CARRIER SAFETY MEASUREMENT SYSTEM (CSMS) METHODOLOGY

Version 3.0.3

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Preface

This report is geared towards motor carriers and documents the Carrier Safety Measurement System (CSMS) methodology developed to support the Compliance, Safety, Accountability (CSA) program for the Federal Motor Carrier Safety Administration (FMCSA). The SMS has two components. One component measures the safety of individual motor carriers, CSMS, which is documented in this report. CSMS results are fully available to the assessed carriers. A subset of the results is publicly available. The other component is the Driver Safety Measurement System (DSMS), which measures the safety of individual commercial motor vehicle (CMV) drivers. The methodology for DSMS can be found in separate document at (http://csa.fmcsa.dot.gov/Documents/Driver_SMSMethodology.pdf). DSMS results are strictly used as an investigative tool and are only available to law enforcement (i.e., DSMS results are not available to the public, motor carriers, or drivers).

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 (FHWA) Office of Motor Carriers, FMCSA's predecessor. It was designed and tested under the Federal/State Performance and Registration Information Systems Management (PRISM) program in the mid-1990s. From the mid-1990s until December 2010, when FMCSA replaced SafeStat with the SMS, SafeStat was implemented nationally to prioritize motor carriers for onsite 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.

Under CSA, the SMS design builds on the lessons learned from developing and implementing SafeStat for CR prioritization. However, the SMS also incorporates new CSA 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 Test (Op-Model Test) of the CSA program, which includes using the SMS to identify and monitor unsafe carrier and CMV driver behavior in nine states. Version 3.0 of the Methodology incorporates feedback from industry, field staff, and other subject matter experts, and was implemented in December 2012. A summary of these methodology changes is presented in Appendix B. Future SMS development will be part of a continuous improvement process based on results and feedback.

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Glossary

BASIC	Behavior Analysis and Safety Improvement Category
CDL	Commercial Driver's License
CMV	Commercial Motor Vehicle
CR	Compliance Review
CRWG	Compliance Review Work Group
CSA	Compliance, Safety, Accountability
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
HM	Hazardous Materials
HMR	Hazardous Materials Regulations
HOS	Hours-of-Service
IEP	Intermodal Equipment Provider
LTCCS	Large Truck Crash Causation Study
MCMIS	Motor Carrier Management Information System
OOS	Out-of-Service
PU	Power Unit
PRISM	Performance and Registration Information Systems Management
SafeStat	Motor Carrier Safety Status Measurement System
SFD	Safety Fitness Determination
SMS	Safety Measurement System
USDOT	U.S. Department of Transportation
VMT	Vehicle Miles Travelled

1. Introduction

The Federal Motor Carrier Safety Administration (FMCSA) has developed its Operational Model through its Compliance, Safety, Accountability (CSA) program. The goal of CSA is to implement more effective and efficient ways for FMCSA, its State Partners, and the trucking industry to prevent commercial motor vehicle (CMV) crashes, fatalities, and injuries. CSA helps FMCSA and its State Partners impact the safety behavior of more motor carriers and drivers, use continually improving data to better identify high-risk motor 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 Operational Model, shown below, features continuous monitoring and tracking of entities' safety performance. Entities may be either motor carriers or CMV drivers. All entities found with problematic safety behavior will be subject to the Intervention Process.

