

The goal of the Federal Motor Carrier Safety Administration (FMCSA) is to reduce the number and severity of large truck-involved crashes through more commercial motor vehicle and operator inspections and compliance reviews, stronger enforcement measures against violators, expedited completion of rulemaking proceedings, scientifically sound research, and effective commercial driver's license testing, record-keeping, and sanctions.

The Office of Data Analysis and Information Systems develops and maintains systems for collecting and analyzing motor carrier data, and disseminates information on the motor carrier industry.

This Analysis Brief has been produced by the Analysis Division within the FMCSA's Office of Data Analysis and Information Systems. The Division analyzes motor carrier data pertaining to crashes, inspections, compliance reviews, and drug and alcohol testing; and supports research on the effectiveness of FMCSA inspections and compliance review programs.



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Motor Carrier Drug and Alcohol Violations: Comparison of Compliance Review Data from SafeStat Selected Carriers and a Random Sample of Carriers

Introduction

As of January 1, 1996, all domestic motor carriers with active commercial driver's license (CDL) operators must have a controlled substance and alcohol testing program. Foreign-based carriers with operations in the United States are also required to have similar programs (see Part 382.115 of the Federal Motor Carrier Safety Regulations [FMCSRs]). Noncompliance with specific requirements of Part 382 of the FMCSRs (Controlled Substances and Alcohol Use Testing) may affect a carrier's compliance review (CR) safety rating.

There has been interest, both within and outside the Federal Motor Carrier Safety Administration (FMCSA, formerly the Office of Motor Carriers of the Federal Highway Administration), in the extent to which motor carriers are in compliance with Part 382, as well as the extent to which the agency's CR selection software, known as SafeStat (Safety Status), captures noncompliant carriers. To address this issue, a random sample of motor carriers was selected in 1997 for special "drug and alcohol" compliance reviews (focusing solely on compliance with Part 382). These reviews were conducted during the latter half of 1997 and in 1998. The results from this random sample were then compared to data collected from motor carriers recently targeted for review by SafeStat. The methodology and results of this analysis are presented below.

Methodology

Eight hundred motor carriers were randomly selected from FMCSA's Motor Carrier Management Information System (MCMIS) Census File for "drug and alcohol" reviews by means of a stratified random sample. With this approach, carriers in the MCMIS sampling frame were first grouped into size classes, based on their total CDL driver count. A systematic sample of carriers (selecting every *k*th unit) was then selected in each size class stratum. The size-class definitions, as well as the number of motor carriers selected and reviewed in each size class, are given in **Table 1**. The size class labeled "Unknown No. CDL Drivers" represents carriers whose total CDL driver count was equal to zero in the MCMIS Census File—indicating that the total is either zero or unknown. If it was later determined that such a carrier had no CDL drivers, the review was not conducted since Part 382 would not apply.

The discrepancy shown in the table between the number of carriers selected into the sample in each stratum and the number of selected carriers actually reviewed resulted from several factors. First, a selected carrier may have had a recent review, making it inappropriate to conduct another one during this time period. Second, in



Table 1.
**Number of Carriers Selected into CR Random Sample
By Size-Class Stratum**

Size Class of CDL Drivers	Number in Population	Number Selected	Number of Selected Receiving CR
Unknown	290,406	310	81
1–19	78,798	210	86
20–49	4,165	70	46
50–99	1,496	70	45
100–999	1,399	70	45
1000+	102	70	42
Total	376,366	800	345

Table 2.
**Percentage of Carriers in Random Sample in Noncompliance
with Part 382 by Size Class and Violation Type**

Size Class of CDL Drivers (from MCMIS)	At Least One Acute Violation	At Least One Critical Violation	No Program in Place	At Least One Violation
Unknown	48%	16%	35%	62%
1–19	40%	10%	24%	45%
20–49	9%	33%	2%	39%
50–99	4%	18%	0%	18%
100–999	9%	13%	2%	16%
1000+	5%	17%	0%	19%

the case of carriers in the “Unknown” size class, a selected carrier may have been found to have no CDL drivers, making it exempt from Part 382. Finally, the total number of carriers actually reviewed depended on the resources available in each FMCSA Service Center for conducting such reviews.

