
COMPREHENSIVE SAFETY ANALYSIS 2010



SAFETY MEASUREMENT SYSTEM (SMS) METHODOLOGY

Version 2.0

August 2010

Prepared for:
Federal Motor Carrier Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Prepared by:
John A. Volpe National Transportation
Systems Center
55 Broadway
Cambridge, MA 02142



Preface

This report documents the Safety Measurement System (SMS) methodology developed to support the Comprehensive Safety Analysis 2010 (CSA 2010) Initiative for the Federal Motor Carrier Safety Administration (FMCSA). The SMS is one of the major tools for measuring the safety of individual motor carriers and Commercial Motor Vehicle (CMV) drivers. Such measures help identify and monitor safety problems as part of the CSA 2010 safety improvement process.

Many of the concepts used to construct the SMS originated from the SafeStat measurement system. SafeStat was developed at the U.S. Department of Transportation's John A. Volpe National Transportation Systems Center (the Volpe Center) in Cambridge, MA, under a project plan agreement with the Federal Highway Administration's Office of Motor Carriers, FMCSA's predecessor. It was designed and tested under the Federal/State Performance & Registration Information Systems Management (PRISM) program in the mid 1990s. Since then, SafeStat has been implemented nationally to prioritize motor carriers for on-site Compliance Reviews (CRs). SafeStat output has been made available to the public via the Internet on the Analysis & Information (A&I) website at <http://www.ai.fmcsa.dot.gov>.

The SMS design builds on the lessons learned from developing and implementing SafeStat for CR prioritization. However, the SMS also incorporates new CSA 2010 requirements for identifying specific types of unsafe behaviors that the entities exhibit. A more specialized set of interventions will now address these unsafe behaviors and the system will also expand the use of on-road safety violation data. In January 2008, FMCSA started an Operational Model (OM) Test of the CSA 2010 Initiative, which includes using the SMS to identify and monitor unsafe carrier and CMV driver behavior in nine states. Version 2.0 of the Methodology incorporates feedback from the OM Test and was implemented as part of the CSA 2010 Data Preview in August 2010 which provided SMS results to carriers nationally. Future SMS development will be part of a continuous improvement process based on results and feedback.

The Volpe Center Technical Project Manager for developing the SMS is David Madsen of the System Measurement and Analysis Division of the Center for Safety Management Systems. Eran Segev, also of the System Measurement and Analysis Division, headed the analysis leading to the SMS design and methodology. Further technical support was provided by the following Volpe Center staff: Lee Biernbaum, Kevin Gay, Gustaf Lawson, Richard (Kha) Nguyen, Amy Olanyk, Jonathan Pearlman and Scott Smith.

Table of Contents

List of Figures	iii
List of Tables	iii
Glossary	v
Glossary	v
1. Introduction.....	1-1
2. Design of the SMS.....	2-1
2.1 Description of BASICS and Crash Indicator.....	2-1
2.2 Data Sources	2-2
2.3 Carrier BASICS Rankings in SMS.....	2-3
2.4 SMS Design Features.....	2-4
2.4.1 Violation Severity.....	2-4
2.4.2 Crash Severity.....	2-4
2.4.3 Time Weights.....	2-4
2.4.4 Normalization	2-4
2.4.5 Segmentation.....	2-5
2.4.6 Safety Event Groups	2-5
2.4.7 Data Sufficiency.....	2-5
2.4.8 Percentile Rank.....	2-5
2.5 Differences Between SafeStat and the SMS.....	2-5
3. CSMS Methodology	3-1
3.1 Unsafe Driving BASIC Assessment.....	3-1
3.1.1 Calculation of BASIC Measure	3-1
3.1.2 Calculation of BASIC Percentile Rank.....	3-3
3.2 Fatigued Driving (HOS) BASIC Assessment.....	3-4
3.2.1 Calculation of BASIC Measure	3-5
3.2.2 Calculation of BASIC Percentile Rank.....	3-6
3.3 Driver Fitness BASIC Assessment.....	3-6
3.3.1 Calculation of BASIC Measure	3-7
3.3.2 Calculation of BASIC Percentile Rank.....	3-8
3.4 Controlled Substances/Alcohol BASIC	3-9
3.4.1 Calculation of BASIC Measure	3-9
3.4.2 Calculation of BASIC percentile rank	3-10
3.5 Vehicle Maintenance BASIC Assessment.....	3-11
3.5.1 Calculation of BASIC Measure	3-11
3.5.2 Calculation of BASIC Percentile Rank.....	3-12
3.6 Cargo-Related BASIC Assessment.....	3-13
3.6.1 Calculation of BASIC Measure	3-13

3.6.2	Calculation of BASIC Percentile Rank.....	3-14
3.7	Crash Indicator Assessment.....	3-15
3.7.1	Calculation of Crash Indicator Measure	3-15
3.7.2	Calculation of Crash Indicator Percentile Rank.....	3-18
4.	DSMS Methodology.....	4-1
4.1	Unsafe Driving BASIC and Controlled Substances/Alcohol BASIC Assessment 4-1	
4.1.1	Calculation of BASIC Measure	4-2
4.1.2	Calculation of BASIC Percentile Rank.....	4-2
4.2	Fatigued Driving (HOS) BASIC and Driver Fitness BASIC Assessment	4-3
4.2.1	Calculation of BASIC Measure	4-3
4.2.2	Calculation of BASIC Percentile Rank.....	4-4
4.3	Vehicle Maintenance BASIC and Cargo-Related BASIC Assessment.....	4-5
4.3.1	Calculation of BASIC Measure	4-5
4.3.2	Calculation of BASIC Percentile Rank.....	4-6
4.4	Crash Indicator Assessment.....	4-7
4.4.1	Calculation of Crash Indicator Measure	4-7
4.4.2	Calculation of Crash Indicator Percentile Rank.....	4-8
5.	Sample SMS Output	5-1
6.	SMS Report – Summary/Next Steps	6-4
	Appendix A.....	A-1
	Appendix B.....	B-1

List of Figures

Figure 1-1.	CSA 2010 Operational Model.....	1-1
Figure 2-2-1.	BASICs Ranking Process	2-3
Figure 5-1.	CSMS Screenshot.....	5-2
Figure 5-2.	DSMS Screenshot	5-3

List of Tables

Table 3-1.	VMT per PU for Combo Segment.....	3-3
Table 3-2.	VMT per Average PU for Straight Segment	3-3
Table 3-3.	Safety Event Group Categories for Unsafe Driving BASIC.....	3-4
Table 3-4.	Safety Event Group Categories for the Fatigued Driving (HOS) BASIC.....	3-6
Table 3-5.	Safety Event Group Categories for the Driver Fitness BASIC	3-8

Table 3-6. Safety Event Group Categories for Controlled Substances/Alcohol BASIC..	3-10
Table 3-7. Safety Event Group Categories for the Vehicle Maintenance BASIC	3-12
Table 3-8. Safety Event Group Categories for the Cargo-Related BASIC.....	3-15
Table 3-9. Crash Severity Weights for Crash Indicator.....	3-16
Table 3-10. VMT per PU for Combo Segment.....	3-17
Table 3-11. VMT per Average PU for Straight Segment	3-18
Table 3-12. Safety Event Group Categories for Crash Indicator.....	3-18
Table 4-1. Safety Event Group Categories for Fatigued Driving (HOS) and Driver Fitness BASICS.....	4-5
Table 4-2. Safety Event Group Categories for Vehicle Maintenance and Cargo-Related BASICS	4-7
Table 4-3. Crash Severity Weights for Crash Indicator.....	4-8

Glossary

BASIC	Behavior Analysis and Safety Improvement Categories
CMV	Commercial Motor Vehicle
CR	Compliance Review
CRWG	Compliance Review Work Group
CSA 2010	Comprehensive Safety Analysis 2010
CSMS	Carrier Safety Measurement System
DIR	Driver Information Resource
DSMS	Driver Safety Measurement System
FMCSA	Federal Motor Carrier Safety Administration
FMCSR	Federal Motor Carrier Safety Regulations
HAZMAT	Hazardous Materials
HMR	Hazardous Materials Regulations
HOS	Hours-Of-Service
LTCCS	Large Truck Crash Causation Study
MCMIS	Motor Carrier Management Information System
MCSAP	Motor Carrier Safety Assistance Program
NGA	National Governors Association
NTSB	National Transportation Safety Board
OOS	Out-Of-Service
OM	Operational Model
PU	Power Unit
PRISM	Performance and Registration Information Systems Management
SafeStat	Motor Carrier Safety Status Measurement System
SEA	Safety Evaluation Area
SFD	Safety Fitness Determination
SMS	Safety Measurement System
USDOT	U.S. Department of Transportation
VSAS	Violation Severity Assessment Study
VMT	Vehicle Miles Travelled

1. Introduction

The Federal Motor Carrier Safety Administration (FMCSA) is developing a new OM through its Comprehensive Safety Analysis 2010 (CSA 2010) Initiative. The goal of CSA 2010 is to develop and implement more effective and efficient ways for FMCSA, its state partners, and the trucking industry to reduce CMV crashes, fatalities, and injuries. CSA 2010 will help FMCSA and its state partners to impact the safety behavior of more carriers and drivers, use continually improving data to better identify high-risk carriers and drivers, and apply a wider range of interventions to reduce high-risk behavior.¹

As part of this effort, FMCSA has identified the attributes of a model for safety oversight that it considers ideal: flexibility, efficiency, effectiveness, innovation, and equity. The CSA 2010 OM, shown below, features continuous monitoring and tracking of entities' safety performance. Entities may be either carriers or drivers. All entities found with problematic safety behavior will be subject to the intervention process.

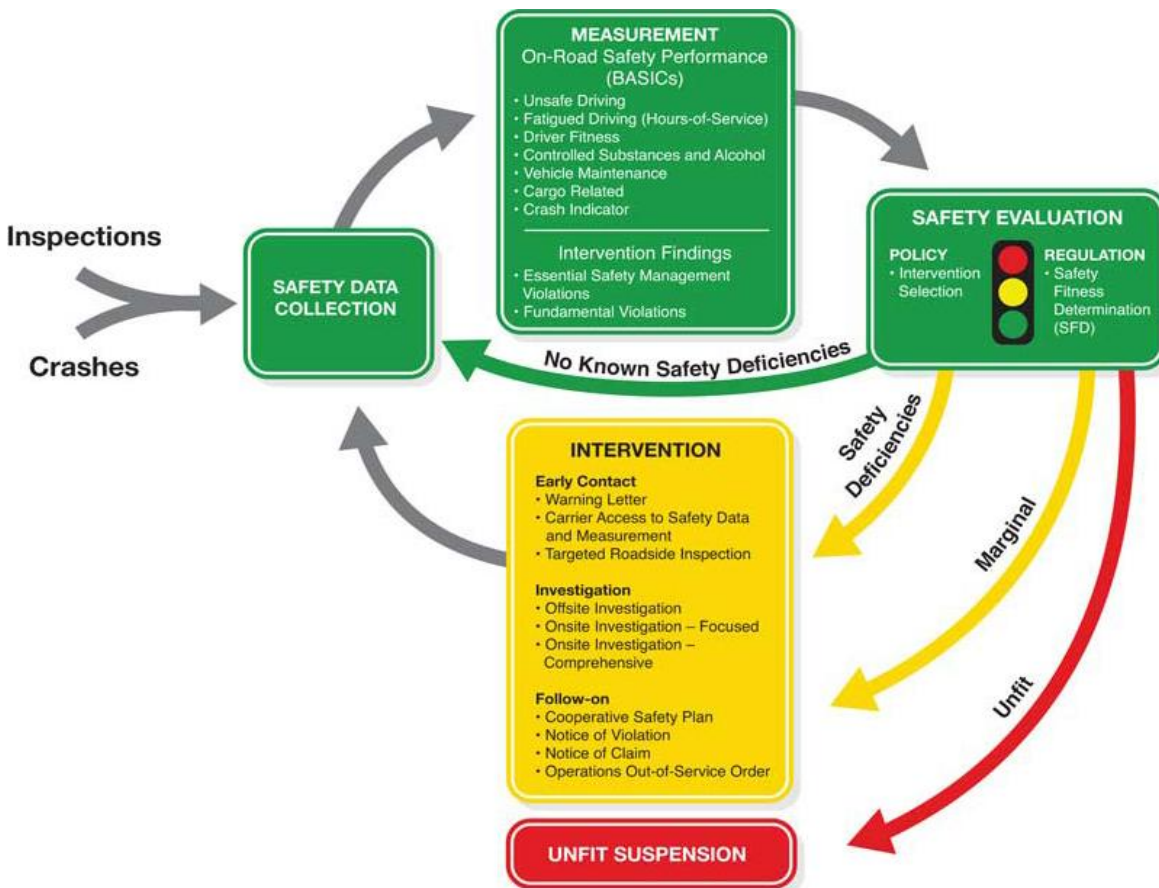


Figure 1-1. CSA 2010 Operational Model

¹ FMCSA CSA2010 website, <http://csa2010.fmcsa.dot.gov>

The Safety Measurement System

Within the CSA 2010 OM, the Safety Measurement System (SMS) quantifies the on-road safety performance of individual entities to:

- Identify entities for interventions. The SMS will be a key component in determining the inclusion of entities with significant safety problems into the CSA 2010 intervention process.
- Determine the specific safety problems an entity exhibits. The SMS allows enforcement officers to identify the specific safety problems the system highlights and to surgically address them through a tailored set of interventions.
- Monitor safety problems throughout the intervention process. The SMS will continuously monitor on-road performance to assess whether an entity's safety performance has improved enough for it to exit the intervention process, or if further intervention is warranted.
- Support FMCSA's proposed Safety Fitness Determination (SFD) process. The SMS results can be an important factor in determining the safety fitness of entities. The SMS will identify the entities demonstrating the worst safety performance so they can be considered for an "Unfit" safety determination. Details on the proposed process will be available as for public comment as part of upcoming Notice of Proposed Rulemaking.

In addition to supporting the CSA 2010 OM, the SMS results can provide other stakeholders with valuable safety information. The SMS results will be easily accessible via the Internet to encourage improvements in motor carrier safety. Findings from the SMS will allow the evaluated entities an assessment of their weaknesses in various safety areas. Thus, the SMS will empower carriers and other firms (e.g. shippers, insurers) involved with the motor carrier industry to make safety-based business decisions.

2. Design of the SMS

The SMS is a tool for assessing available roadside performance data. These data are used to rank an entity's relative performance in any of six Behavior Analysis and Safety Improvement Categories (BASICS) as well as crash involvement (Crash Indicator). Law enforcement will use rankings within these BASICS and the Crash Indicator to select entities for appropriate interventions.

2.1 Description of BASICS and Crash Indicator

The CSA 2010 team developed the BASICS under the premise that CMV crashes can be traced to the behavior of motor carriers and/or drivers. The behavior categories are derived based on information from a number of sources: Large Truck Crash Causation Study (LTCCS);² CSA 2010 Driver History Study; the existing FMCSA regulatory structure; and analysis conducted under FMCSA's Compliance Review Workgroup (CRWG), the predecessor to CSA 2010. The BASICS are defined as follows:

- **Unsafe Driving BASIC**—Operation of CMVs in a dangerous or careless manner. Example violations: speeding, reckless driving, improper lane change, and inattention.
- **Fatigued Driving (Hours-Of-Service) BASIC**—Operation of CMVs by drivers who are ill, fatigued, or in non-compliance with the Hours-Of-Service (HOS) regulations. This BASIC includes violations of regulations surrounding the complete and accurate recording of logbooks as they relate to HOS requirements and the management of CMV driver fatigue. Instances related to the Fatigued Driving (HOS) BASIC are distinguished from incidents where unconsciousness or an inability to react is brought about by the use of alcohol, drugs, or other controlled substances. Example violations: HOS, logbook, and operating a CMV while ill or fatigued.
- **Driver Fitness BASIC**—Operation of CMVs by drivers who are unfit to operate a CMV due to lack of training, experience, or medical qualifications. Example violations: failing to have a valid and appropriate commercial driver's license and being medically unqualified to operate a CMV.
- **Controlled Substances/Alcohol BASIC**—Operation of CMVs by drivers who are impaired due to alcohol, illegal drugs, and misuse of prescription or over-the-counter medications. Example violations: use or possession of controlled substances or alcohol.
- **Vehicle Maintenance BASIC**—Failure to properly maintain a CMV. Example violations: brakes, lights, and other mechanical defects, and failure to make required repairs.

² Daniel Blower and Kenneth L. Campbell, *Large Truck Crash Causation Study Analysis Brief*, February 2005. Available: <http://www.ai.fmcsa.dot.gov/ltccs/>

- Cargo-Related BASIC—Failure to properly prevent shifting loads, spilled or dropped cargo, and unsafe handling of hazardous materials on a CMV. Example violations: improper load securement, cargo retention, and hazardous material handling.

Additionally, the SMS evaluates an entity’s crash history. Crash history is not specifically a behavior. Rather, it is a consequence of a behavior and may indicate a problem with the entity that warrants intervention. The Crash Indicator is defined as follows:

- Crash Indicator—Histories or patterns of high crash involvement, including frequency and severity. It is based on information from state-reported crash reports.

The SMS will initially focus on the two types of entities most likely to impact the BASICs and Crash Indicator: motor carriers and CMV drivers. Therefore, two measurement systems were designed for CSA 2010:

- Carrier Safety Measurement System (CSMS)
- Driver Safety Measurement Systems (DSMS)

2.2 Data Sources

Both CSMS and DSMS assess an individual entity’s performance by BASIC and Crash Indicators calculated from information collected during on-road safety inspections and state-reported CMV crash records. These data are recorded in the Motor Carrier Management Information System (MCMIS). In addition, motor carrier Census data, also recorded in MCMIS, are used for the identification and normalization of safety event data. Below are more detailed descriptions of each data source:

- Roadside Inspections are examinations a Motor Carrier Safety Assistance Program (MCSAP) inspector conducts on individual CMVs and drivers to determine if they are in compliance with the Federal Motor Carrier Safety Regulations (FMCSRs) and/or Hazardous Materials Regulations (HMRs).
- Violations are recorded during inspections and are entered into the MCMIS database. A subset of these violations results in driver or vehicle Out-of-Service (OOS) orders. These OOS violations must be corrected before the affected driver or vehicle is allowed to return to service. The SMS assessments are based on the safety violations listed in Appendix A. These assessments, however, do not include those violations that are: (1) a result of a crash³ or (2) assigned to another entity such as a shipper or Intermodal Equipment Provider.

