

The vision of the Office of Motor Carriers (OMC) is to help move people, goods, and commercial motor vehicles on our Nation's highways in the most efficient, economical, and crash-free manner possible. The goal of OMC's Office of Information Analysis is to develop and maintain systems for collecting and analyzing motor carrier data and to disseminate information concerning the motor carrier industry.

The Analysis Division analyzes motor carrier data pertaining to crashes, inspections, compliance reviews, and drug and alcohol testing; supports research on the effectiveness of OMC programs, such as roadside inspections and compliance reviews; and helps States to comply with Federal size and weight statutes for trucks.



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# 1996 National Fleet Safety Survey

## Introduction

Approximately 2 million roadside inspections of commercial motor vehicles (CMVs) are conducted annually, primarily through the joint Federal and State Motor Carrier Safety Assistance Program (MCSAP). Vehicles and drivers with serious safety problems are placed out-of-service (OOS) and are not allowed to continue operations until the condition is corrected. Inspections are not conducted randomly; inspectors focus on vehicles that pose safety risks. While this is a reasonable enforcement strategy, it limits the Federal Highway Administration's (FHWA) ability to use these data to estimate the "true" OOS rate, i.e., the percentage of vehicles and drivers that would be placed OOS if all vehicles were inspected. To estimate this rate, the FHWA conducted the National Fleet Safety Survey (NFSS) in the summer of 1996, during which a number of States randomly inspected CMVs.

The FHWA decided to take advantage of this unique survey to gather information not regularly obtained during inspections, including data on driver training and experience. In addition, because of widespread interest in the safety of hazardous material (HM) shipments, vehicles carrying placardable quantities of HM were oversampled, whereby an extra number of HM vehicles was chosen for inspection.

This Analysis Brief presents a summary of the 1996 National Fleet Safety Survey which is fully documented in a separate report (FHWA-MC-98-015).

## Research Methodology

A three-stage sample design was employed: States were selected in the first stage, inspection locations in the second, and trucks in the third stage.

### Stage 1: States

Due to practical considerations, only States that were willing to participate were eligible for selection in the first stage of selection. The 17 States that volunteered to participate in the NFSS were divided into 4 strata, based on their past overall Level 1 OOS rates from MCSAP inspections:

- Less than 32 percent of vehicles placed OOS
- 32 percent to 39 percent of vehicles placed OOS
- 39 percent to 46 percent of vehicles placed OOS
- Over 46 percent of vehicles placed OOS

Three States were purposively (not randomly) selected from each strata, and one State withdrew from the survey, leaving 11 participants. The FHWA attempted to ensure the sample was geographically disperse, given the limited number of candidate States.

### Stage 2: Inspection Sites

Fixed and non-fixed inspection sites were selected within each State from each of four road and area types:

- Rural Interstate roads
- Rural Non-Interstate roads



- Urban Interstate roads
- Urban Non-Interstate roads

Because of practical difficulties in selecting sites, selection of the sites was left to the States. Although the selection of sites was purposive rather than random, States were instructed to select as many different kinds of sites as possible and were given a minimum number of sites to be selected within each road-type category.

### Stage 3: Inspections

The required number of inspections was allocated to the States loosely following the rule of optimal allocation, using vehicle miles of travel (VMT) as a size measure, so that States with more truck travel conducted a greater number of inspections. States were asked to initially sample the third eligible truck. Thereafter, States were to sample the next truck available, and to continue in this fashion until the completion of the shift.

To ensure that a sufficient number of HM trucks was inspected, States were requested to set aside one day for inspecting HM trucks exclusively. However, not all States followed this procedure, and some of those that did still did not inspect a large enough number of HM trucks to allow for viable estimates by road and area type.

Two samples were generated: an “all-trucks sample” which included all inspections conducted in the survey, and an “HM-only sample” which was limited

to inspections conducted on the day only HM trucks were inspected. Some States had difficulty meeting the allocated sample sizes in certain road and area types, particularly on urban, non-interstate roads. The number of inspections conducted by each State in each road and area type is shown in **table 1**.

#### Formula 1.

$$P = (\sum p_h \times N_h) \div \sum N_h$$

where,

$P_h$  is the percentage of trucks that are OOS in stratum  $h$ ,

$N_h$  is the number of trucks in stratum  $h$ , and

$h$  is the stratum defined by the road and area type.