Data on motor carrier compliance with Part 382 from the 345 carriers in the random sample were compared with similar data collected from motor carriers selected for compliance reviews by SafeStat. For the SafeStat comparison group, only carriers reviewed in 1998 and having known CDL counts in MCMIS were considered. (Had the carriers with “Unknown” CDL counts been included in this group, it would have been impossible to distinguish between those carriers with no Part 382 violations because they have no CDL drivers, and those carriers with no Part 382 violations because they are in full compliance, since CDL driver counts are not currently a data element in MCMIS’s compliance review data base; for the random sample, such carriers did not have to be excluded since reviews were performed only when carriers had CDL drivers.)

Findings

The percentage of carriers reviewed in the random sample with at least one acute violation, at least one critical violation, and any violation of Part 382 is given below in Table 2, broken down by carrier size. The table indicates that those carriers whose CDL driver information was missing in MCMIS (size class unknown) had the highest rates of noncompliance with Part 382 (62 percent), followed by the “1–19 CDL Driver” size class (45 percent). Based on the information presented in the table, these high violation rates may stem from the fact that many of these carriers do not have testing programs in place. Not having a testing program in place is an acute violation of Part 382, and may also explain why a large percentage of the carriers in these two class sizes have at least one acute violation (48 percent and 40 percent respectively).

The percentages given in Table 2 for each size-class stratum can be used to produce population estimates for the percentage of carriers in the industry, as a whole, that are in noncompliance with Part 382. Population estimates for the four violation categories shown in the table were generated using the

standard statistical formula for estimating a population percentage P from a stratified random sample:

$$(1) \quad P = (1/N) * \sum N_h * p_h,$$

where p_h is the estimate of the percentage of carriers in stratum h having the characteristic in question, N_h is the total number of carriers in stratum h , N is the total number of carriers in the population, and the summation is across all strata. Formula #1 represents a weighted average of the size-class percentage estimates, where each size-class estimate is weighted according to its population size (see Table 1).

The statistical precision of P is measured by its variance, V :

$$(2) \quad V = [1 / N^2] * \sum N_h^2 * (N_h - n_h) * \{p_h * (1 - p_h) / n_h\} / (N_h - 1),$$

where n_h is the number of units sampled in stratum h . Based on the variance, V , a 95 percent confidence interval can be developed for each population estimate. Based on statistical theory, one would

expect the population estimate to fall within the confidence interval 95 percent of the time, if the survey were to be replicated multiple times.

Population estimates and their associated confidence intervals are presented below in **Table 3** for the four violation categories.

Table 3. Population Estimates of the Percentage of Carriers in Noncompliance with Part 382, by Type of Violation, Based on the Random Sample			
At Least One Acute Violation	At Least One Critical Violation	No Program in Place	At Least One Violation
46% ± 9%	15% ± 6%	32% ± 8%	58% ± 8%

Because the motor carriers in the “unknown CDL” size class constitute such a large fraction of the total motor carrier population (77 percent), it is not surprising that the estimates given above are primarily driven by the data collected from this size class (this can be seen directly by comparing **Table 3** with the results obtained for the “unknown CDL” size class in **Table 2**).

Table 4. Population Estimates of the Percentage of Carriers in Noncompliance with Part 382, for Carriers with Known CDL Counts in MCMIS, by Type of Violation, Based on Random Sample			
At Least One Acute Violation	At Least One Critical Violation	No Program in Place	At Least One Violation
37% ± 9%	12% ± 6%	23% ± 8%	44% ± 10%

If the “Unknown Number of CDL Drivers” size-class stratum is excluded from the analysis, similar non-compliance rates can be made for the segment of the motor carrier population whose CDL driver information is known in MCMIS. This information is given in **Table 4**. In this case, the estimates are primarily driven by the data collected from the “1 to 19” size class, which constitutes 92 percent of this sub-population. Limiting the scope of the estimates to this subpopulation allows for a direct comparison between the overall random sample estimates and the overall estimates from the SafeStat comparison group.

SafeStat Comparison Group

The percentage of motor carriers from the SafeStat comparison group in noncompliance with Part 382 is given in **Table 5**.