Note: Some roadside inspections are performed following a traffic enforcement stop for a moving violation. Violations reported during such stops do not always

³ Only pre-existing violations from post-crash inspections are used in the SMS. Violations recorded in MCMIS as being attributed to the crash are not used.

result in the issuance of a citation to the driver, but are used in the SMS whether or not a citation is issued.

- State-Reported Commercial Vehicle Crash Data are taken from MCMIS and provide information on crashes as reported by state and local police officials. The reporting of these crashes follows National Governors Association (NGA) standards.
- Motor Carrier Census Data are first collected when a carrier obtains a USDOT number. The Census data are primarily collected from: (1) Form MCS-150, filled out by the carrier, and (2) Form MCS-151, filled out by law enforcement as part of an investigation. Carriers are required to update their MCS-150 information biennially. Carriers domiciled in states participating in Performance and Registration Information Systems Management (PRISM) Program update their Census data as part of the CMV registration process. The CSMS uses Census data for identification and normalization of safety-related data. Examples of Census data include USDOT number, carrier name, number and type of Power Units (PUs), annualized vehicle miles travelled (VMT), physical location, current status, and types of cargo hauled.

2.3 Carrier BASICs Rankings in SMS

Four principal steps are used to assess an entity's performance in each BASIC and the Crash Indicator. First, relevant inspection, violation, and crash data obtained from MCMIS are attributed to an entity to create a safety event history for the entity. Each entity's violations are classified into a BASIC and are then time weighted, severity weighted, and normalized to form a quantifiable measure for an entity in each BASIC. Based on a comparison of each entity's BASIC measure to other entities with a similar number of safety events, a rank and percentile are assigned. These steps are illustrated in Figure 2-1. The SMS applies similar steps to crash data to calculate carrier Crash Indicator percentiles.

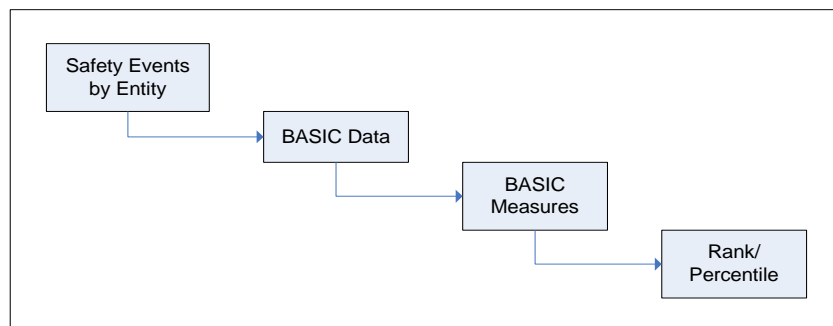


Figure 2-2-1. BASICs Ranking Process

2.4 SMS Design Features

The conversion of an entity's safety data into a BASIC measure, and rank/percentile involves the application of several SMS design features as discussed below.

2.4.1 Violation Severity

All roadside inspection violations that pertain to a BASIC are assigned severity weights that reflect their association with crash occurrence and crash consequences. The severity weights help differentiate the levels of crash risk associated with the various violations attributed to each BASIC. The violation severity weights are assigned on a 1 to 10 scale, where 1 represents the lowest crash risk and 10 represents the highest crash risk relative to the other violations in the BASIC. Within certain BASICs, additional severity weight is applied to violations that resulted in driver or vehicle OOS orders. The severity weighting is based on analysis that quantified the extent of these associations between violation and crash risk, as well as on input from enforcement subject matter experts. Because the weights reflect the relative importance of each violation within each particular BASIC, they cannot be compared meaningfully across the various BASICs. See Appendix A for more information about the severity weights.

2.4.2 Crash Severity

Crashes are assigned severity weights according to their impact. Greater weight is attributed to crashes involving injuries, fatalities, and/or crashes involving the release of hazardous materials than to crashes only resulting in a vehicle tow-away.

2.4.3 Time Weights

All safety events are assigned a time weight. The time weight of an event decreases with time. This decline results in more recent events having a greater impact on an entity's BASIC and Crash Indicator measures than events from the more distant past. When safety events become older than two years, they are no longer used to assess a carrier's safety in the SMS.

2.4.4 Normalization

BASIC and Crash Indicator measures are normalized to reflect differences in exposure among entities. The normalization approach varies depending on what is being measured.

The SMS normalizes for the number of driver inspections with driver-related BASICs, whereas vehicle inspections are used for normalization within vehicle-related BASICs. Therefore, the number of driver inspections normalizes the Fatigued Driving (HOS), Driver Fitness and Controlled Substances/Alcohol measures, while the number of vehicle inspections normalizes the Vehicle Maintenance and Cargo-Related measures.

While violations of the above BASICs are discovered during an inspection, a distinction is made for behaviors that usually prompt an inspection. For this reason, the SMS normalizes the Unsafe Driving BASIC measure by carrier size (i.e., a hybrid power unit (PU) and vehicle miles travelled (VMT) measure), instead of by number of inspections. Similarly, the Crash Indicator is also normalized by carrier size.

2.4.5 Segmentation

The Unsafe Driving BASIC and Crash Indicator account for carrier differences by segmenting the carrier population into two groups based on the types of vehicles operated. The segmentation of the carriers means companies that have fundamentally different types of vehicles/operations are not compared to each other. The two segments are: —Combo” or combination trucks/motor coach buses constituting 70% or more of the total power units and —Straight” or straight trucks/other vehicles constituting more than 30% of the total power units.

2.4.6 Safety Event Groups

To further account for the differences among carriers, the SMS places carriers in safety event groups based on the number of safety events (e.g., inspections, crashes) in which the carriers have been involved. This tiered approach accounts for the inherent greater variability in rates based on small samples or limited levels of exposure and the stronger level of confidence in measures based on larger levels of exposure. The safety event grouping also allows the CSMS to handle the widely diverse motor carrier population, while ensuring that similarly situated carriers are treated with the same standards.

2.4.7 Data Sufficiency

The SMS employs data sufficiency standards to ensure that there are enough inspections or crashes to produce meaningful measures of safety for carriers. In instances where the safety performance of an entity can potentially lead to incursion of CSA 2010 interventions or detrimental SFD outcome, additional data sufficiency tests are employed. These tests ensure a —critical mass” of poor performance data or a pattern of violations before adverse action is taken upon an entity.

2.4.8 Percentile Rank

The SMS uses the measures to assign a percentile ranking to each BASIC and Crash Indicator. Each measure is a quantifiable determination of safety behavior. Percentile ranking allows the safety behavior of a carrier to be compared with the safety behavior of carriers with similar numbers of safety events. Within each safety event group, a percentile is computed on a 0 –100 scale for each entity that receives a non-zero measure, with 100 indicating the worst performance.

Carriers with percentiles above a certain threshold and meeting minimum data sufficiency requirements in a BASIC or Crash Indicator can be deemed poor safety performers. These entities will be identified for CSA 2010’s Intervention process.

2.5 Differences Between SafeStat and the SMS

The SMS offers several improvements over FMCSA’s existing carrier measurement system, SafeStat. Some of the key differences are listed below.

The SMS is organized by specific behaviors whereas SafeStat is organized into four general Safety Evaluations Areas (SEAs).

SafeStat assesses carriers in four Safety Evaluation Areas (SEAs)—Accident, Driver, Vehicle, and Safety Management—whereas the SMS measures each entity in six

behavioral categories (i.e., the BASICS) and the Crash Indicator. The specific behavioral metrics in the SMS provide a more detailed level of measurement that can be used to describe, evaluate, and address entity safety. For example, SafeStat indicates that an entity has general driver issues according to its Driver SEA value, while the SMS provides information on the specific driver behavior (i.e., Controlled Substances/Alcohol, Fatigued Driving (HOS), Unsafe Driving, and Driver Fitness) that needs modification and/or attention. The more specific organization of the SMS's BASICS often allows the discovery of serious safety problems that go undetected under SafeStat's more generalized SEA structure. This is particularly important for BASICS related to driver behavior given that recent research (e.g. the LTCCS) has highlighted driver behavior as increasingly relevant to crash occurrence.

The SMS identifies specific safety problems so that CSA 2010 interventions can address them in a surgical manner; the SafeStat score is based on grouping safety problems together to identify carriers for a one-size-fits-all CR.

Through the measurement of an entity's safety performance by behavior, and the targeting of an intervention to the entity's specific behavior, the CSA 2010 OM provides an integrated approach to measuring and improving CMV safety. The alignment of both the SMS and intervention selection through BASICS and the Crash Indicator allows FMCSA to identify both the entity for intervention as well as the specific safety problem that should be surgically addressed. This approach will lead to more efficient and effective use of enforcement resources directed towards improving motor carrier safety.

The SMS uses all safety-based inspection violations while SafeStat uses only OOS violations and selected moving violations from inspections.

The inclusion of all safety-based inspection violations in the SMS fully leverages the results of the roadside inspection program (3.5 million inspections annually) and provides a more comprehensive evaluation of an entity's on-road safety performance.

The SMS utilizes risk-based violation weightings while SafeStat does not.

Although the SMS utilizes all safety-based inspection violations in the SMS, it is recognized that not all violations pose the same crash risk. Therefore, violations in the SMS are weighted according to the relationship that the violation may cause, contribute to, or exacerbate the outcome of CMV crash. Violations shown to have a larger impact on crash risk will have a stronger detrimental impact on an entity's BASIC measure. The risk-based weighting of violations will provide a risk-based assessment of an entity's performance in each BASIC.

The SMS will feed the Safety Fitness Determination (SFD) of an entity while SafeStat has no impact on an entity's safety rating.

Currently SafeStat prioritizes carriers for CRs. Based strictly on the results of the CR, FMCSA provides a SFD in the form of a safety rating to a carrier. Under CSA 2010, FMCSA will consider the results of the SMS along with the results of interventions in

generating a carrier's SFD. With this approach, all violations can be considered when determining safety fitness, not just the more severe ones from CRs as is now done with SFD. Carrier SMS results can impact the SFD in two ways. First, poor CSMS results can prompt further examination through the CSA 2010 Intervention Process. Major violations found during the Intervention Process can adversely impact a carrier's SFD. Secondly, the SFD can be calculated solely on the basis of on-road performance by comparing a carrier's absolute BASIC measures, not relative percentiles, to a pre-set BASIC measurement standard. Adverse SFD can occur when a carrier's measures do not meet or exceed the standard. This new SFD procedure places strong emphasis on carrier on-road performance in determining overall carrier safety fitness. This approach addresses one of the National Transportation Safety Board's (NTSB) long-standing recommendations that a carrier's poor on-road performance alone should have a detrimental impact on its SFD.

The SMS assesses individual drivers and carriers while SafeStat assesses only carriers.

Currently, most of the focus of FMCSA safety programs and enforcement has been on motor carriers. In the future, the DSMS will allow FMCSA to identify unsafe drivers for interventions based on their inspection and crash history across all employers (former and current). Given the often transient nature of driver employment, the DSMS will be a valuable tool for FMCSA to address driver-specific problems that cannot be easily handled at the motor carrier level. The DSMS may eventually be a valuable tool for motor carriers to monitor their own drivers and assess prospective hires. These efforts will encourage safe and compliant behavior among CMV drivers and will enable carriers to consider drivers' safety histories when making hiring decisions.

3. CSMS Methodology

The following sections describe the CSMS methodology used to calculate the measurement and percentile of each BASIC and the Crash Indicator for individual motor carriers.

3.1 Unsafe Driving BASIC Assessment

This section describes the calculation of carrier measures and percentile ranks in the Unsafe Driving BASIC. This BASIC is defined as:

Operating CMVs in a dangerous or careless manner. Example violations: speeding, reckless driving, improper lane change, and inattention. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Unsafe Driving BASIC using relevant violations of FMCSRs recorded during roadside inspections and reported in MCMIS. Individual carriers' BASIC measures also incorporate carrier size in terms of power units (PUs) and annual vehicle miles travelled (VMT). These measures are used to generate percentile ranks that reflect each carrier's driver safety posture relative to carriers in the same segment with similar numbers of inspections with violations.

3.1.1 Calculation of BASIC Measure

The BASIC measures for the Unsafe Driving BASIC are calculated as the sum of severity and time weighted applicable violations divided by carrier average PUs times a Utilization Factor, as follows:

$$BASIC\ Measure = \frac{Total\ of\ time\ and\ severity\ weighted\ applicable\ violations}{Average\ PUs * Utilization\ Factor}$$

Equation 3-1

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Unsafe Driving (Table 1, Appendix A) and during the past 24 months. In cases of multiple counts of the same violation, the CSMS only uses each violation cite once per inspection.

Note: Some roadside inspections are performed following a traffic enforcement stop for a moving violation. Violations reported during such stops do not always result in the issuance of a citation to the driver, but are used in the SMS whether or not a citation is issued.

A Severity Weight from 1 (less severe) to 10 (most severe) is assigned to each applicable violation. See the Unsafe Driving Table (Table 1, Appendix A) for the severity weights corresponding to each violation. The severity weighting of each

violation cite accounts for the level of crash risk relative to the other violation cites used in the BASIC measurement. The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation based on how long ago it was recorded. Violations recorded in the past 6 months receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. This time weighting places more emphasis on recent violations relative to older violations.

Time and Severity Weighted Violation is a violation's severity weight multiplied by its time weight.

Average Power Units (PUs) is used in part to account for each carrier's level of exposure when calculating the BASIC measure. The BASIC violations are normalized by the number of owned, term-leased, and trip-leased PUs (trucks, tractors, hazardous-material tank trucks, motor coaches, and school buses) contained in the Census data. The average PUs for each carrier is calculated using (i) the carrier's current number of PUs, (ii) the number of PUs the carrier had 6 months ago, and (iii) the number of PUs the carrier had 18 months ago. The average PU calculation is shown below:

$$PU(average) = \frac{PU(current) + PU(6Months) + PU(18Months)}{3}$$

Equation 3-2

Utilization Factor is a multiplier that adjusts the Average PU values based on the utilization in terms of vehicle miles travelled (VMT) per Average PU where VMT data in the past 24 months are available. The primary sources of VMT information in the Census are: (1) Form MCS-150, filled out by the carrier, and (2) Form MCS-151, filled out by law enforcement as part of an investigation. Carriers are required to update their MCS-150 information biennially. In cases where the VMT data has been obtained multiple times over the past 24 months for the same carrier, the most current positive VMT figure is used. The Utilization Factor is calculated by the following three steps:

(i) Carrier Segment

There are two segments that each motor carrier falls into:

- –Combo” – combination trucks/motor coach buses constituting 70% or more of the total PU.
- –Straight” – straight trucks/other vehicles constituting more than 30% of the total PU.

(ii) VMT per Average PU

The VMT per Average PU is derived by taking most recent positive VMT data and dividing it by the average PUs (defined above).

(iii) Utilization Factor

Given the information in (i) and (ii) the Utilization Factor are determined from the following tables:

Combo Segment	
VMT per Average PU	Utilization Factor
< 80,000	1
80,000 - 160,000	$1+0.6[(\text{VMT per PU}-80,000) / 80,000]$
160,000 - 200,000	1.6
> 200,000	1
No Recent VMT Information	1

Table 3-1. VMT per PU for Combo Segment

Straight Segment	
VMT per Average PU	Utilization Factor
< 20,000	1
20,000 - 60,000	VMT per PU / 20,000
60,000 - 200,000	3
> 200,000	1
No Recent VMT Information	1

Table 3-2. VMT per Average PU for Straight Segment

3.1.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention or detrimental SFD. The calculation is as follows:

A. Determine the carrier's segment:

- –Combo” – combination trucks/motor coach buses constituting 70% or more of the total PU.
- –Straight” – straight trucks/other vehicles constituting more than 30% of the total PU.

- B. Determine the total number of inspections with at least one BASIC violation and remove carriers with less than three such inspections. For the remaining carriers, place each carrier into one of five groups based on the carrier segment and the number of inspections with an Unsafe Driving violation:

Safety Event Group Category	Combo Segment: Number of Inspections with Unsafe Driving Violations	Straight Segment: Number of Inspections with Unsafe Driving Violations
1	3-8	3-4
2	9-21	5-8
3	22-57	9-18
4	58-149	19-49
5	150+	50+

Table 3-3. Safety Event Group Categories for Unsafe Driving BASIC

- C. Within each group, rank all the carriers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers whose violations in the BASIC are all older than twelve months. Carriers that remain retain the previously calculated percentile.

3.2 Fatigued Driving (HOS) BASIC Assessment

This section describes the calculation of carrier measures and percentile ranks in the Fatigued Driving (HOS) BASIC. This BASIC is defined as:

Operating CMVs by drivers ill, fatigued, or in non-compliance with the Hours-Of-Service (HOS) regulations. This BASIC includes violations of regulations surrounding the complete and accurate recording of logbooks as they relate to HOS requirements and the management of CMV driver fatigue. Instances related to the Fatigued Driving (HOS) BASIC are distinguished from incidents where unconsciousness or an inability to react is brought about by the use of alcohol, drugs, or other controlled substances. Example violations include: HOS, logbook, and operating a CMV while ill or fatigued. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Fatigued Driving (HOS) BASIC using relevant violations recorded during roadside inspections to calculate a measure for motor carriers. These measures are used to generate percentile ranks that reflect each carrier's safety posture relative to carriers with similar numbers of relevant inspections.

3.2.1 Calculation of BASIC Measure

The equation used for calculating Fatigued Driving (HOS) BASIC measures is as follows:

$$\text{BASIC Measure} = \frac{\text{Total of time and severity weighted applicable violations}}{\text{Total time weight of relevant inspections}}$$

Equation 3-3

In this equation, the terms are defined as follows:

Applicable Violation is any violation recorded in any level roadside inspection that matches the FMCSRs and HMRs listed for Fatigued Driving (HOS) (Table 2, Appendix A) during the past 24 months. The CSMS only uses each violation cite once per inspection in cases of multiple counts of the same violation.