### Estimation

Estimates of the OOS rate were calculated using **formula 1**. Because the value of  $N_h$  (the number of trucks operating in different sampling strata) is unknown, we used truck VMT as a proxy. Since the assumption that VMT is highly correlated with  $N_h$  is a reasonable one, only minimal bias may be introduced into the estimator.

### Results

Over 10,000 level 1 inspections were conducted in the NFSS. The overall OOS rate was 32 percent: 29 percent for vehicles and 5 percent for drivers. (The vehicle and

**Table 1.**  
**Level 1 Inspections Conducted in the “All-Trucks Sample” 1996 National Fleet Safety Survey**

State	Rural		Urban	
	Interstate	Non-Interstate	Interstate	Non-Interstate
California	175	77	731	227
Connecticut	180	174	34	49
Illinois	209	164	17	54
Kansas	112	221	31	53
Maryland	441	134	225	102
Missouri	2005	512	20	24
New Mexico	197	62	98	1
North Carolina	216	201	192	151
Ohio	512	267	106	66
Washington	219	435	171	110
Wisconsin	405	335	225	19
<b>Total</b>	<b>4,671</b>	<b>2,582</b>	<b>1,850</b>	<b>856</b>

**Table 2.**  
**1996 National Fleet Safety Survey and FY 1996 MCSAP Out-of-Service Rates (Level 1 Inspections)**

State	Fleet Survey Results			MCSAP Results	
	Total OOS Rate	Driver OOS Rate	Vehicle OOS Rate	Driver OOS Rate	Vehicle OOS Rate
California	.22	.02	.21	.03	.26
Connecticut	.31	.07	.27	.10	.51
Illinois	.33	.12	.26	.05	.31
Kansas	.35	.07	.30	.05	.33
Maryland	.37	.04	.35	.05	.36
Missouri	.37	.07	.34	.10	.46
North Carolina	.36	.05	.32	.06	.32
New Mexico	.39	.10	.34	.07	.41
Ohio	.38	.09	.34	.12	.43
Washington	.29	.04	.27	.05	.32
Wisconsin	.30	.02	.29	.08	.37
<b>Nation</b>	<b>.32</b>	<b>.05</b>	<b>.29</b>	<b>.06</b>	<b>.32</b>

Source: FHWA 1996 Fleet Survey and MCSAP FY96 Quarterly Report File

driver rates do not add up to the overall 32 percent total OOS rate because some instances were found where both the vehicle and driver were OOS.) These rates were slightly lower than the comparable fiscal year 1996 MCSAP OOS rates, as was expected, and the differences appear to be statistically significant at the national level. **Table 2** presents the national and State-specific OOS rates from the NFSS and MCSAP.

The most common OOS violations were brake related, accounting for almost half of those found in the NFSS. Approximately half of the brake violations were for out-of-adjustment brakes. This distribution of violations was the same for HM vehicles.

The OOS rates differed slightly for different locations or levels of driver experience. OOS rates were similar for fixed and non-fixed sites, for day and night inspections, for drivers with different levels of training and experiences, and with different types of loads. The differences in OOS rates across these categories were not statistically significant. One interesting and statistically significant difference was that drivers with 3 or fewer years of experience and no training had a dramatically higher OOS rate than drivers who had received some training: 51 percent compared to 31 percent.

OOS rates were somewhat lower at urban than at rural inspection sites. For interstates, urban sites had an OOS rate of 30 percent compared to 33 percent at

rural sites; for non-interstates, rates were 29 percent and 34 percent, respectively.

Based on the NFSS, approximately 7.2 percent of trucks carry placardable amounts of HM. Twenty-seven percent of vehicles carrying HM were placed OOS: 25 percent for vehicle violations and 4 percent for driver violations. These numbers are somewhat lower than found for all inspections, and the differences are statistically significant. For HM vehicles, unlike the other vehicles in the survey, there was no difference in the OOS rates between rural and urban inspections. Seventy-eight percent of trucks requiring HM registration had the correct documentation, and these vehicles had a lower OOS rate than those lacking appropriate registration documentation.

### Future Plans

A second NFSS was conducted in June and July of 1998, with about double the number of States participating. The results from this NFSS will be used to refine the estimate of the true OOS rate, and to measure any change since 1996.

**Researcher**

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**Distribution**

This Analysis Brief is being distributed according to a standard distribution. Direct distribution is being made to the Regions and Divisions.

**Availability**

The final analysis report is now available. Copies can be obtained from the OMC's Office of Information Analysis, Analysis Division. Telephone: (202) 366-1861.

**Key Words**

trucks, out-of-service rates, survey, hazardous materials (HM).

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