus Survey

For the bus survey, the procedure for producing the weighted OOS rates for tour/charter buses was similar to that used for the trucks, except that weighting by State VMT was not used. The procedure is shown in the following formula:

$$(3) \quad R = (\sum V_j \times R_j) / \sum V_j \quad ,$$

where:

R = the estimated national percentage of buses that are in out-of-service condition,

R_j = the percentage of buses from site j that are in out-of-service condition, and

V_j = the estimated daily bus volume for site j .