A Relevant Inspection is any Driver Inspection (Level 1, 2, 3 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation, with a value dependent on two parts: (i) the level of crash risk relative to the other violations comprising the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

- (i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Fatigued Driving (HOS) table (Table 2, Appendix A) for the violations' corresponding severity weights.
- (ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, the OOS weight of 2 applies if any of the counts of the violation are OOS.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 6 months receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation's severity weight multiplied by its time weight.

3.2.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention or detrimental SFD. The calculation is as follows:

- A. Determine the total number of relevant inspections and number of inspections with at least one BASIC violation. For the Fatigued Driving (HOS) BASIC, remove carriers with (1) less than three relevant driver inspections or (2) no inspections resulting in at least one BASIC violation. For the remaining carriers, place each carrier into one of five groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	3-10
2	11-20
3	21-100
4	101-500
5	501+

Table 3-4. Safety Event Group Categories for the Fatigued Driving (HOS) BASIC

- B. Within each group, rank all the carriers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers that meet both of the following criteria: (1) no violation was recorded in the BASIC during the previous twelve months, and (2) no violation in the BASIC was recorded during the latest relevant inspection. For the remaining carriers with three or more relevant inspections resulting in a Fatigued Driving (HOS) BASIC violation, assign the percentile values to each carrier's BASIC.

3.3 Driver Fitness BASIC Assessment

This section describes the calculation of carrier measures and percentile ranks in the Driver Fitness BASIC. This BASIC is defined as:

Operating CMVs by drivers who are unfit to operate a CMV due to lack of training, experience, or medical qualifications. Example violations: failing to have a valid and appropriate commercial driver's license and being medically unqualified to operate a CMV. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Driver Fitness BASIC using relevant violations recorded during roadside inspections to calculate a measure for individual motor carriers. These measures are used to generate percentile ranks that reflect each carrier's driver safety posture relative to carriers with similar numbers of relevant inspections.

3.3.1 Calculation of BASIC Measure

The equation used for calculating the BASIC measure for Driver Fitness is as follows:

$$\text{BASIC Measure} = \frac{\text{Total of time and severity weighted applicable violations}}{\text{Total time weight of relevant inspections}}$$

Equation 3-4

In this equation, the terms are defined as follows:

Applicable Violation is any violation recorded in any level roadside inspection that matches the FMCSRs and HMRs listed for Driver Fitness (Table 3, Appendix A) during the past 24 months. The CSMS only uses each violation cite once per inspection in cases of multiple counts of the same violation.

A Relevant Inspection is any Driver Inspection (Level 1, 2, 3 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation, with a value dependent on two parts: (i) the level of crash risk relative to the other violations comprising the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

(i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Driver Fitness table (Table 3, Appendix A) for the violations' corresponding severity weights.

(ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, the OOS weight of 2 applies if any of the counts of the violation are OOS.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 6 months

receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation’s severity weight multiplied by its time weight.

3.3.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention or detrimental SFD. The calculation is as follows:

- A. Determine the total number of relevant inspections and number of inspections with at least one BASIC violation. For the Driver Fitness BASIC, remove carriers with (1) less than five relevant driver inspections or (2) no inspections resulting in at least one BASIC violation. For the remaining carriers, place each carrier into one of five groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	5-10
2	11-20
3	21-100
4	101-500
5	501+

Table 3-5. Safety Event Group Categories for the Driver Fitness BASIC

- B. Within each group, rank all the carriers’ BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers that meet both of the following criteria: (1) no violation was recorded in the BASIC during the previous twelve months, and (2) no violation in the BASIC was recorded during the latest relevant inspection. For the remaining carriers with five or more relevant inspections resulting in a Driver Fitness BASIC violation, assign the percentile values to each carrier’s BASIC.

3.4 Controlled Substances/Alcohol BASIC

This section describes the calculation of carrier measures and percentile ranks in the Controlled Substances/Alcohol BASIC. The definition of this BASIC is as:

Operating CMVs by drivers cited in roadside inspections for impairment due to alcohol, illegal drugs, and misuse of prescription or over-the-counter medications. Example violations: use or possession of controlled substances or alcohol. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Controlled Substances/Alcohol BASIC using relevant violations of FMCSRs recorded during roadside inspections and reported in MCMIS. Individual carriers' BASIC measures also incorporate quantity of relevant roadside inspections. These measures are used to generate percentile ranks that reflect each carrier's driver safety posture relative to carriers with similar numbers of inspections with violations.

3.4.1 Calculation of BASIC Measure

The BASIC measures for the Controlled Substances/Alcohol BASIC are calculated as the sum of severity and time weighted applicable violations divided by time weighted relevant inspections, as follows:

$$\text{BASIC Measure} = \frac{\text{Total of time and severity weighted applicable violations}}{\text{Total time weight of relevant inspections}}$$

Equation 3-5

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Controlled Substances/Alcohol (Table 4, Appendix A) and during the past 24 months. In cases of multiple counts of the same violation, the CSMS only uses each violation cite once per inspection.

Note: Some roadside inspections are performed following a traffic enforcement stop for a moving violation. Violations reported during such stops do not always result in the issuance of a citation to the driver, but are used in the SMS whether or not a citation is issued.

A Relevant Inspection is any Driver Inspection (Level 1, 2, 3 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight from 1 (less severe) to 10 (most severe) is assigned to each applicable violation. See the Controlled Substances/Alcohol Table (Table 4, Appendix A) for the severity weights corresponding to each violation. The

severity weighting of each violation cite accounts for the level of crash risk relative to the other violation cites used in the BASIC measurement. The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 6 months receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation's severity weight multiplied by its time weight.

3.4.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention. The calculation is as follows:

- A. Remove carriers with no violations in this BASIC. For the remaining carriers, place each carrier into one of four groups based on the number of carrier relevant inspections:

Safety Event Group Category	Number of inspections with Controlled Substance/Alcohol Violations
1	1
2	2
3	3
4	4+

Table 3-6. Safety Event Group Categories for Controlled Substances/Alcohol BASIC

- B. Within each group, rank all the carriers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers whose violations in the BASIC are all older than twelve months. Carriers that remain retain the previously calculated percentile.

3.5 Vehicle Maintenance BASIC Assessment

This section describes the calculation of carrier measures and percentile ranks in the Vehicle Maintenance BASIC. This BASIC is defined as:

Failure to properly maintain a CMV. Example violations: brakes, lights, and other mechanical defects, and failure to make required repairs. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Vehicle Maintenance BASIC using relevant violations recorded during roadside inspections to calculate a measure of each BASIC for individual motor carriers. These measures are used to generate percentile ranks that reflect each carrier's safety posture relative to carriers with similar numbers of relevant inspections.

3.5.1 Calculation of BASIC Measure

The equation used for calculating Vehicle Maintenance BASIC measures is as follows:

$$\text{BASIC Measure} = \frac{\text{Total of time and severity weighted applicable violations}}{\text{Total time weight of relevant inspections}}$$

Equation 3-6

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Vehicle Maintenance (Table 5, Appendix A) during the past 24 months. In cases of multiple counts of the same violation, the CSMS only uses each violation cite once per inspection.

A Relevant Inspection is any Vehicle Inspection (Level 1, 2, 5 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation with a value dependent on two parts: (i) the level of crash risk relative to the other violation cites used in the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

- (i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Vehicle Maintenance table (Table 5, Appendix A) for the corresponding severity weights of each violation cite.
- (ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, the OOS weight of 2 applies if any of the counts of the violation are OOS.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 6 months receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation’s severity weight multiplied by its time weight.

3.5.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention or detrimental SFD. The calculation is as follows:

- A. Determine the total number of relevant vehicle inspections and the number of inspections with at least one BASIC violation. Remove carriers with (1) less than five relevant inspections or (2) no inspections resulting in at least one BASIC violation. For the remaining carriers, place each carrier into one of five groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	5-10
2	11-20
3	21-100
4	101-500
5	501+

Table 3-7. Safety Event Group Categories for the Vehicle Maintenance BASIC

- B. Within each group, rank all the carriers’ BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers that meet both of the following criteria: (1) no violation was

recorded in the BASIC during the previous twelve months, and (2) no violation in the BASIC was recorded during the latest relevant inspection. For the remaining carriers with five or more relevant inspections resulting in a Vehicle Maintenance BASIC violation, assign the percentile values to each carrier's BASIC.

3.6 Cargo-Related BASIC Assessment

This section describes the calculation of carrier measures and percentile ranks in the Cargo-Related BASIC. This BASIC is defined as:

Failure to properly prevent shifting loads, spilled or dropped cargo, and unsafe handling of hazardous materials on a CMV. Example violations: improper load securement, cargo retention, and hazardous material handling. See Appendix A for a complete list of roadside inspection violations used in the SMS.

The CSMS assesses the Cargo-Related BASIC using relevant violations recorded during roadside inspections to calculate a measure of each BASIC for individual motor carriers. These measures are used to generate percentile ranks that reflect each carrier's safety posture relative to carriers with similar numbers of relevant inspections

3.6.1 Calculation of BASIC Measure

The equation used for calculating Cargo-Related BASIC measures is as follows:

$$\text{BASIC Measure} = \frac{\text{Total of time and severity weighted applicable violations}}{\text{Total time weight of relevant inspections}}$$

Equation 3-7

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed in the Cargo-Related BASIC (Table 6, Appendix A) during the past 24 months. In cases of multiple counts of the same violation, the CSMS only uses each violation cite once per inspection.

A Relevant Inspection is any Vehicle Inspection (Level 1, 2, 5 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation with a value dependent on two parts: (i) the level of crash risk relative to the other violation cites used in the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

(i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Cargo-Related table (Table 6, Appendix A) for the corresponding severity weights of each violation cite.

(ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, the OOS weight of 2 applies if any of the counts of the violation are OOS.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 6 months receive a time weight of 3. Violations recorded between 6 and 12 months ago receive a time weight of 2. All violations recorded earlier (older than 12 months but within the past 24 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation's severity weight multiplied by its time weight.

3.6.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the CSMS applies data sufficiency standards and safety event grouping to assign a percentile rank to carriers that can then potentially receive a CSA 2010 intervention or detrimental SFD. The calculation is as follows:

- A. Determine the total number of relevant vehicle inspections and the number of inspections with at least one BASIC violation. Remove carriers with (1) less than five relevant inspections or (2) no inspections resulting in at least one BASIC violation. For the remaining carriers, place each carrier into one of five groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	5-10
2	11-20
3	21-100
4	101-500
5	501+

Table 3-8. Safety Event Group Categories for the Cargo-Related BASIC

- B. Within each group, rank all the carriers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Eliminate carriers that meet both of the following criteria: (1) no violation was recorded in the BASIC during the previous twelve months, and (2) no violation in the BASIC was recorded during the latest relevant inspection. For the remaining carriers with five or more relevant inspections resulting in a Cargo-Related BASIC violation, assign the percentile values to each carrier's BASIC.

3.7 Crash Indicator Assessment

This section describes the calculation of carrier measures and percentile ranks for the Crash Indicator. The Crash Indicator is defined as:

Histories or patterns of high crash involvement, including frequency and severity, based on information from state-reported crash reports.

Although the BASICs are used to measure an entity's behaviors, the crash history utilized by the Crash Indicator is not specifically a behavior; instead, it is the consequence of behavior and may indicate a problem with the entity that warrants intervention.

The CSMS assesses the Crash Indicator using relevant state-reported crash data reported in MCMIS. Individual carriers' Crash Indicator measures also incorporate carrier size in terms of PUs and annual VMT. These measures are used to generate percentile ranks that reflect each carrier's safety posture relative to carriers in the same segment with similar numbers of crashes.

3.7.1 Calculation of Crash Indicator Measure

The equation used for calculating the Crash Indicator measure is as follows:

$$\text{Crash Indicator Measure} = \frac{\text{Total of time and severity weighted applicable crashes}}{\text{Average PUs} * \text{Utilization Factor}}$$

Equation 3-8

In this equation, the terms are defined as follows:

Applicable Crash is a state-reported crash that meets the reportable crash standard during the past 24 months. A reportable crash is one that results in at least one fatality; one injury where the injured person is taken to a medical facility for immediate medical attention; or, one vehicle having been towed from the scene as a result of disabling damage caused by the crash (i.e. tow-away).

Crash Severity Weight places more weight on crashes with more severe consequences. For example, a crash involving an injury or fatality is weighted more heavily than a crash where only a tow-away occurred. A hazmat release also increases the weighting of a crash, as shown in Table 3-9.

Crash Type	Crash Severity Weight
Involves tow-away but no injury or fatality	1
Involves injury or fatality	2
Involves a hazmat release	Crash Severity Weight (from above) + 1

Table 3-9. Crash Severity Weights for Crash Indicator

A Time Weight of 1, 2 or 3 is assigned to each applicable crash based on the time elapsed since the crash occurred. Crashes that occurred within 6 months of the measurement date receive a time weight of 3. Crashes that occurred between 6 and 12 months prior to the measurement date receive a time weight of 2. All crashes that happened later (older than 12 months but within the past 24 months of the measurement date) receive a time weight of 1. This time weighting places more emphasis on recent crashes relative to older crashes.

Time and Severity Weighted Crash is a crash’s severity weight multiplied by its time weight.

Average Power Units (PUs) is used in part to account for each carrier’s level of exposure when calculating the BASIC measure. The BASIC violations are normalized by the number of owned, term-leased, and trip-leased PUs (trucks, tractors, hazardous-material tank trucks, motor coaches, and school buses) contained in the Census data. The average PUs for each carrier is calculated using (i) the carrier’s current number of PUs, (ii) the number of PUs the carrier

had 6 months ago, and (iii) the number of PUs the carrier had 18 months ago. The average PU calculation is shown below:

$$PU(average) = \frac{PU(current) + PU(6Months) + PU(18Months)}{3}$$

Equation 3-9

Utilization Factor is a multiplier that adjusts the Average PU values based on the utilization in terms of vehicle miles travelled (VMT) per Average PU where VMT data in the past 24 months are available. The primary sources of VMT information in the Census are: (1) Form MCS-150, filled out by the carrier, and (2) Form MCS-151, filled out by law enforcement as part of an investigation. Carriers are required to update their MCS-150 information biennially. In cases where the VMT data has been obtained multiple times over the past 24 months for the same carrier, the most current positive VMT figure is used. The Utilization Factor is calculated by the following three steps:

(i) Carrier Segment

There are two segments that each motor carrier falls into:

- -Combo” – combination trucks/motor coach buses constituting 70% or more of the total PU.
- -Straight” – straight trucks/other vehicles constituting more than 30% of the total PU.

(ii) VMT per Average PU

The VMT per Average PU is derived by taking most recent positive VMT data and dividing it by the average PUs (defined above).

(iii) Utilization Factor

Given the information in (i) and (ii) the Utilization Factor are determined from the following tables:

Combo Segment	
VMT per Average PU	Utilization Factor
< 80,000	1
80,000 - 160,000	$1 + 0.6[(VMT \text{ per PU} - 80,000) / 80,000]$
160,000 - 200,000	1.6
> 200,000	1
No Recent VMT Information	1

Table 3-10. VMT per PU for Combo Segment

Straight Segment	
VMT per Average PU	Utilization Factor
< 20,000	1
20,000 - 60,000	VMT per PU / 20,000
60,000 - 200,000	3
> 200,000	1
No Recent VMT Information	1

Table 3-11. VMT per Average PU for Straight Segment

3.7.2 Calculation of Crash Indicator Percentile Rank

Based on the Crash Indicator measures, the CSMS applies data sufficiency standards and Safety Event Grouping to assign a percentile rank to carriers that can potentially receive a CSA 2010 intervention. The calculation is as follows:

- A. Determine the carrier's segment:
 - -"Combo" – combination trucks/motor coach buses constituting 70% or more of the total PU.
 - -"Straight" – straight trucks/other vehicles constituting more than 30% of the total PU.
- B. For carriers with two or more applicable crashes, place each carrier into one of five groups based on the carrier segment and number of crashes:

Safety Event Group Category	Combo Segment: Number of Crashes	Straight Segment: Number of Crashes
1	2-3	2
2	4-6	3-4
3	7-16	5-8
4	17-45	9-26
5	46+	27+

Table 3-12. Safety Event Group Categories for Crash Indicator

- C. Within each group, rank all the carriers' Crash Indicator measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest indicator measure) to 100 (representing the highest indicator measure). Remove carriers that did not have a crash recorded in

the previous twelve months. Carriers that remain retain the previously calculated percentile.

4. DSMS Methodology

The DSMS is the second major component of the SMS, along with the CSMS. Law enforcement officials use the DSMS results to examine the safety performance of individual CMV drivers when conducting CSA 2010 investigations. Currently, the DSMS results are being used strictly as an investigative tool for law enforcement and **are not available to carriers, drivers, or the public**. However, the raw safety information from roadside inspections and crashes that feeds the DSMS is compiled by the same system that will provide CMV driver-based data to FMCSA's Driver Pre-Employment Screening Program (PSP). This new program will allow motor carriers to access driver inspection and crash records electronically as a part of the hiring process.⁴

This section describes the algorithms used in the DSMS methodology and the computational logic used to calculate the driver measures and percentiles for each BASIC and the Crash Indicator for individual CMV drivers. BASICs that are evaluated similarly are described together.

- Unsafe Driving BASIC and Controlled Substances/Alcohol BASIC
- Fatigued Driving (HOS) BASIC and Driver Fitness BASIC
- Vehicle Maintenance BASIC and Cargo-Related BASIC
- Crash Indicator

4.1 Unsafe Driving BASIC and Controlled Substances/Alcohol BASIC Assessment

This section describes the measurement of the Unsafe Driving BASIC and the Controlled Substances/Alcohol BASIC. The definition of each BASIC is as follows:

- Unsafe Driving BASIC—Operation of CMVs in a dangerous or careless manner. Example violations: speeding, reckless driving, improper lane change, and inattention.
- Controlled Substances/Alcohol BASIC—Operation of CMVs by drivers who are impaired due to alcohol, illegal drugs, and misuse of prescription or over-the-counter medications. Example violations: use or possession of controlled substances or alcohol.