Comparing **Table 5** with **Table 2**, one notes that the random sample found a slightly higher percentage

of noncompliant carriers in the smaller size classes, whereas the SafeStat comparison group has a considerably higher percentage of such carriers in the larger size classes. The largest discrepancy occurs in the “1–19” size class, where the random sample found considerably more carriers with no drug testing program in place (24 percent vs. 13 percent). This result, however, may be due to the fact that the companies reviewed in this size class tended to be somewhat smaller in the case of the random sample: the average number of drivers for these carriers was 3.9 for the random sample, compared to 8.1 for the SafeStat comparison group. Smaller companies with minimal management structure (particularly owner operators) may be more likely than larger companies to have no drug testing program in place.

Overall, 37 percent of the carriers reviewed in the SafeStat comparison group had at least one Part 382 violation. This compares to a population estimate of 58 percent for all motor carriers, based on the

Table 5. Percentage of Carriers in in SafeStat Comparison Group in Noncompliance with Part 382 by Size Class and Violation Type					
Size Class of CDL Drivers	No. Reviews	At Least One Acute Violation	At Least One Critical Violation	No Program in Place	At Least One Violation
1–19	2,600	24%	22%	13%	40%
20–49	594	7%	26%	2%	29%
50–99	218	9%	24%	1%	28%
100–999	189	5%	22%	0%	24%
1000+	5	0%	20%	0%	20%
All Carriers	3,606	20%	22%	10%	37%

Researcher

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

Availability

This Analysis Brief is available from the Office of Data Analysis and Information Systems, Telephone: (202) 366-1861.

Key Words

motor carriers, CDL drivers, controlled substance and alcohol testing programs, random sample survey, compliance review, acute violations, critical violations.

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random sample (Table 3), and a population estimate of 44 percent for all motor carriers with nonzero CDL counts in the MCMIS file (Table 4). Since the 37 percent noncompliance rate for the SafeStat comparison group falls within the 34 to 54 percent confidence interval obtained from the random sample for the nonzero CDL population, this 7 percent difference between the results from the random survey and SafeStat cannot be shown to be statistically significant (i.e., from the limited data, the difference cannot be shown to be real, even if it is).

Since small carriers constitute a large fraction of the motor carrier population (and hence are weighted heavily by formula #1, above) and also have the highest noncompliance rates for Part 382, one would expect the population estimates of noncompliance based on the random sample to be higher than similar rates obtained from SafeStat. In fact, it is quite likely that in order to achieve anything close to a 44 percent noncompliance rate with carriers targeted by SafeStat, at least 90 percent of them would have to be conducted in the "1-19" size class.

Summary

Data on motor carrier compliance with Part 382 were collected from a stratified random sample of 345 carriers and compared with data collected from carriers targeted for review by SafeStat. Based on the stratified random sample, an estimated 32 percent of all motor carriers do not have a drug and alcohol testing program in place and 58 percent of all motor carriers are in violation of some aspect of Part 382. If the target population is limited to only those carriers with known CDL counts in MCMIS, the estimates become 23 and 44 percent, respectively. These estimates are "driven" by data from small carriers (19 or fewer CDL drivers), which dominate the industry. Owing to the limited sample size (345 carriers) used in this study, the confidence intervals around these estimates are rather wide, ranging between plus or minus 8 percent to plus or minus 10 percent.

In the SafeStat comparison group, 10 percent of all carriers had no drug and alcohol testing program in place and 37 percent of all carriers were in violation of at least some aspect of Part 382. The difference between this latter noncompliance rate of 37 percent and the 44 percent noncompliance rate from the random sample (for carriers with known CDL counts) cannot be shown to be statistically significant, given the limited size of the random sample.

Comparing results at the size-class level, one notes that the random sample has higher noncompliance rates in the smaller size classes, but that the SafeStat comparison has higher noncompliance rates in the larger size classes (50 or more drivers). The higher rates of noncompliance in the smaller size classes for the random sample may stem in part from the fact that motor carriers in the "1 to 19" size class tended to be smaller in the random sample than those selected by SafeStat.