The DSMS assesses both the Unsafe Driving BASIC and Controlled Substances/Alcohol BASIC by using applicable violations recorded during roadside inspections to calculate a measure in each BASIC for individual drivers. These measures are used to generate percentile ranks that reflect drivers' safety postures relative to drivers with applicable violations.

⁴ More information about the PSP program can be found on FMCSA's PSP website at <http://www.psp.fmcsa.dot.gov/>.

4.1.1 Calculation of BASIC Measure

The BASIC measures for the Unsafe Driving and Controlled Substances/Alcohol BASICs are calculated as the sum of severity and time weighted applicable violations as follows:

$$\text{BASIC Measure} = \text{Total of time and severity weighted applicable violations}$$

Equation 4-1

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Unsafe Driving (Table 1, Appendix A) and Controlled Substances/Alcohol (Table 4, Appendix A) during the past 36 months, and for which the CMV driver can be held responsible ('Driver Responsible' column, Table 1 and 2). In cases of multiple counts of the same violation, the DSMS only uses each violation cite once per inspection.

A Severity Weight from 1 (less severe) to 10 (most severe) is assigned to each applicable violation. See the Unsafe Driving Table (Table 1, Appendix A) and the Controlled Substance and Alcohol Table (Table 4, Appendix A) for the corresponding severity weights of each violation cite. The severity weighting of each violation cite accounts for the level of crash risk relative to the other violation cites used in the BASIC measurement. The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation based on how long ago a violation on the inspection was recorded. Violations recorded in the past 12 months receive a time weight of 3. Violations recorded between 12 and 24 months ago receive a time weight of 2. All violations recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on recent violations relative to older violations.

Time and Severity Weighted Violation is a violation's severity weight multiplied by its time weight.

4.1.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank to drivers who can then potentially be subjected to a CSA 2010 intervention. The calculation is as follows:

- A. Determine the total number of inspections with at least one BASIC violation. Remove drivers with no BASIC violations.
- B. Rank all the drivers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Then, assign the percentile values for that BASIC to each driver.

4.2 Fatigued Driving (HOS) BASIC and Driver Fitness BASIC Assessment

This section describes the measurement of the Fatigued Driving (HOS) BASIC and the Driver Fitness BASIC. The definition of each BASIC is as follows:

- **Fatigued Driving (HOS) BASIC**—Operation of CMVs by drivers who are ill, fatigued, or in non-compliance with the Hours-Of-Service (HOS) regulations. This BASIC includes violations of regulations surrounding the complete and accurate recording of logbooks as they relate to HOS requirements and the management of CMV driver fatigue. Instances related to the Fatigued Driving (HOS) BASIC are distinguished from incidents where unconsciousness or an inability to react is brought about by the use of alcohol, drugs, or other controlled substances. Example violations include: HOS, logbook, and operating a CMV while ill or fatigued.
- **Driver Fitness BASIC**—Operation of CMVs by drivers who are unfit to operate a CMV due to lack of training, experience, or medical qualifications. Example violations: failure to have a valid and appropriate commercial driver's license and being medically unqualified to operate a CMV.

The DSMS assesses both the Fatigued Driving (HOS) BASIC and Driver Fitness BASIC using applicable violations recorded during roadside inspections to calculate a measure in each BASIC for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

4.2.1 Calculation of BASIC Measure

The equation used for calculating the BASIC measure for Fatigued Driving (HOS) and Driver Fitness is as follows:

$$BASIC\ Measure = \frac{Total\ of\ time\ and\ severity\ weighted\ applicable\ violations}{Total\ time\ weight\ of\ relevant\ inspections}$$

Equation 4-2

In this equation, the terms are defined as follows:

Applicable Violation is defined as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Fatigued Driving (HOS) (Table 2, Appendix A) and Driver Fitness (Table 3, Appendix A) during

the past 36 months, and for which the CMV driver can be held responsible (‘Driver Responsible’ column, Table 3 and 4). In cases of multiple counts of the same violation, the DSMS only uses each violation cite once per inspection.

A Relevant Inspection is any Driver Inspection (Level 1, 2, 3 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation, with a value dependent on two parts: (i) the level of crash risk relative to the other violation cites used in the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

- (i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Fatigued Driving (HOS) Table (Table 2, Appendix A) and the Driver Fitness Table (Table 3, Appendix A) for the corresponding severity weights of each violation cite.
- (ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, if any of the counts of the violation are OOS the OOS weight of 2 applies.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 12 months receive a time weight of 3. Violations recorded between 12 and 24 months ago receive a time weight of 2. All violations recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation’s severity weight multiplied by its time weight.

4.2.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank to drivers that can then potentially be subjected to a CSA 2010 intervention. The calculation is as follows:

- A. Determine the total number of relevant inspections and number of inspections with at least one BASIC violation. Remove drivers with (1) less than three relevant inspections or (2) no inspections resulting in at least one BASIC

violation. For the remaining drivers, place each driver into one of three groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	3
2	4-6
3	7+

Table 4-1. Safety Event Group Categories for Fatigued Driving (HOS) and Driver Fitness BASICS

- B. Within each group, rank all the drivers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure).

4.3 Vehicle Maintenance BASIC and Cargo-Related BASIC Assessment

This section describes the measurement of the Vehicle Maintenance BASIC and the Cargo-Related BASIC. The definition of each BASIC is as follows:

- Vehicle Maintenance BASIC— Failure to properly maintain a CMV. Example violations: brakes, lights, and other mechanical defects, and failure to make required repairs that would be found in a pre-trip inspection.
- Cargo-Related BASIC— Failure to properly prevent shifting loads, spilled or dropped cargo, and unsafe handling of hazardous materials on a CMV. Example violations: improper load securement, cargo retention, and hazardous material handling.

The DSMS assesses both the Vehicle Maintenance BASIC and the Cargo-Related BASIC using relevant violations recorded during roadside inspections to calculate a measure in each BASIC for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

4.3.1 Calculation of BASIC Measure

The equation used for calculating the Vehicle Maintenance and Cargo-Related BASIC measures is as follows:

$$BASIC\ Measure = \frac{Total\ of\ time\ and\ severity\ weighted\ applicable\ violations}{Total\ time\ weight\ of\ relevant\ inspections}$$

Equation 4-3

In this equation, the terms are defined as follows:

Applicable Violation is as any violation recorded in any level roadside inspection that matches the FMCSR and HMR cites listed for Vehicle Maintenance (Table 5, Appendix A) and Cargo-Related (Table 6, Appendix A) BASICS during the past 36 months, and for which the CMV driver can be held responsible (‘Driver Responsible’ column, Table 5 and 6). In cases of multiple counts of the same violation, the DSMS only uses each violation cite once per inspection.

A Relevant Inspection is any Vehicle Inspection (Level 1, 2, 5 or 6), including those that do **not** result in a violation in the BASIC, or any other inspection resulting in applicable BASIC violation.

A Severity Weight is assigned to each applicable violation with a value dependent on two parts: (i) the level of crash risk relative to the other violation cites used in the BASIC measurement, and (ii) whether or not the violation resulted in an OOS condition.

- (i) The level of crash risk is assigned to each applicable violation ranging from 1 (less severe) to 10 (most severe); see the Vehicle Maintenance Table (Table 5, Appendix A) and the Cargo-Related (Table 6, Appendix A) BASICS for the corresponding severity weights of each violation cite.
- (ii) An OOS weight of 2 is then added to the severity weight of OOS violations. In cases of multiple counts of the same violation, if any of the counts of the violation are OOS the OOS weight of 2 applies.

The sum of all severity weights yielded by any one inspection for violations in any one BASIC is capped at a maximum of 30. This cap of 30 is applied before the severity weights are multiplied by the time weight.

A Time Weight of 1, 2 or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations recorded in the past 12 months receive a time weight of 3. Violations recorded between 12 and 24 months ago receive a time weight of 2. All violations recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. Using the exact same time weight scheme, time weights are assigned to each relevant inspection, regardless of whether or not an inspection yielded an applicable violation. This time weighting places more emphasis on results of recent inspections relative to older inspections.

Time and Severity Weighted Violation is a violation’s severity weight multiplied by its time weight.

4.3.2 Calculation of BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank to drivers that can then potentially be subjected to a CSA 2010 intervention. The calculation is as follows:

- A. Determine the total number of relevant vehicle inspections and the number of inspections with at least one BASIC violation. Remove drivers with (1) less than three relevant inspections or (2) no inspections resulting in at least one BASIC violation. For the remaining drivers, place each driver into one of three groups based on the number of relevant inspections:

Safety Event Group Category	Number of Relevant Inspections
1	3
2	4-6
3	7+

Table 4-2. Safety Event Group Categories for Vehicle Maintenance and Cargo-Related BASICS

- B. Within each group, rank all the drivers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure).

4.4 Crash Indicator Assessment

This section describes the measurement of the Crash Indicator. The definition of the Crash Indicator is as follows:

- Crash Indicator—Histories or patterns of high crash involvement, including frequency and severity, based on information from state-reported crash reports.

Although the BASICS are used to measure an entity's behaviors, the crash history utilized by the Crash Indicator is not specifically a behavior; rather, it is the consequence of behavior and may indicate a problem with the entity that warrants intervention.

The DSMS assesses the Crash Indicator using relevant state-reported crash data to calculate a measure of the indicator for individual drivers. This measure is used to generate percentile ranks that reflect drivers' relative crash posture.

4.4.1 Calculation of Crash Indicator Measure

The equation used for calculating the Crash Indicator measure is as follows:

$$\text{Crash Indicator Measure} = \text{Total of time and severity weighted applicable crashes}$$

Equation 4-4

In this equation, the terms are defined as follows:

Applicable Crash is based on crash reports provided by the states for each crash that meets the reportable crash standard during the past 36 months. A reportable crash is one that results in at least one fatality; one injury where the person injured is taken to a medical facility for immediate medical attention; or one vehicle having been towed from the scene (i.e. tow-away) as a result of disabling damage caused by the crash.

Crash Severity Weight places more weight on crashes with more severe consequences. For example, a crash involving an injury or fatality is weighted more heavily than a crash where only a tow-away occurred. A hazmat release also increases the weighting of a crash, as shown in Table 4-3.

Crash Type	Crash Severity Weight
Involves tow-away but no injury or fatality	1
Involves injury or fatality	2
Involves a hazmat release	Crash Severity Weight (from above) + 1

Table 4-3. Crash Severity Weights for Crash Indicator

A Time Weight of 1, 2 or 3 is assigned to each applicable crash based on the time elapsed since it occurred. Crashes that occurred in the past 12 months receive a time weight of 3. Crashes that occurred between 12 and 24 months ago receive a time weight of 2. All crashes that happened later (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on recent crashes relative to older crashes.

Time and Severity Weighted Crash is a crash's severity weight multiplied by its time weight.

4.4.2 Calculation of Crash Indicator Percentile Rank

Based on the Crash Indicator measures, the DSMS applies data sufficiency standards and assigns a percentile rank to drivers who then can potentially receive a CSA 2010 intervention. The calculation is as follows:

- A. Identify drivers with at least one applicable crash.
- B. Rank all the drivers' Crash Indicator measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest indicator measure) to 100 (representing the highest indicator measure). Then, assign the percentile values to each driver.

5. Sample SMS Output

As part of the SMS development process, a web-based interface was developed to display preliminary/prototype results. The website provides a query capability allowing a user to search an entity of interest or identify the worst performing entities in each BASIC and Crash Indicator. Also available is a drill-down capability, which displays all the BASIC and Crash Indicator results of an individual entity and the safety events used in determining the BASIC percentile.

Figure 5-1 is a screenshot of the CSMS carrier measurement summary page for an actual carrier with the identifying fields obscured. This summary page provides carrier identification information (e.g., name, USDOT number), current safety information (e.g., safety rating, SafeStat results, inspection, and crash activity), and SMS BASIC and Crash Indicator information (e.g., measure, rank, and percentile). The BASIC percentiles above the CSA 2010 intervention thresholds are highlighted in yellow to indicate potential problem areas. Percentiles of 97 and higher in the Unsafe Driving, Fatigued Driving (HOS), Driver Fitness, Vehicle Maintenance and Cargo-Related BASICs are highlighted in red.

Note that the carrier in Figure 5-1 is at 99.9% in both the Unsafe Driving BASIC and at 98.6% in the Driver Fitness BASIC. These BASIC percentiles mean that this carrier has demonstrated worse safety performance than 99.9% and 98.6%, respectively, of the other carriers evaluated in these BASICs. Under the current SafeStat/CR process, this carrier, as a Category E carrier, is not a high priority to receive a CR and has not yet received a CR or safety rating. Under the CSA 2010 OM, this carrier will be slated for CSA 2010 interventions and potentially be given a detrimental SFD.

Figure 5-2 is a screenshot of the DSMS driver measurement summary page for an actual driver with the identifying fields obscured. This summary page provides driver identification information, a summary of carriers for which the driver has been operating, current safety activity (inspection and crash activity), and SMS BASIC and Crash Indicator information (e.g., measure, rank and percentile).

The driver in Figure 5-2 provides an example of a safety problem that is not easily addressed by a carrier-based safety program. The driver has operated for five motor carriers in the past three years. FMCSA attention on the carrier in this instance may not be the most effective approach to increasing safety, because the driver may continue the pattern of poor performance while operating for a new carrier. In the same way, carrier termination of the driver's employment may not fully address the safety problem because the driver may continue the pattern of poor performance while operating for a new carrier. CSA 2010 will tackle these behavior problems by applying driver-specific interventions to poor safety performers to change this behavior.

U.S. Department of Transportation What's New | FAQ | Contact Us | Feedback

Comprehensive Safety Information (CSI)

Federal Motor Carrier Safety Administration

Overview
Carrier Measurement
Driver Measurement
Intervention Management
Guidance

SEARCH | **SUMMARY** | UNSAFE | FATIGUE | FITNESS | DRUG/ALCOHOL | VEHICLE | CARGO | CRASH | HISTORY | DRIVERS

Home > Carrier Measurement > Summary Logout

Using August 22, 2008 snapshot
[How do I correct my data?](#)
[Measurement Profile](#)
[Methodology](#)

Carrier Measurement: Summary Print

CARRIER INFORMATION							
DOT #:				Carrier Operation:			
Carrier Legal Name:				Carrier DBA Name:			
Carrier Address:				Mailing Address:			
Telephone/Fax:				Email:			
Number of Power Units:	23			Number of Drivers:	23		
HM Carrier:	No	Passenger Carrier:	No	HHG Carrier:	No	New Entrant Carrier:	Yes
FMCSA Review Date:				FMCSA Review Type:			
Safety Rating:				Date of Last MCS-150 Update:	03/04/2008		
SafeStat Category:	E			HM 70 SafeStat Category:	E		
Accident SEA:	45.69			Vehicle SEA:	17.43		
Driver SEA:	99.92			Safety Management SEA:			

CSA 2010 INTERVENTION ACTIVITY			
No intervention activity			

CRASH ACTIVITY (within 2 years)			
# of Crashes:	3	# of Crashes with Injuries or Fatalities:	1
# of Towaways:	3	# of HM Releases:	0

INSPECTION ACTIVITY (within 2 years)					
Driver Inspections:	101	VH Inspections:	67	HM Inspections:	0

CARRIER SAFETY MEASUREMENT				
	BASIC	Measure	Percentile *	# inspections resulting in violation of BASIC
1	Unsafe Driving	13.84	98.6	30
2	Fatigued Driving	3.18	90.5	41
3	Driver Fitness	3.73	99.9	56
4	Controlled Substances and Alcohol	N/A	Insufficient	0
5	Vehicle Maintenance	4.66	43.1	55
6	Improper Loading/Cargo Securement	1.30	50.7	11
INDICATOR				# crashes
7	Crash Indicator	0.42	64.3	3

* The percentile is shaded in yellow when the [intervention threshold](#) is exceeded, red when the percentile is greater than or equal to 97% (except for Controlled Substances and Alcohol and Crash Indicator), otherwise there is no shading.

[Feedback](#) | [Privacy Policy](#) | [FirstGov.gov](#) | [Freedom of Information Act \(FOIA\)](#) | [Accessibility](#)
[Web Policies and Important Links](#) | [Site Map](#) | [Plug-ins](#)



 Federal Motor Carrier Safety Administration
 1200 New Jersey Avenue SE, Washington, DC 20590 • 1-800-832-5660 • TTY: 1-800-877-8339

Figure 5-1. CSMS Screenshot

U.S. Department of Transportation What's New | FAQ | Contact Us | Feedback

Comprehensive Safety Information (CSI)

Federal Motor Carrier Safety Administration

Overview
Carrier Measurement
Driver Measurement
Intervention Management
Guidance

SEARCH
SUMMARY
UNSAFE
FATIGUE
FITNESS
DRUG/ALCOHOL
VEHICLE
CARGO
CRASH
HISTORY

Home > Driver Measurement > Summary Logout

Using August 22, 2008 snapshot
[How do I correct my data?](#)
[Measurement Profile](#)
[Methodology](#)

Driver Measurement: Summary Print

DRIVER INFORMATION

Last Name:		First Name:	
License Number:		License State:	
Driver DOB:			

OPERATION HISTORY

Date of Most Recent Activities	DOT#	Carrier Name
6/19/2008		
3/28/2008		
7/26/2007		
1/10/2007		
2/1/2006		

CRASH ACTIVITY (within 3 years)

# of Crashes:	4	# of Crashes with Injuries or Fatalities:	0
# of Towaways:	0	# of HM Releases:	0

INSPECTION ACTIVITY (within 3 years)

Driver Inspections:	10	VH Inspections:	4	HM Inspections:	0
---------------------	----	-----------------	---	-----------------	---

DRIVER SAFETY MEASUREMENT

	BASIC		Measure	Percentile [*]	# inspections resulting in violation of BASIC
1	Unsafe Driving	⊕	77.00	99.9	7
2	Fatigued Driving	⊕	3.08	71.6	4
3	Driver Fitness	⊕	0.00	0.0	0
4	Controlled Substances and Alcohol	⊕	0.00	0.0	0
5	Vehicle Maintenance	⊕	13.22	91.8	4
6	Improper Loading/Cargo Securement	⊕	4.22	75.3	1
INDICATOR					# crashes
7	Crash Indicator	⊕	9.00	99.2	4

^{*} The percentile is shaded in yellow when the [intervention threshold](#) is greater than or equal to 90%, otherwise there is no shading.

Feedback | Privacy Policy | FirstGov.gov | Freedom of Information Act (FOIA) | Accessibility
Web Policies and Important Links | Site Map | Plug-ins

Federal Motor Carrier Safety Administration
1200 New Jersey Avenue SE., Washington, DC 20590 • 1-800-832-5660 • TTY: 1-800-877-8339

Figure 5-2. DSMS Screenshot

6. SMS Report – Summary/Next Steps

The SMS methodology is part of a continuous improvement process in support of CSA 2010 and the implementation of the new FMCSA OM. Several major enhancements (see Appendix B) were made to the SMS as part of lessons learned from the CSA 2010 OM test and public lessoning session feedback. Future improvements to the SMS will be also based on feedback from stakeholders such as enforcement personnel, industry and the public, as well as on additional findings as FMCSA implements the CSA OM nationally. In addition, as new data sources become available, these may be incorporated into the SMS methodology. Finally, the SMS will be enhanced periodically as future research reveals new and useful knowledge about crash causation and about the relationship between crash risk and regulatory compliance.

Appendix A

Violation Severity by BASIC

Overview

The tables in this Appendix contain a breakdown of all FMCSRs and HMRs that can lead to roadside violations, with each table representing a unique BASIC. A severity weight is assigned to each regulation and reflects its relevance to crash risk. Within each BASIC, the regulations are grouped based on their attributes so that similar violations can be assigned the same severity weights. Severity weights, discussed in more detail below, are not comparable across the BASICs.

Interpretation of the Severity Weights

The violation severity weights in the tables that follow have been converted into a scale from 1 to 10, where 1 represents the lowest crash risk and 10 represents the highest crash risk relative to the other violations in the BASIC. Because the weights reflect the relative importance of each violation only within each particular BASIC, they cannot be compared meaningfully across the various BASICs. Therefore, a ‘5’ in one BASIC is not equivalent to a ‘5’ in another BASIC, but the ‘5’ does represent the midpoint between a crash risk of 1 and 10 within the same BASIC. The “Violation Group” column in each table identifies the group to which each violation has been assigned. Each violation within a violation group is assigned the same severity weight.

Derivation of the Severity Weights

The severity weights for each violation were derived through the following six-step process:

1. **BASIC Mapping**—All roadside safety-related violations were mapped to an appropriate BASIC so the severity weight analysis could be conducted on each individual BASIC.
2. **Violation Grouping**—All violations in each BASIC were placed into groups of similar violations based on the judgment of enforcement subject matter experts. These groups, listed in the “Violation Group” column in each table, make it possible to incorporate otherwise rarely cited violations into the robust statistical analysis used to derive the severity weights. The violation grouping also ensured that similar types of violations received the same severity weight.
3. **Crash Occurrence Analysis**—Statistical analysis was performed to quantify the extent of the relationship between crash involvement on the one hand, and violation rates in each violation group, within each BASIC, on the other hand. A driver approach was used in this analysis. This approach was followed due to

- strong demonstrable relationships between driver crashes and violations documented in prior research at the Volpe Center. The earlier research was conducted in support of FMCSA's CRWG, the CSA 2010 Initiative's predecessor. Based on the conclusions from this past research, the Volpe Center developed a Driver Information Resource (DIR) for FMCSA. The DIR uses individual crash and inspection reports from all states to construct multi-year driver safety histories on individual drivers. Multivariate negative binomial regression models were used to quantify the strength of relationships between driver violations rates in individual violation groups and crash involvement.
4. **Crash Consequences Analysis**—This analysis incorporates crash consequences attributable to the violation groups based on findings from the Violation Severity Assessment Study (VSAS).⁵ The VSAS quantifies the crash risk associated with individual FMCSR and HMR violations in terms of comparable dollar values. These comparable dollar values represent the increased social cost attributable to the presence of a violation. Together, the regression analysis (Step 3) and VSAS findings make it possible to address total crash risk in terms of both crash occurrence and crash consequence.
 5. **Subject Matter Expert Review**—Enforcement subject matter experts reviewed the results derived purely from the statistical approaches described in Steps 3 and 4. Modifications were made to the severity weights based on input from the subject matter experts. This approach helps to compensate for the limitations of the statistical analysis, such as lack of statistical significance of rarely cited violations.
 6. **CSMS Effectiveness Test**—Various severity weighting schemes developed in Steps 1 through 5 were applied to the CSMS to provide an empirical evaluation of the weighting schemes. The empirical evaluation, or “CSMS Effectiveness Test,” was modeled after the SafeStat Effectiveness Test.⁶ The CSMS Effectiveness Test was accomplished through the following actions: (1) performing a simulated CSMS run that calculates carrier percentile ranks for each BASIC using historical data; (2) examining each carrier's crash involvement over the immediate 18 months after the simulated CSMS timeframe, and (3) observing the relationship between the percentile ranks in each BASIC and the subsequent post-CSMS carrier crash rates. The CSMS Effectiveness Test provides an environment to evaluate various severity weight schemes in terms of their impact in identifying high-risk carriers. It also provides a means of testing other weight schemes, such as the OOS weight, to help optimize CSMS's effectiveness.

This six-step process made it possible to develop a conceptual framework for the CSMS in the form of violation groupings and associated severity weights. The associated

⁵ *Violations Severity Assessment Study Final Report* (October 2007). Prepared for FMCSA by John A. Volpe National Transportation Systems Center.

⁶ *SafeStat Motor Carrier Safety Status Measurement System Methodology: Version 8.6* (January 2004). Prepared for FMCSA by John A. Volpe National Transportation Systems Center. Chapter 7: SafeStat Evaluation.

severity weights were based on both empirical analysis and valuable accumulated knowledge from field experts. The data-driven component of the process, in particular, differentiates the CSMS from SafeStat and addresses some of the criticisms of the SafeStat algorithm.

Tables 1 through 6 list all of the violations in the CSMS, with the first two columns of each table identifying each violation by regulatory part and its associated definition. The third column in each table identifies the violation group to which each violation is assigned, followed by the violation groups' severity weights in the fourth column. The final column in these tables specifies whether or not each violation is also included in the DSMS; violations included in the DSMS are the subset of CSMS BASIC violations of which the CMV driver could also be a responsible party.

Table 1. CSMS Unsafe Driving BASIC Violations ⁷				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight	Violation in the DSMS (Y/N)
177.800(d)	Unnecessary delay in HM transportation to destination	HM Related	1	Y
390.17DT	Operating a CMV while texting	Texting	10	Y
390.20	Failing to properly secure parked vehicle	Other Driver Violations	1	Y
392.2C	Failure to obey traffic control device	Dangerous Driving	5	Y
392.2DH	Headlamps - Failing to dim when required	Misc Violations	3	Y
392.2FC	Following too close	Dangerous Driving	5	Y
392.2LC	Improper lane change	Dangerous Driving	5	Y
392.2LV	Lane Restriction violation	Misc Violations	3	Y
392.2P	Improper passing	Dangerous Driving	5	Y
392.2PK	Unlawfully parking and/or leaving vehicle in the roadway	Other Driver Violations	1	Y
392.2R	Reckless driving	Reckless Driving	10	Y
392.2RR	Railroad Grade Crossing violation	Dangerous Driving	5	Y
392.2S	Speeding	Speeding Related	5	Y
392.2-SLLS1	State/Local Laws - Speeding 1-5 miles per hour over the speed limit	Speeding 1	1	Y
392.2-SLLS2	State/Local Laws - Speeding 6-10 miles per hour over the speed limit	Speeding 2	4	Y
392.2-SLLS3	State/Local Laws - Speeding 11-14 miles per hour over the speed limit	Speeding 3	7	Y
392.2-SLLS4	State/Local Laws - Speeding 15 or more miles per hour over the speed limit	Speeding 4	10	Y

⁷ Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

Table 1. CSMS Unsafe Driving BASIC Violations⁷

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight	Violation in the DSMS (Y/N)
392.2-SLLSWZ	State/Local Laws - Speeding work/construction zone	Speeding 4	10	Y
392.2-SLLT	State/Local Laws - Operating a CMV while texting	Texting	10	Y
392.2T	Improper turns	Dangerous Driving	5	Y
392.2Y	Failure to yield right of way	Dangerous Driving	5	Y
392.6	Scheduling run to necessitate speeding	Speeding Related	5	N
392.10(a)(1)	Failing to stop at railroad crossing—bus	Dangerous Driving	5	Y
392.10(a)(2)	Failing to stop at railroad crossing—chlorine	Dangerous Driving	5	Y
392.10(a)(3)	Failing to stop at railroad crossing—placard	Dangerous Driving	5	Y
392.10(a)(4)	Failing to stop at railroad crossing—HM cargo	Dangerous Driving	5	Y
392.14	Failed to use caution for hazardous condition	Dangerous Driving	5	Y
392.16	Failing to use seat belt while operating CMV	Seat Belt	7	Y
392.22(a)	Failing to use hazard warning flashers	Other Driver Violations	1	Y
392.60(a)	Unauthorized passenger on board CMV	Other Driver Violations	1	Y
392.62	Unsafe bus operations	Other Driver Violations	1	Y
392.62(a)	Bus—Standees forward of the standee line	Other Driver Violations	1	Y
392.71(a)	Using or equipping a CMV with radar detector	Speeding Related	5	Y
397.3	State/local laws ordinances regulations	HM Related	1	Y
397.13	Smoking within 25 feet of HM vehicle	HM Related	1	Y
398.4	Driving of vehicle—migrant workers	Other Driver Violations	1	Y

Table 2. CSMS Fatigued Driving (HOS) BASIC Violations ⁸				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight ⁹	Violation in the DSMS (Y/N)
392.2H	State/Local Hours of Service (HOS)	Hours	7	Y
392.3	Operating a CMV while ill/fatigued	Jumping OOS/Driving Fatigued	10	Y
395.1(h)(1)	15, 20, 70/80 HOS violations (Alaska-Property)	Hours	7	Y
395.1(h)(2)	15, 20, 70/80 HOS violations (Alaska-Passenger)	Hours	7	Y
395.1(h)(3)	Adverse driving conditions violations (Alaska)	Hours	7	Y
395.1(o)	16 hour rule violation (Property)	Hours	7	Y
395.3(a)(1)	Requiring or permitting driver to drive more than 11 hours	Hours	7	Y
395.3A1R	11 hour rule violation (Property)	Hours	7	Y
395.3(a)(2)	Requiring or permitting driver to drive after 14 hours on duty	Hours	7	Y
395.3A2R	14 hour rule violation (Property)	Hours	7	Y
395.3(b)	60/70- hour rule violation	Hours	7	Y
395.3BR	60/70 hour rule violation (Property)	Hours	7	Y
395.3(c)	34- hour restart violation (Property)	Hours	7	Y
395.5(a)(1)	10- hour rule violation (Passenger)	Hours	7	Y
395.5(a)(2)	15- hour rule violation (Passenger)	Hours	7	Y
395.5(b)	60/70- hour rule violation (Passenger)	Hours	7	Y
395.8	Log violation (general/form and manner)	Other Log/Form & Manner	2	Y

⁸ Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

⁹ In cases where a violation results in an out-of-service order as defined in 49 CFR 390.5, an additional weight of 2 is added to arrive at a total severity weight for the violation.

Table 2. CSMS Fatigued Driving (HOS) BASIC Violations⁸

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight⁹	Violation in the DSMS (Y/N)
395.8(a)	No drivers record of duty status	Incomplete/ Wrong Log	5	Y
395.8(e)	False report of drivers record of duty status	False Log	7	Y
395.8(f)(1)	Drivers record of duty status not current	Incomplete/ Wrong Log	5	Y
395.8(k)(2)	Driver failing to retain previous 7 days' logs	Incomplete/ Wrong Log	5	Y
395.13(d)	Driving after being declared out-of-service	Jumping OOS/Driving Fatigued	10	Y
395.15(b)	Onboard recording device information requirements not met	EOBR Related	1	Y
395.15(c)	Onboard recording device improper form and manner	EOBR Related	1	Y
395.15(f)	Onboard recording device failure and driver failure to reconstruct duty status	EOBR Related	1	Y
395.15(g)	On-board recording device information not available	EOBR Related	1	Y
395.15(i)(5)	Onboard recording device does not display required information.	EOBR Related	1	N
398.6	Violation of hours of service regulations—migrant workers	Hours	7	Y

Table 3. CSMS Driver Fitness BASIC Violations ¹⁰				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight ¹¹	Violation in the DSMS (Y/N)
177.816	Driver training requirements	General Driver Qualification	4	N
383.21	Operating a CMV with more than one driver's license	License-related	8	Y
383.21(a)	Operating a CMV with more than one driver's license [†]	License-related	8	Y
383.23(a)(2)	Operating a CMV without a CDL	License-related	8	Y
383.23(c)	Operating on learner's permit without CDL holder	License-related	8	Y
383.23(c)(1)	Operating on learner's permit without CDL holder	License-related	8	Y
383.23(c)(2)	Operating on learner's permit without valid driver's license	License-related	8	Y
383.51(a)	Driving a CMV (CDL) while disqualified	License-related	8	Y
383.91(a)	Operating a CMV with improper CDL group	License-related	8	Y
383.93(b)(1)	No double/triple trailer endorsement on CDL	License-related	8	Y
383.93(b)(2)	No passenger vehicle endorsement on CDL	License-related	8	Y
383.93(b)(3)	No tank vehicle endorsement on CDL	License-related	8	Y
383.93(b)(4)	No hazardous materials endorsement on CDL	License-related	8	Y

¹⁰ Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

¹¹ In cases where a violation results in an out-of-service order as defined in 49 CFR 390.5, an additional weight of 2 is added to arrive at a total severity weight for the violation.

[†] Citations marked with † are being phased out based on regulatory changes, and are intended for removal from the SMS at a later time.

Table 3. CSMS Driver Fitness BASIC Violations¹⁰				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹¹	Violation in the DSMS (Y/N)
383.93(b)(5)	No school bus endorsement on CDL	License-related	8	Y
383.93B5LCDL	License (CDL) - Operating a school bus without a school bus endorsement as described in 383.93(b)(5)	License-related	8	Y
383.95(a)	Violating airbrake restriction	License-related	8	Y
386.72(b)	Failing to comply with Imminent Hazard OOS Order	Fitness/ Jumping OOS	10	Y
391.11	Unqualified driver	License-related	8	Y
391.11(b)(1)	Interstate driver under 21 years of age	General Driver Qualification	4	Y
391.11(b)(2)	Non-English speaking driver	General Driver Qualification	4	Y
391.11B2S	Driver must be able to understand highway traffic signs and signals in the English language	General Driver Qualification	4	Y
391.11(b)(4)	Driver lacking physical qualification(s)	Physical	2	Y
391.11(b)(5)	Driver lacking valid license for type vehicle being operated	License-related	8	Y
391.11(b)(7)	Driver disqualified from operating CMV	License-related	8	Y
391.15(a)	Driving a CMV while disqualified	License-related	8	Y
391.41(a)	Driver not in possession of medical certificate	Medical Certificate	1	Y
391.43(h)	Improper medical examiners certificate form	Medical Certificate	1	Y
391.45(b)	Expired medical examiner's certificate	Medical Certificate	1	Y
391.49(j)	No valid medical waiver in driver's possession	Medical Certificate	1	Y

Table 3. CSMS Driver Fitness BASIC Violations¹⁰				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹¹	Violation in the DSMS (Y/N)
398.3(b)	Driver not physically qualified	Physical	2	Y
398.3(b)(8)	No doctor's certificate in possession	Medical Certificate	1	Y

Table 4. CSMS Controlled Substances/Alcohol BASIC Violations¹²				
Section	Violation Description	Violation Group Description	Violation Severity Weight	Violation in the DSMS (Y/N)
392.5(c)(2)	Violating OOS order pursuant to 392.5(a)/(b)	Alcohol Jumping OOS	10	Y
392.4(a)	Driver uses or is in possession of drugs	Drugs	10	Y
392.5(a)	Possession/use/under influence alcohol-4hrs prior to duty	Alcohol	5	Y

¹² Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight ¹⁴	Violation in the DSMS (Y/N)
365.511	Fail to display current CVSA Decal: Permanent Authority	Inspection Reports	4	N
374.313(a)	Failure to maintain a reasonable temperature	Cab, Body, Frame	2	Y
374.313(b)	Bus — Failure to maintain restroom	Cab, Body, Frame	2	Y
374.313(c)	Bus — Not maintained in clean working order	Cab, Body, Frame	2	Y
385.103(c)	Fail to display current CVSA decal— Provisional Authority	Inspection Reports	4	N
392.2WC	Wheel (Mud) Flaps missing or defective	Windshield /Glass /Markings	1	Y
392.7	No pre-trip inspection	Inspection Reports	4	Y
392.7(a)	Driver failing to conduct pre-trip inspection	Inspection Reports	4	Y
392.7(b)	Driver failing to conduct a pre-trip inspection of Intermodal Equipment	Inspection Reports	4	Y
392.8	Failing to inspect/use emergency equipment	Emergency Equipment	2	Y
392.22(b)	Failing/improper placement of warning devices	Cab, Body, Frame	2	Y
392.33	Operating CMV with lamps/reflectors obscured	Lighting	6	Y
393.9(a)	Inoperative required lamps	Clearance Identification Lamps/Other	2	Y

¹³ Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

¹⁴ In cases where a violation results in an out-of-service order as defined in 49 CFR 390.5, an additional weight of 2 is added to arrive at a total severity weight for the violation.

† Citations marked with † are being phased out based on regulatory changes, and are intended for removal from the SMS at a later time.

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.9H	Inoperative head lamps	Lighting	6	Y
393.9T	Inoperative tail lamp	Lighting	6	Y
393.9TS	Inoperative turn signal	Lighting	6	Y
393.11	No/defective lighting devices/reflective devices/projected	Reflective Sheeting	3	Y
393.11LR	Lower retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11N	No retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11RT	Retroreflective not affixed as required Trailer manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11S	Side retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11TL	Truck Tractor manufactured on or after 7/1/1997 with no retro reflective sheeting or reflex reflectors on mud flaps	Reflective Sheeting	3	Y
393.11TT	Truck Tractor no retroreflective sheeting/reflex reflectors manufactured on or after 7/1/1997	Reflective Sheeting	3	Y
393.11TU	Truck Tractor upper body corners retroreflective sheeting/reflex reflectors manufactured on or after 7/1/1997	Reflective Sheeting	3	Y
393.11UR	Upper reflex reflectors retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.13(a)	Retroreflective tape not affixed; Trailer manufactured before 12/1/1993	Reflective Sheeting	3	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.13(b)	No retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.13(c)(1)	Side retroreflective sheeting/reflex reflectors manufactured on or before 12/1/1993	Reflective Sheeting	3	Y
393.13(c)(2)	Lower retroreflective sheeting/reflex reflectors manufactured on or before 12/1/1993	Reflective Sheeting	3	Y
393.13(c)(3)	Upper retroreflective sheeting/reflex reflectors manufactured on or before 12/1/1993	Reflective Sheeting	3	Y
393.13(d)(1)	Side retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.13(d)(2)	Lower rear retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.13(d)(3)	Upper rear retroreflective sheeting/reflex reflectors manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.17	No/defective lamp/reflector-tow-away operation	Lighting	6	Y
393.17(a)	No/defective lamps-towing unit-tow-away operation	Lighting	6	Y
393.17(b)	No/defective tow-away lamps on rear unit	Lighting	6	Y
393.19	Inoperative/defective hazard warning lamp	Lighting	6	Y
393.23	Required lamp not powered by vehicle electricity	Clearance Identification Lamps/Other	2	Y
393.24(a)	Non-compliance with headlamp requirements	Lighting	6	Y
393.24(b)	Non-compliant fog/driving lamps	Lighting	6	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.24	Non-compliant fog or driving lamps	Lighting	6	Y
393.24(c)	Improper headlamp mounting	Lighting	6	N
393.24(d)	Improper head / auxiliary / fog lamp aiming	Lighting	6	N
393.25(a)	Improper lamp mounting	Lighting	6	N
393.25(b)	Lamps are not visible as required	Lighting	6	Y
393.25(e)	Lamp not steady burning	Lighting	6	Y
393.25(f)	Stop lamp violations	Lighting	6	Y
393.26	Requirements for reflectors	Reflective Sheeting	3	Y
393.28	Improper or no wiring protection as required	Other Vehicle Defect	3	Y
393.30	Improper battery installation	Other Vehicle Defect	3	Y
393.40	Inadequate brake system on a CMV	Brakes, All Others	4	Y
393.41	No or defective parking brake system on CMV	Brakes, All Others	4	Y
393.42	No brakes as required	Brakes, All Others	4	Y
393.43	No/improper breakaway or emergency braking	Brakes, All Others	4	Y
393.43(a)	No/improper tractor protection valve	Brakes, All Others	4	Y
393.43(d)	No or defective automatic trailer brake	Brakes, All Others	4	Y
393.44	No/defective bus front brake line protection	Brakes, All Others	4	Y
393.45	Brake tubing and hose adequacy	Brakes, All Others	4	N
393.45(a)(4)	Failing to secure brake hose/tubing against mechanical damage	Brakes, All Others	4	N
393.45(b)(2)	Failing to secure brake hose/tubing against mechanical damage	Brakes, All Others	4	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.45(b)(3)	Failing to secure brake hose/tubing against high temperatures	Brakes, All Others	4	N
393.45(d)	Brake connections with leaks/constrictions	Brakes, All Others	4	N
393.47	Inadequate/contaminated brake linings	Brakes, All Others	4	Y
393.47(a)	Inadequate brakes for safe stopping	Brakes, All Others	4	Y
393.47(b)	Mismatched brake chambers on same axle	Brakes, All Others	4	Y
393.47(c)	Mismatched slack adjuster effective length	Brakes, All Others	4	Y
393.47(d)	Insufficient brake linings	Brakes, All Others	4	Y
393.47(e)	Clamp/Roto-Chamber type brake(s) out of adjustment	Brakes Out of Adjustment	4	Y
393.47(f)	Wedge type brake(s) out of adjustment	Brakes Out of Adjustment	4	Y
393.47(g)	Insufficient drum/rotor thickness	Brakes, All Others	4	Y
393.48(a)	Inoperative/defective brakes	Brakes, All Others	4	Y
393.48(b)(1)	Defective brake limiting device	Brakes, All Others	4	Y
393.50	Inadequate reservoir for air/vacuum brakes	Brakes, All Others	4	N
393.50(a)	Failing to have sufficient air/vacuum reserve	Brakes, All Others	4	N
393.50(b)	Failing to equip vehicle—prevent reservoir air/vacuum leak	Brakes, All Others	4	N
393.50(c)	No means to ensure operable check valve	Brakes, All Others	4	N
393.50(d)	No or defective air reservoir drain valve	Brakes, All Others	4	Y
393.51	No or defective brake warning device	Brakes, All Others	4	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.52(a)(1)	Insufficient braking force as percent of GVW or GCW	Brakes, All Others	4	Y
393.53(a)	Automatic brake adjuster CMV manufactured on or after 10/20/1993— hydraulic brake	Brakes, All Others	4	Y
393.53(b)	Automatic brake adjuster CMV manufactured on or after 10/20/1994— air brake	Brakes, All Others	4	Y
393.53(c)	Brake adjustment indicator CMV manufactured on or after 10/20/1994— external automatic adjustment	Brakes, All Others	4	Y
393.55(a)	ABS— all CMVs manufactured on or after 3/1/1999 with hydraulic brakes	Brakes, All Others	4	N
393.55(b)	ABS— malfunction indicators for hydraulic brake system	Brakes, All Others	4	N
393.55(c)(1)	ABS— all tractors manufactured on or after 3/1/1997 air brake system	Brakes, All Others	4	N
393.55(c)(2)	ABS— all other CMVs manufactured on or after 3/1/1998 air brake system	Brakes, All Others	4	N
393.55(d)(1)	ABS— malfunctioning circuit/signal manufactured on or after 3/1/1997, single-unit CMV manufactured on or after 3/1/1998	Brakes, All Others	4	N
393.55(d)(2)	ABS— malfunctioning indicator to cab of towing CMV manufactured on or after 3/1/2001	Brakes, All Others	4	N
393.55(d)(3)	ABS— malfunctioning indicator connection from towed CMV manufactured on or after 3/1/2001	Brakes, All Others	4	N
393.55(e)	ABS— malfunctioning lamps towed CMV manufactured on or after 3/1/1998, manufactured before 3/1/2009	Brakes, All Others	4	Y
393.60(b)	Windshields required	Windshield/ Glass/ Makings	1	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.60(c)	Damaged or discolored windshield	Windshield/ Glass/ Makings	1	Y
393.60(d)	Glazing permits less than 70 percent of light	Windshield/ Glass/ Makings	1	Y
396.60EWS	Windshield - Obstructed	Windshield/ Glass/ Makings	1	Y
393.61	Inadequate or missing truck side windows	Windshield/ Glass/ Makings	1	Y
393.61(a)	Inadequate or missing truck side windows	Windshield/ Glass/ Makings	1	Y
393.61(b)(2)	Emergency exit window handle broken †	Windshield/ Glass/ Makings	1	Y
393.62(a)	No or defective bus emergency exits, manufactured on or after 9/1/1994	Windshield/ Glass/ Makings	1	Y
393.62(b)	No or defective bus emergency exits, manufactured on or after 9/1/1973 but before 9/1/1994	Windshield/ Glass/ Makings	1	Y
393.62(c)	No or defective bus emergency exit windows, manufactured before 9/1/1973	Windshield/ Glass/ Makings	1	Y
393.62(d)	No / defective Safety glass/push-out window	Windshield/ Glass/ Makings	1	Y
393.62(e)	No or inadequate bus emergency exit marking	Windshield/ Glass/ Makings	1	Y
393.65(b)	Improper location of fuel system	Fuel Systems	1	Y
393.65(c)	Improper securement of fuel tank	Fuel Systems	1	Y
393.65(f)	Improper fuel line protection	Fuel Systems	1	Y
393.67	Fuel tank requirement violations	Fuel Systems	1	N
393.67(c)(7)	Fuel tank fill pipe cap missing	Fuel Systems	1	Y
393.67(c)(8)	Improper fuel tank safety vent	Fuel Systems	1	N
393.68	Compressed Natural Gas (CNG) Fuel Container does not conform to regulations	Other Vehicle Defect	3	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.70	Fifth wheel	Coupling Devices	3	N
393.70(a)	Defective coupling device—improper tracking	Coupling Devices	3	N
393.70(b)	Defective/improper fifth wheel assemblies	Coupling Devices	3	Y
393.70(b)(2)	Defective fifth wheel locking mechanism	Coupling Devices	3	Y
393.70(c)	Defective coupling devices for full trailer	Coupling Devices	3	Y
393.70(d)	No/improper safety chains/cables for full trailer	Coupling Devices	3	Y
393.70(d)(8)	Improper safety chain attachment	Coupling Devices	3	Y
393.71	Improper coupling driveaway/tow-away operation	Coupling Devices	3	Y
393.71(g)	Prohibited towing connection / device	Coupling Devices	3	Y
393.71(h)	Towbar requirement violations	Coupling Devices	3	Y
393.71(h)(10)	No/improper safety chains/cables for towbar	Coupling Devices	3	Y
393.75	Tires/tubes (general)	Tires	8	Y
393.75(a)	Flat tire or fabric exposed	Tires	8	Y
393.75(a)(1)	Tire—ply or belt material exposed	Tires	8	Y
393.75(a)(2)	Tire—tread and/or sidewall separation	Tires	8	Y
393.75(a)(3)	Tire—flat and/or audible air leak	Tires	8	Y
393.75(a)(4)	Tire—cut exposing ply and/or belt material	Tires	8	Y
393.75(b)	Tire—front tread depth less than 4/32 of inch	Tires	8	Y
393.75(c)	Tire—other tread depth less than 2/32 of inch	Tires	8	Y
393.75(d)	Tire-bus regrooved/recap on front wheel	Tires	8	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.75(e)	Tire—regrooved on front of truck/truck-tractor	Tire vs. Load	3	Y
393.75(f)	Tire—load weight rating/under inflated	Tire vs. Load	3	Y
393.75(f)(1)	Weight carried exceeds tire load limit †	Tire vs. Load	3	Y
393.75(f)(2)	Tire under-inflated †	Tire vs. Load	3	Y
393.75(h)	Tire under-inflated	Tire vs. Load	3	Y
393.76	Sleeper berth requirement violations	Other Vehicle Defect	3	Y
393.77	Defective and/or prohibited heaters	Other Vehicle Defect	3	Y
393.77(b)(5)	Protection of operating controls from tampering	Other Vehicle Defect	3	Y
393.77(b)(11)	Bus heater fuel tank location	Other Vehicle Defect	3	Y
393.78	Windshield wipers inoperative/defective	Windshield/ Glass/ Makings	1	Y
393.79(a)	Defroster / Defogger inoperative	Windshield/ Glass/ Makings	1	Y
393.80	Failing to equip vehicle with two rear vision mirrors	Other Vehicle Defect	3	Y
393.81	Horn inoperative	Other Vehicle Defect	3	Y
393.82	Speedometer inoperative / inadequate	Other Vehicle Defect	3	Y
393.83(a)	Exhaust system location	Exhaust Discharge	1	Y
393.83(b)	Exhaust discharge fuel tank/filler tube	Exhaust Discharge	1	Y
393.83(c)	Improper exhaust—bus (gasoline)	Exhaust Discharge	1	Y
393.83(d)	Improper exhaust—bus (diesel)	Exhaust Discharge	1	Y
393.83(e)	Improper exhaust discharge (not rear of cab)	Exhaust Discharge	1	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.83(f)	Improper exhaust system repair (patch/wrap)	Exhaust Discharge	1	Y
393.83(g)	Exhaust leak under truck cab and/or sleeper	Exhaust Discharge	1	Y
393.83(h)	Exhaust system not securely fastened	Exhaust Discharge	1	Y
393.84	Inadequate floor condition	Cab, Body, Frame	2	Y
393.86	No or improper rearend protection	Cab, Body, Frame	2	Y
393.86(a)(1)	Rear impact guards—all trailers/semitrailers manufactured on or after 1/26/98	Cab, Body, Frame	2	N
393.86(a)(2)	Impact guard width— all trailers/semitrailers manufactured on or after 1/26/98	Cab, Body, Frame	2	N
393.86(a)(3)	Impact guard height— all trailers/semitrailers manufactured on or after 1/26/98	Cab, Body, Frame	2	N
393.86(a)(4)	Impact guard rear— all trailers/semitrailers manufactured on or after 1/26/98	Cab, Body, Frame	2	N
393.86(a)(5)	Cross-sectional vertical height— all trailers/semitrailers manufactured on or after 1/26/98	Cab, Body, Frame	2	N
393.86(b)(1)	Rear Impact Guards— motor vehicle manufactured on or after 12/31/52, see exceptions	Cab, Body, Frame	2	Y
393.88	Improperly located television receiver	Cab, Body, Frame	2	Y
393.89	Bus driveshaft not properly protected	Cab, Body, Frame	2	Y
393.90	Bus—no or obscure standee line	Cab, Body, Frame	2	Y
393.91	Bus—improper aisle seats	Cab, Body, Frame	2	Y
393.93(a)	Bus—not equipped with seat belt	Cab, Bdy, Frame	2	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.93(a)(3)	Seats not secured in conformance with FMVSS	Cab, Body, Frame	2	N
393.93(b)	Truck not equipped with seat belt	Cab, Body, Frame	2	Y
393.95(a)	No/discharged/unsecured fire extinguisher	Emergency Equipment	2	Y
393.95(a)(1)(i)	No/discharged/unsecured fire extinguisher	Emergency Equipment	2	Y
393.95(b)	No spare fuses as required	Emergency Equipment	2	Y
393.95(c)	No spare fuses as required	Emergency Equipment	2	Y
393.95(f)	No / insufficient warning devices	Emergency Equipment	2	Y
393.95(g)	HM—restricted emergency warning device	Emergency Equipment	2	Y
393.201(a)	Frame cracked / loose / sagging / broken	Cab, Body, Frame	2	Y
393.201(b)	Bolts securing cab broken/loose/missing	Cab, Body, Frame	2	N
393.201(c)	Frame rail flange improperly bent/cut/notched	Cab, Body, Frame	2	N
393.201(d)	Frame accessories improperly attached	Cab, Body, Frame	2	N
393.201(e)	Prohibited holes drilled in frame rail flange	Cab, Body, Frame	2	N
393.203	Cab/body parts requirements violations	Cab, Body, Frame	2	Y
393.203(a)	Cab door missing/broken	Cab, Body, Frame	2	Y
393.203(b)	Cab/body improperly secured to frame	Cab, Body, Frame	2	Y
393.203(c)	Hood not securely fastened	Cab, Body, Frame	2	Y
393.203(d)	Cab seats not securely mounted	Cab, Body, Frame	2	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations ¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
393.203(e)	Cab front bumper missing/unsecured/ protrude	Cab, Body, Frame	2	Y
393.205(a)	Wheel/rim cracked or broken	Wheels, Studs, Clamps, Etc.	2	Y
393.205(b)	Stud/bolt holes elongated on wheels	Wheels, Studs, Clamps, Etc.	2	Y
393.205(c)	Wheel fasteners loose and/or missing	Wheels, Studs, Clamps, Etc.	2	Y
393.207(a)	Axle positioning parts defective/missing	Suspension	7	Y
393.207(b)	Adjustable axle locking pin missing/disengaged	Suspension	7	Y
393.207(c)	Leaf spring assembly defective/missing	Suspension	7	Y
393.207(d)	Coil spring cracked and/or broken	Suspension	7	Y
393.207(e)	Torsion bar cracked and/or broken	Suspension	7	Y
393.207(f)	Air suspension pressure loss	Suspension	7	Y
393.207(g)	No/defective air suspension exhaust control	Suspension	7	N
393.209(a)	Steering wheel not secured/broken	Steering Mechanism	6	Y
393.209(b)	Excessive steering wheel lash	Steering Mechanism	6	Y
393.209(c)	Loose steering column	Steering Mechanism	6	Y
393.209(d)	Steering system components worn/welded/missing	Steering Mechanism	6	Y
393.209(e)	Power steering violations	Steering Mechanism	6	Y
396.1	Must have knowledge of and comply with regulations	Inspection Reports	4	Y
396.3(a)(1)	Inspection/repair and maintenance parts and accessories	Wheels, Studs, Clamps, Etc.	2	Y
396.3A1B	Brakes (general)	Brakes, All Others	4	Y

Table 5. CSMS Vehicle Maintenance BASIC Violations¹³

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁴	Violation in the DSMS (Y/N)
396.3A1BA	Brake out of adjustment	Brakes Out of Adjustment	4	N
396.3A1BC	Brake-air compressor violation	Brakes, All Others	4	N
396.3A1BD	Brake-defective brake drum	Brakes, All Others	4	N
396.3A1BL	Brake-reserve system pressure loss	Brakes, All Others	4	N
396.3A1T	Tires (general)	Tires	8	Y
396.5	Excessive oil leaks†	Other Vehicle Defect	3	N
396.5(a)	Failing to ensure that vehicle is properly lubricated	Other Vehicle Defect	3	N
396.5(b)	Oil and/or grease leak	Other Vehicle Defect	3	N
396.7	Unsafe operations forbidden	Other Vehicle Defect	3	Y
396.9(c)(2)	Operating an OOS vehicle	Vehicle Jumping OOS	10	Y
396.9(d)(2)	Failure to correct defects noted on inspection report	Inspection Reports	4	N
396.11	No or inadequate driver vehicle inspection report	Inspection Reports	4	Y
396.13(c)	No reviewing driver's signature on Driver Vehicle Inspection Report (DVIR)	Inspection Reports	4	Y
396.17(c)	Operating a CMV without periodic inspection	Inspection Reports	4	N
398.5	Parts/access—migrant workers	Other Vehicle Defect	3	Y
398.7	Inspect/maintain motor vehicle—migrant workers	Inspection Reports	4	N
399.207	Vehicle access requirements violations	Cab, Body, Frame	2	N
399.211	Inadequate maintenance of driver access	Cab, Body, Frame	2	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵				
Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
171.2(a)	Failure to comply with HM regulations	HM Other	2	Y
171.2(b)	Failure to comply with the requirements for HM transportation (including labeling and handling)	HM Other	2	Y
171.2(c)	Representing a package./container for HM not meeting specs	Markings - HM	5	N
171.2(d)	Accepting HM without registering with PHMSA	Documentation - HM	3	Y
171.2(f)	Transporting HM not in accordance with this part	Fraudulent Behavior	5	Y
171.2(g)	Cargo tank does not comply with HM Regulations	Fraudulent Behavior	5	N
171.2(k)	Representing vehicle with HM, none present	Fraudulent Behavior	5	Y
172.301(a)(1)	No proper shipping name and/or ID# marking on non-bulk	Markings - HM	5	N
172.301(a)(3)	No ID number on side/ends of non-bulk package — large quantity of single HM	Markings - HM	5	N
172.301(b)	No technical name on non-bulk	Documentation - HM	3	N
172.301(c)	No special permit number on non-bulk package	Documentation - HM	3	N
172.301(d)	No consignee/consignor on non-bulk	Documentation - HM	3	N
172.302(a)	No ID number (portable and cargo tank)	Markings - HM	5	Y
172.302(b)	Bulk package marking incorrect size	Markings - HM	5	N
172.302(c)	No special permit number on bulk package	Documentation - HM	3	N
172.303(a)	Prohibited HM marking on package	Markings - HM	5	N

¹⁵ Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICS.

¹⁶ In cases where a violation results in an out-of-service order as defined in 49 CFR 390.5, an additional weight of 2 is added to arrive at a total severity weight for the violation.

† Citations marked with † are being phased out based on regulatory changes, and are intended for removal from the SMS at a later time

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
172.304(a)(1)	Package marking not durable, English, or print	Markings - HM	5	N
172.304(a)(2)	Marking not on sharply contrasting color	Markings - HM	5	N
172.304(a)(3)	Marking obscured by label or attachments	Markings - HM	5	N
172.304(a)(4)	Marking not away from other marking	Markings - HM	5	N
172.310(a)	No gross weight on radioactive materials package greater than 50 KG	Markings - HM	5	N
172.310(b)	Radioactive materials package not marked "Type A or B"	Markings - HM	5	N
172.312(a)	No package orientation arrows	Cargo Protection - HM	4	N
172.312(a)(2)	No package orientation arrows	Cargo Protection - HM	4	N
172.312(b)	Prohibited use of orientation arrows	Cargo Protection - HM	4	N
172.313(a)	No "inhalation hazard" on package	Markings - HM	5	N
172.313(b)	No "poison" on non-bulk plastic package	Markings - HM	5	N
172.316(a)	"Other regulated material" non-bulk package not marked	Markings - HM	5	N
172.320(a)	Class 1 package not marked with ex-number	Markings - HM	5	N
172.322(b)	No marine pollutant marking on bulk packaging	Markings - HM	5	N
172.324	Non-bulk hazardous substance not marked	Markings - HM	5	N
172.325(a)	Elevated temperature not marked "Hot"	Markings - HM	5	N
172.325(b)	Improperly marked molten aluminum/sulphur	Markings - HM	5	N
172.326(b)	No portable tank owner or lessee marking	Markings - HM	5	N
172.326(c)(1)	No ID number marking on vehicle carrying portable tank	Markings - HM	5	N
172.326(c)(2)	Shipper failed to provide ID number to carrier	Markings - HM	5	N
172.328(a)	Shipper failed to provide or affix ID number for cargo tank	Markings - HM	5	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
172.328(b)	Cargo tank not marked for class 2	Markings - HM	5	N
172.328(c)	No quenched and tempered steel (QT)/other than quenched and tempered steel (NQT) marked on cargo tank (MC 330/331)	Markings - HM	5	N
172.328(d)	Fail to mark manual remote shutoff device	Markings - HM	5	N
172.330(a)(2)	Tank car tank (non cylinder) not marked as required	Markings - HM	5	N
172.330(b)	Motor vehicle with tank not marked	Markings - HM	5	N
172.332	Required ID markings displayed	Markings - HM	5	N
172.334	Prohibited ID number marking	Markings - HM	5	N
172.334(a)	ID # displayed on Class 7/Class 1/Dangerous or Subsidiary placard	Markings - HM	5	N
172.336(b)	ID numbers not properly displayed	Markings - HM	5	N
172.336(c)(1)	Failing to display ID numbers on compartment cargo tank in sequence	Markings - HM	5	N
172.338	Carrier failed to replace missing ID number	Markings - HM	5	N
172.400(a)	Package/containment not labeled as required	Markings - HM	5	Y
172.401	Prohibited labeling	Markings - HM	5	N
172.402(a)	No label for subsidiary hazard	Markings - HM	5	N
172.402(b)	Display of class number on label	Markings - HM	5	N
172.402(d)	Subsidiary labeling for radioactive materials	Markings - HM	5	N
172.402(e)	Subsidiary labeling for class 1(explosive) materials	Markings - HM	5	N
172.403(a)	Radioactive material label requirement	Markings - HM	5	N
172.403(f)	Radioactive material package—2 labels on opposite sides	Markings - HM	5	N
172.403(g)	Failed to label radioactive material properly	Markings - HM	5	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
172.403(g)(2)	Class 7 label – no activity/activity not in SI units	Markings - HM	5	N
172.404(a)	Mixed package not properly labeled	Markings - HM	5	N
172.404(b)	Failed to properly label consolidated package	Markings - HM	5	N
172.406(a)(1)	Label placement not as required	Markings - HM	5	N
172.406(c)	Multiple label placement not as required	Markings - HM	5	N
172.406(d)	Label not on contrasting background or no border	Markings - HM	5	N
172.406(e)	Failed to display duplicate label as required	Markings - HM	5	N
172.406(f)	Label obscured by marking or attachment	Markings - HM	5	N
172.504(a)	Vehicle not placarded as required	Markings - HM	5	Y
172.506(a)(1)	Placards not affixed to vehicle	Markings - HM	5	Y
172.516(a)	Placard not visible from direction it faces	Markings - HM	5	Y
172.516(c)(1)	Placard not securely affixed or attached	Markings - HM	5	Y
172.516(c)(2)	Placard not clear of appurtenance	Markings - HM	5	Y
172.516(c)(4)	Placard improper location	Markings - HM	5	Y
172.516(c)(5)	Placard not reading horizontally	Markings - HM	5	Y
172.516(c)(6)	Placard damaged, deteriorated, or obscured	Markings - HM	5	Y
172.516(c)(7)	Placard not on contrasting background or border	Markings - HM	5	Y
172.600(c)	Emergency Response (ER) information not available	Documentation - HM	3	Y
172.602(a)	Emergency response information missing	Documentation - HM	3	Y
172.602(b)	Form and manner of emergency response information	Documentation - HM	3	Y
172.602(c)(1)	Maintenance/accessibility of emergency response information	Documentation - HM	3	Y
173.24(b)(1)	Release of HM from package	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
173.25(c)	Failure to label and package poison properly, when transported with edible material	Markings - HM	5	Y
173.29(a)	Empty package improper transportation	Cargo Protection - HM	4	N
173.30	Loading/ unloading transport vehicles	Cargo Protection - HM	4	Y
173.33(a)	Cargo tank general requirements	Cargo Protection - HM	4	Y
173.33(b)	HM in cargo tank which had dangerous reaction with cargo tank	Cargo Protection - HM	4	Y
173.33(c)(2)	Cargo tank not marked with design or maximum allowable working pressure (MAWP)	Cargo Protection - HM	1	N
173.35(a)	Intermediate bulk container requirements	Package Integrity - HM	8	Y
173.35(f)(2)	Intermediate bulk container (IBC) not secured to or within vehicle	Load Securement	10	Y
173.54	Forbidden explosives, offering or transporting	Fire Hazard - HM	6	N
173.315(j)(3)	Residential gas tank not secure in transport	Fire Hazard - HM	6	Y
173.315(j)(4)	Liquefied Petroleum Gas (LPG) storage tank overfilled for transport	Fire Hazard - HM	6	N
173.421(a)	Transporting limited quantity—radioactive material exceeds 0.5 millirem/hour	Cargo Protection - HM	4	N
173.427(a)(iv)	No instructions for exclusive use packaging—low specific activity	Cargo Protection - HM	4	Y
173.427(a)(vi)	Exclusive use low specific activity (LSA) radioactive material not marked "Radioactive-LSA"	Markings - HM	5	Y
173.427(a)(6)(iv)	No instructions for exclusive use packaging—low specific activity	Cargo Protection - HM	4	Y
173.427(a)(6)(vi)	Exclusive use low specific activity (LSA) radioactive material not marked "Radioactive-LSA"	Markings - HM	5	Y
173.427(d)	Not packaged in accordance with 10 CFR, part 71	Cargo Protection - HM	4	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
173.441(a)	Exceeding radiation level limitations allowed for transport	Cargo Protection - HM	4	N
177.801	Accepting/transporting HM not prepared properly	HM Other	2	Y
177.817(a)	No shipping papers (carrier)	Documentation - HM	3	Y
177.817(b)	Shipper certification missing (when required)	Documentation - HM	3	N
177.817(e)	Shipping paper accessibility	Documentation - HM	3	Y
177.823(a)	No placards/markings when required	Markings - HM	5	N
177.834(a)	Package not secure in vehicle	Load Securement	10	Y
177.834(c)	Smoking while loading or unloading	Fire Hazard - HM	6	Y
177.834(f)	Using a tool likely to cause damage to the closure of any package or container	Load Securement	10	Y
177.834(i)	Attendance of cargo tank— (load or unload)	Cargo Protection - HM	4	Y
177.834(j)	Manholes and valves not closed or leak free	Cargo Protection - HM	4	Y
177.834(m)(1)	Securing specification 106a or 110a tanks	Cargo Protection - HM	4	N
177.834(n)	Improper loading—specification 56, 57, IM101 and IM102	Fire Hazard - HM	6	N
177.835(a)	Loading/Unloading Class 1 with engine running	Fire Hazard - HM	6	Y
177.835(c)	Transporting Class 1 in combination vehicles	Fire Hazard - HM	6	N
177.835(j)	Transfer of Class 1 materials en route	Fire Hazard - HM	6	Y
177.837(c)	Cargo tanks not properly bonded/grounded	Cargo Protection - HM	4	N
177.837(d)	Improper unloading of combustible liquids	Cargo Protection - HM	4	N
177.838	Improper transport of class 4, 5 or division 4.2	Fire Hazard - HM	6	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
177.840	Improper transport of class 2	Fire Hazard - HM	6	Y
177.840(g)	Discharge valve not closed in transit class 2	Cargo Protection - HM	4	Y
177.840(o)	Fail to test off-truck remote shutoff device	Cargo Protection - HM	4	Y
177.840(s)	Fail to possess remote shutoff when unloading	Cargo Protection - HM	4	Y
177.841(e)	Poison label loaded with foodstuffs	HM Other	2	Y
177.842(a)	Total transport index exceeds 50— non-exclusive use	HM Other	2	N
177.842(b)	Distance from package to person— radioactive material	HM Other	2	N
177.842(d)	Blocking and bracing of radioactive material packages	HM Other	2	Y
177.848(d)	Prohibited load/transport/storage combination	Fire Hazard - HM	6	N
177.848(f)	Class 1 load separation or segregation	HM Other	2	N
178.245-4	DOT51 integrity and securement	Package Integrity - HM	8	N
178.245-5	DOT51 valve protection	Package Integrity - HM	8	N
178.245-6(a)	DOT51 name plate Markings - HM	Package Integrity - HM	8	N
178.245-6(b)	Tank outlets not marked	Package Integrity - HM	8	N
178.251-4	DOT 56/57 integrity and securement	Package Integrity - HM	8	N
178.251-7(b)	DOT 56/57 spec Markings - HM	Package Integrity - HM	8	N
178.255-4	DOT 60 manhole	Package Integrity - HM	8	N
178.255-7	DOT 60 valve protection	Package Integrity - HM	8	N
178.255-14	DOT 60 ID plate	Package Integrity - HM	8	N
178.270-1	IM101/102 general design	Package Integrity - HM	8	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
178.270-11(d)(1)	IM101/102 pressure relief	Package Integrity - HM	8	N
178.270-4	Structural integrity	Package Integrity - HM	8	N
178.270-6	IM 101/102 frames	Package Integrity - HM	8	N
178.270-8	IM101/102 valve protection	Package Integrity - HM	8	N
178.270-9	IM101/102 manholes	Package Integrity - HM	8	N
178.270-14	IM101/102 spec plate	Package Integrity - HM	8	N
178.336-9(a)	Safety relief devices MC330	Package Integrity - HM	8	N
178.336-9(c)	Marking of inlets/outlets MC330	Package Integrity - HM	8	N
178.336-10	Protecting of fittings MC330	Package Integrity - HM	8	N
178.336-13	Anchoring of tank MC330	Package Integrity - HM	8	N
178.336-17	Metal ID plate marking MC330	Package Integrity - HM	8	N
178.336-17(a)	Certification plate MC330	Package Integrity - HM	8	N
178.337-8(a)	Outlets general requirements MC331	Package Integrity - HM	8	N
178.337-8(a)(2)	Outlets MC331	Package Integrity - HM	8	N
178.337-8(a)(3)	Internal or back flow valve MC331	Package Integrity - HM	8	N
178.337-8(a)(4)(i)	Remote closure device greater than 3500 gallons MC331	Package Integrity - HM	8	Y
178.337-8(a)(4)(ii)	Remote closure device less than 3500 gallons MC331	Package Integrity - HM	8	Y
178.337-9(c)	Marking inlets/outlets MC331	Package Integrity - HM	8	N
178.337-10(a)	Protection of fittings MC331	Package Integrity - HM	8	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
178.337-10(d)	Rear end protection MC331	Package Integrity - HM	8	N
178.337-11(b)	Shut off valves MC331	Package Integrity - HM	8	Y
178.337-13	MC331 supports and anchoring	Package Integrity - HM	8	N
178.337-17(a)	Metal ID plate missing MC331	Package Integrity - HM	8	N
178.338-6	Manhole MC338	Package Integrity - HM	8	N
178.338-8	Pressure relief devices MC338	Package Integrity - HM	8	N
178.338-10(a)	Protection of fittings MC338	Package Integrity - HM	8	N
178.338-10(c)	Rear end protection MC338	Package Integrity - HM	8	N
178.338-11(b)	Manual shutoff valve MC338	Package Integrity - HM	8	Y
178.338-12	Shear section MC338	Package Integrity - HM	8	N
178.338-13	Supports and anchoring MC338	Package Integrity - HM	8	N
178.338-18(a)	Name plate/Specification plate missing MC338	Package Integrity - HM	8	N
178.338-18(b)	Specification plate missing MC338	Package Integrity - HM	8	N
178.340-6	MC306/307/312 supports and anchoring	Package Integrity - HM	8	N
178.340-7(a)	MC306/307/312 ring stiffeners	Package Integrity - HM	8	N
178.340-7(c)	MC306/307/312 double bulkhead drain	Package Integrity - HM	8	N
178.340-7(d)(2)	MC306/307/312 ring stiffener drain hole	Package Integrity - HM	8	N
178.340-8(a)	MC306/307/312 appurtenances attachment	Package Integrity - HM	8	N
178.340-8(b)	MC306/307/312 rearend protection	Package Integrity - HM	8	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
178.340-8(c)	MC306/307/312 overturn protection	Package Integrity - HM	8	N
178.340-8(d)	MC306/307/312 piping protection	Package Integrity - HM	8	N
178.340-8(d)(1)	MC306/307/312 piping protection	Package Integrity - HM	8	N
178.340-8(d)(2)	MC306/307/312 minimum road clearance	Package Integrity - HM	8	N
178.340-10(b)	MC306/307/312 metal certification plate missing	Package Integrity - HM	8	N
178.341-3(a)	MC306 no manhole closure	Package Integrity - HM	8	N
178.341-4	MC306 venting	Package Integrity - HM	8	N
178.341-4(d)(1)	MC306 inadequate emergency venting	Package Integrity - HM	8	N
178.341-4(d)(2)	MC306 pressure activated vents	Package Integrity - HM	8	N
178.341-4(d)(3)	MC306 no fusible venting	Package Integrity - HM	8	N
178.341-5(a)	MC306 internal valves	Package Integrity - HM	8	N
178.341-5(a)(1)	MC306 heat actuated safety	Package Integrity - HM	8	N
178.341-5(a)(2)	MC306 remote control shutoff	Package Integrity - HM	8	Y
178.342-3	MC307 manhole closure	Package Integrity - HM	8	Y
178.342-4	MC307 venting	Package Integrity - HM	8	N
178.342-4(b)	Inadequate venting capacity	Package Integrity - HM	8	N
178.342-5(a)	MC307 internal valve	Package Integrity - HM	8	N
178.342-5(a)(1)	MC307 heat actuated safety	Package Integrity - HM	8	N
178.342-5(a)(2)	MC307 remote control shutoff	Package Integrity - HM	8	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
178.343-3	Manhole closure MC312	Package Integrity - HM	8	N
178.343-4	Venting MC312 (show calculations)	Package Integrity - HM	8	N
178.343-5(a)	MC312 top outlet and valve	Package Integrity - HM	8	N
178.343-5(b)(1)	MC312 bottom valve/piping protection	Package Integrity - HM	8	N
178.345-1(i)(2)	DOT 406, 407, 412 Obstructed double bulkhead drain/vent	Package Integrity - HM	8	N
178.345-5(d)	DOT406/407/412 manhole securement	Package Integrity - HM	8	N
178.345-6	DOT406/407/412 supports and anchoring	Package Integrity - HM	8	N
178.345-7(d)(4)	DOT406/407/412 ring stiffener drain	Package Integrity - HM	8	N
178.345-8(a)	DOT406/407/412 accident protection	Package Integrity - HM	8	N
178.345-8(a)(5)	DOT406/407/412 minimum road clearance	Package Integrity - HM	8	N
178.345-8(b)	DOT406/407/412 bottom damage protection	Package Integrity - HM	8	N
178.345-8(c)	DOT406/407/412 rollover damage protection	Package Integrity - HM	8	N
178.345-8(d)	DOT406/407/412 rear end protection	Package Integrity - HM	8	N
178.345-10	DOT406/407/412 pressure relief	Package Integrity - HM	8	N
178.345-11(b)	DOT406/407/412 tank valves	Package Integrity - HM	8	N
178.345-11(b)(1)	DOT406/407/412 remote control	Package Integrity - HM	8	Y
178.345-11(b)(1)(i)	DOT406/407/412 remote control	Package Integrity - HM	8	Y
178.345-14(b)	DOT406/407/412 name plate	Package Integrity - HM	8	N
178.345-14(c)	DOT406/407/412 specification plate	Package Integrity - HM	8	N

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
178.703(a)	Intermediate bulk container (IBC) manufacturer Markings - HM	Package Integrity - HM	8	N
178.703(b)	Intermediate bulk container additional Markings - HM	Package Integrity - HM	8	N
178.704(e)	Intermediate bulk container bottom discharge valve protection	Package Integrity - HM	8	N
180.205(c)	Periodic re-qualification of cylinders	Package Testing - HM	7	N
180.213(d)	Re-qualification Markings - HM	Package Testing - HM	7	N
180.352(b)	Intermediate bulk container retest or inspection	Package Testing - HM	7	N
180.405(b)	Cargo tank specifications	Package Testing - HM	7	N
180.405(j)	Certification withdrawal (failed to remove/cover/obliterate spec plate)	Package Testing - HM	7	N
180.407(a)(1)	Cargo tank periodic test and inspection	Package Testing - HM	7	N
180.407(c)	Failing to periodically test and inspect cargo tank	Package Testing - HM	7	N
180.415(b)	Cargo tank test or inspection Markings - HM	Package Testing - HM	7	N
180.605(k)	Test date marking	Package Testing - HM	7	N
385.403	No HM Safety Permit	Documentation - HM	3	Y
392.9	Failing to secure load	Load Securement	10	Y
392.9(a)	Failing to secure load	Load Securement	10	Y
392.9(a)(1)	Failing to secure cargo/§§ 393.100-393.136	Load Securement	10	Y
392.9(a)(2)	Failing to secure vehicle equipment	Load Securement	10	Y
392.9(a)(3)	Driver's view/movement is obstructed	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
392.62(c)(1)	Bus — baggage/freight restricts driver operation	Load Securement	10	Y
392.62(c)(2)	Bus — Exit(s) obstructed by baggage/freight	Load Securement	10	Y
392.62(c)(3)	Passengers not protected from falling baggage	Load Securement	10	Y
392.63	Pushing/towing a loaded bus	Load Securement	10	Y
393.87	Warning flag required on projecting load	Warning Flags	4	Y
393.87(a)	Warning flag required on projecting load	Warning Flags	4	Y
393.87(b)	Improper warning flag placement	Warning Flags	4	Y
393.100	Failure to prevent cargo shifting	Load Securement	10	Y
393.100(a)	Failure to prevent cargo shifting	Load Securement	10	Y
393.100(b)	Leaking/spilling/blowing/falling cargo	Load Securement	10	Y
393.100(c)	Failure to prevent cargo shifting	Load Securement	10	Y
393.102(a)	Improper securement system (tiedown assemblies)	Load Securement	10	Y
393.102(a)(1)	Insufficient means to prevent forward movement	Load Securement	10	Y
393.102(a)(3)	Insufficient means to prevent lateral movement	Load Securement	10	Y
393.102(a)(2)	Tiedown assembly with inadequate working load limit	Load Securement	10	Y
393.102(b)	Insufficient means to prevent vertical movement	Load Securement	10	Y
393.102(c)	No equivalent means of securement	Load Securement	10	Y
393.104(a)	Inadequate/damaged securement device/system	Load Securement	10	Y
393.104(b)	Damaged securement system/tiedowns	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
393.104(c)	Damaged vehicle structures/anchor points	Load Securement	10	Y
393.104(d)	Damaged Dunnage/bars/blocking-bracing	Load Securement	10	Y
393.104(f)(1)	Knotted tiedown	Load Securement	10	Y
393.104(f)(2)	Use of tiedown with improper repair.	Load Securement	10	Y
393.104(f)(3)	Loose/unfastened tiedown.	Load Securement	10	Y
393.104(f)(4)	No edge protection for tiedowns	Load Securement	10	Y
393.104F4R	No edge protection for tiedowns	Load Securement	10	Y
393.105(f)(5)	No edge protection for tiedowns	Load Securement	10	Y
393.106(a)	No/improper front end structure/headerboard	Load Securement	10	Y
393.106(b)	Cargo not immobilized or secured	Load Securement	10	Y
393.106(c)(1)	No means to prevent cargo from rolling	Load Securement	10	Y
393.106(c)(2)	Cargo without direct contact/prevention from shifting	Load Securement	10	Y
393.106(d)	Insufficient aggregate working load limit	Load Securement	10	Y
393.110	Failing to meet minimum tiedown requirements (Load Securement	10	Y
393.110(b)	Insufficient tiedowns; without headerboard/blocking	Load Securement	10	Y
393.110(c)	Insufficient tiedowns; with headerboard/blocking	Load Securement	10	Y
393.110(d)	Large/odd-shaped cargo not adequately secured	Load Securement	10	Y
393.112	Tiedown not adjustable by driver	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
393.114	No/improper front end structure	Load Securement	10	Y
393.114(b)(1)	Insufficient height for front-end structure	Load Securement	10	Y
393.114(b)(2)	Insufficient width for front-end structure	Load Securement	10	Y
393.114(d)	Front-end structure with large opening(s)	Load Securement	10	Y
393.116	No/improper securement of logs	Load Securement	10	Y
393.116(d)(1)	Short; over 1/3 length past structure	Load Securement	10	Y
393.116(d)(2)	Short, insufficient/no tiedowns	Load Securement	10	Y
393.116(d)(3)	Short, tiedowns improperly positioned	Load Securement	10	Y
393.116(d)(4)	Short, no center stakes/high log not secured	Load Securement	10	Y
393.116(e)	Short, length; improper securement	Load Securement	10	Y
393.118	No/improper lumber/building materials. securement	Load Securement	10	Y
393.118(b)	Improper placement of bundles	Load Securement	10	Y
393.118(d)	Insufficient protection against lateral movement	Load Securement	10	Y
393.118(d)(3)	Insufficient/improper arrangement of tiedowns	Load Securement	10	Y
393.120	No/improper securement of metal coils	Load Securement	10	Y
393.120(b)(1)	Coil/vertical improper securement	Load Securement	10	Y
393.120(b)(2)	Coils, rows, eyes vertical; improper secure.	Load Securement	10	Y
393.120(c)(1)	Coil/eye crosswise improper securement	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
393.120(c)(2)	X-pattern on coil(s) with eyes crosswise	Load Securement	10	Y
393.120(d)(1)	Coil with eye lengthwise—improper securement	Load Securement	10	Y
393.120(d)(4)	Coils, rows, eyes length—improper securement.	Load Securement	10	Y
393.120(e)	No protection against shifting/tipping	Load Securement	10	Y
393.122	No/improper securement of paper rolls	Load Securement	10	Y
393.122(b)	Rolls vertical—improper securement	Load Securement	10	Y
393.122(c)	Rolls vertical /split—improper securement	Load Securement	10	Y
393.122(d)	Rolls vertical /stacked—improper securement	Load Securement	10	Y
393.122(e)	Rolls crosswise—improper securement	Load Securement	10	Y
393.122(f)	Rolls crosswise/stacked load—improperly secured	Load Securement	10	Y
393.122(g)	Rolls length—improper securement	Load Securement	10	Y
393.122(h)	Rolls lengthwise/stacked—improper securement	Load Securement	10	Y
393.122(i)	Improper securement—rolls on flatbed/curb-side	Load Securement	10	Y
393.124	No/improper securement of concrete pipe	Load Securement	10	Y
393.124(b)	Insufficient working load limit—concrete pipes	Load Securement	10	Y
393.124(c)	Improper blocking of concrete pipe	Load Securement	10	Y
393.124(d)	Improper arrangement of concrete pipe	Load Securement	10	Y
393.124(e)	Improper securement, up to 45 in. diameter	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
393.124(f)	Improper securement, greater than 45 inch diameter	Load Securement	10	Y
393.126	Fail to ensure intermodal container secured	Load Securement	10	Y
393.126(b)	Damaged/missing tiedown/securement device	Load Securement	10	Y
393.126(c)(1)	Lower corners not on vehicle/structure	Load Securement	10	Y
393.126(c)(2)	All corners of chassis not secured	Load Securement	10	Y
393.126(c)(3)	Front and rear not secured independently	Load Securement	10	Y
393.126(d)(1)	Empty container not properly positioned	Load Securement	10	Y
393.126(d)(2)	Empty container, more than 5 foot overhang	Load Securement	10	Y
393.126(d)(4)	Empty container—not properly secured	Load Securement	10	Y
393.128	No/improper securement of vehicles	Load Securement	10	Y
393.128(b)(1)	Vehicle not secured—front and rear	Load Securement	10	Y
393.128(b)(2)	Tiedown(s) not affixed to mounting points.	Load Securement	10	Y
393.128(b)(3)	Tiedown(s) not over/around wheels.	Load Securement	10	Y
393.130	No/improper heavy vehicle/machine securement	Load Securement	10	Y
393.130(b)	Item not properly prepared for transport	Load Securement	10	Y
393.130(c)	Improper restraint/securement of item	Load Securement	10	Y
393.132	No/improper securement of crushed vehicles	Load Securement	10	Y
393.132(b)	Prohibited use of synthetic webbing.	Load Securement	10	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
393.132(c)	Insufficient tiedowns per stack cars	Load Securement	10	Y
393.132(c)(5)	Insufficient means to retain loose parts	Load Securement	10	Y
393.134	No/improper securement of roll/hook container	Load Securement	10	Y
393.134(b)(1)	No blocking against forward movement	Load Securement	10	Y
393.134(b)(2)	Container not secured to front of vehicle	Load Securement	10	Y
393.134(b)(3)	Rear of container not properly secured	Load Securement	10	Y
393.136	No/improper securement of large boulders	Load Securement	10	Y
393.136(b)	Improper placement/positioning for boulder	Load Securement	10	Y
393.136(c)(1)	Boulder not secured with chain	Load Securement	10	Y
393.136(d)	Improper securement—cubic boulder	Load Securement	10	Y
393.136(e)	Improper securement—non-cubic boulder with base	Load Securement	10	Y
393.136(f)	Improper securement—non-cubic boulder without base	Load Securement	10	Y
397.1(a)	Driver/carrier must obey part 397	HM Other	2	Y
397.1(b)	Failing to require employees to know/obey part 397	HM Other	2	Y
397.2	Must comply with rules in parts 390-397—transporting HM	HM Other	2	Y
397.7(a)	Improperly parked explosives vehicle	Fire Hazard - HM	6	Y
397.7(b)	Improperly parked HM vehicle	Fire Hazard - HM	6	Y
397.11(a)	HM vehicle operated near open fire	Fire Hazard - HM	6	Y
397.11(b)	HM vehicle parked within 300 feet of fire	Fire Hazard - HM	6	Y
397.15	HM vehicle fueling violation	Fire Hazard - HM	6	Y
397.17	No tire examination on HM vehicle	HM Other	2	Y

Table 6. CSMS Cargo-Related BASIC Violations ¹⁵

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight¹⁶	Violation in the DSMS (Y/N)
397.19	No instructions/documents when transporting Division 1.1/1.2/1.3 (explosive) materials	Documentation - HM	3	Y
397.19(c)	Required documents not in possession—explosive materials	Documentation - HM	3	Y
397.67	HM vehicle routing violation (non-radioactive materials)	HM Route	1	Y
397.101(b)	Radioactive materials vehicle not on preferred route	HM Route	1	Y
397.101(d)	No or incomplete route plan—radioactive materials	HM Route	1	Y
397.101(e)(2)	Driver not in possession of training certificate	HM Route	1	Y
397.101(e)(3)	Driver not in possession of written route plan	HM Route	1	Y

Appendix B

SMS Methodology Changes from Version 1.2 to 2.0

FMCSA and its stakeholders share a commitment to safety, which has been underscored by strong participation in FMCSA's listening sessions on CSA 2010 resulting in constructive input from organizations, enforcement personnel, industry, and motor carrier safety experts. During the Operational Model test period, FMCSA solicited feedback and suggestions from stakeholders including FMCSA staff, state partners, industry and safety advocates and, as a result, the Agency has identified four opportunities to enhance the new program. The enhancements include:

1. Modifications to the measure of exposure for the Unsafe Driving BASIC and Crash Indicator
2. Refinements to the measurement approach for the Controlled Substances/Alcohol BASIC
3. Updates to the severity weights of roadside violations based on subject matter expert review
4. A more strategic approach to addressing motor carriers with a history of vehicle size and weight violations

Below is detailed information regarding the feedback, analysis and implementation approach for each of these four enhancements.

1. Modifications to the measure of exposure for the Unsafe Driving BASIC and Crash Indicator

- a. *Feedback:* The sole use of number of Power Units (PUs) owned by a motor carrier underestimates the on-road exposure for carriers that more extensively utilize their PUs. The use of Vehicle Miles Travelled (VMT) should be considered as a means of assessing the Unsafe Driving BASIC and Crash Indicator that currently rely on PUs.
- b. *Analysis Conducted:* Analysis conducted by FMCSA shows that, while measuring exposure solely by PUs may overly identify high-utilization carriers (i.e., carriers with above average VMT per PU) as deficient, the sole use of VMT overly identifies low-utilization carriers as deficient. In addition, complete and accurate data on all carriers' VMT is not currently available.
- c. *Solution:* FMCSA has revised its approach to measure carriers' exposure on the road within the Unsafe Driving BASIC and the Crash Indicator. This new approach uses a combination of PUs and, when available and reliable, VMT data from FMCSA's Motor Carrier Census. Further, the

Agency is currently exploring options to enhance the completeness and accuracy of VMT data including confirming the validity of the VMT information from other sources.

d. *Implementation Approach:*

i. Segmentation –The carrier population is segmented into two groups for the Unsafe Driving BASIC and Crash Indicator based on the types of vehicles operated so that companies operating fundamentally different types of vehicles are no longer compared to each other:

1. Segment 1 –“Combo”: Combination trucks/motor coach buses constituting 70% or more of the total PUs in a carrier’s fleet.
2. Segment 2 –“Straight”: Straight trucks/other vehicles constituting more than 30% of the total PUs in a carrier’s fleet.

ii. Utilization Factor –Carriers with above average truck utilization will receive an adjustment to their PUs called the Utilization Factor (UF), which will provide a safety-based adjustment to the Unsafe Driving BASIC and Crash Indicator percentiles. Only carriers with annualized VMT data reported in the past 24 months on the Motor Carrier Census (obtained via the VMT field on the MCS-150 Form or from a FMCSA investigation) will be eligible to receive an adjustment. Carriers without current VMT will not benefit from the utilization factor in their safety assessment calculations.

iii. Safety Event Grouping – The Unsafe Driving BASIC and Crash Indicator will change from using PUs as the basis for safety event grouping (formerly referred to as peer grouping) to using the number of inspections with an Unsafe Driving-related violation for the Unsafe Driving BASIC and the number of crashes for the Crash Indicator. The safety event grouping allows the SMS to handle the diverse motor carrier population while ensuring similarly situated carriers are treated with the same standard.

2. Refinements to the measurement approach for the Controlled Substances/Alcohol BASIC

- a. *Feedback Received:* Operational Model test results and law enforcement experts indicated that violations within this BASIC are more likely to be found during an inspection rather than cause an inspection and therefore,

measuring exposure in this BASIC by number of PUs does not accurately reflect carrier exposure.

- b. *Analysis Conducted:* Analysis confirmed that these types of violations are more likely to result from an inspection than to be the cause of the inspection.
- c. *Solution:* The Controlled Substance/Alcohol BASIC measure of exposure will now be based on number of relevant inspections instead of number of PUs as in the prior version of the SMS. This BASIC will change from using PUs as the basis for safety event grouping to using number of inspections with a Controlled Substance/Alcohol-related violation.
- d. *Implementation Approach:* This measure is now calculated by the following formula:

$$\text{BASIC Measure} = \frac{\text{number of time and severity weighted applicable violations}}{\text{total time weight of relevant inspections}}$$

Note: Further information on time and severity weights is available in this [SMS Methodology](#) document.

3. Updates to the severity weights of roadside violations based on subject matter expert review

- a. *Feedback Received:* Law enforcement personnel recommended that the violation used in the measurement system should be updated to reflect the current set of roadside inspection safety violations. Enforcement personnel, along with the motor carrier industry, also suggested that the severity weights assigned to some violations be reassessed.
- b. *Analysis Conducted:* Subject Matter Experts (SMEs) from FMCSA's field staff, including enforcement personnel and CSA 2010 development team members, examined severity weighting and submitted recommendations for changes to the Agency.
- c. *Solution:* This version of SMS includes updated violations and severity weightings.
- d. *Implementation Approach:* [Appendix A](#) in the SMS Methodology contains a complete listing of violations and severity weights.

4. A more strategic approach to addressing motor carriers with a history of size and weight violations

- a. *Feedback Received:* Results from the Operational Model test have demonstrated the difficulties of enforcing vehicle size and weight violations through CSA 2010 interventions conducted by FMCSA and State Safety Investigators

- b. *Analysis Conducted:* Alternative methods to address this safety issue are currently under development. These methods include more refined collection of detailed size and weight violation data and alerts in systems used by roadside inspectors to identify carriers with patterns of prior size and weight violations.
- c. *Solution:* Size and weight violations have been removed from the Cargo-Related BASIC. However, it is important to note that roadside inspectors will continue to cite these violations at the roadside and Safety Investigators will continue to address these violations, including potential enforcement actions if appropriate, through investigations.