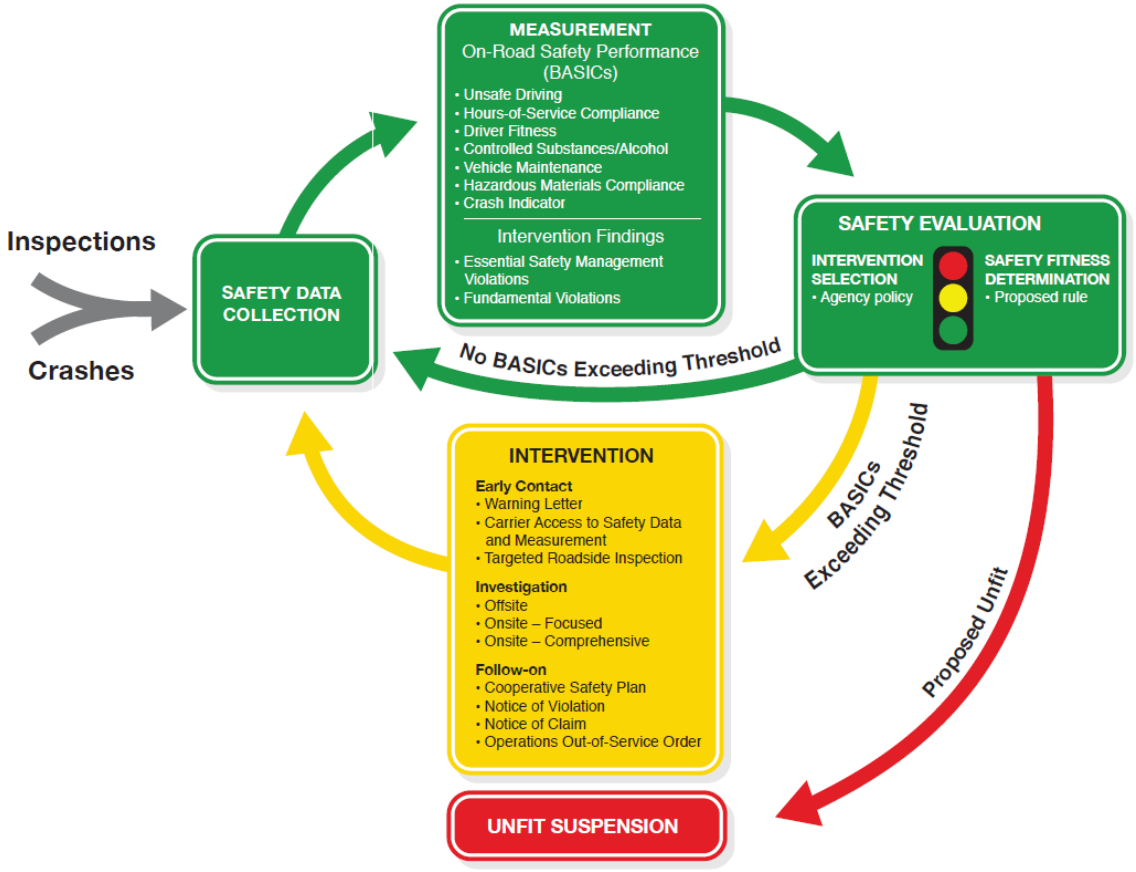


Figure 1-1. CSA Operational Model

[1] FMCSA CSA Website, http://csa.fmcsa.dot.gov/

The Safety Measurement System

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

- Identify entities for interventions. The SMS is a key component in determining the inclusion of entities with significant safety problems into the Intervention Process.
- Determine the specific safety problems an entity exhibits. The SMS allows enforcement officers to identify the specific safety problems that 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 carriers. The SMS identifies the carriers demonstrating the worst safety performance so that they can be considered for an "Unfit" safety determination. Details on the proposed process will be available for public comment as part of the upcoming Notice of Proposed Rulemaking.

In addition to supporting the CSA Operational Model, the SMS results can provide stakeholders with valuable safety information. The SMS results are easily accessible via the Internet to encourage improvements in motor carrier safety. Findings from the SMS will allow the evaluated carriers to view an assessment of their weaknesses in various safety areas. In turn, this information will empower motor carriers and other stakeholders 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 team developed the BASICs under the premise that CMV crashes can be traced to the behavior of motor carriers and/or CMV drivers. The behavior categories are derived based on information from a number of sources: Large Truck Crash Causation Study (LTCCS);[2] CSA Driver History Study; the existing FMCSA regulatory structure; and analysis conducted under FMCSA's Compliance Review Workgroup (CRWG), the predecessor to CSA. 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.*
- HOS Compliance BASIC—Operation of CMVs by drivers who are ill, fatigued, or in noncompliance with the Hours-of-Service (HOS) regulations. This BASIC includes violations of driving time limitations and 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 HOS Compliance 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 (CDL) 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 and prevent shifting loads. *Example violations: brakes, lights, and other mechanical defects, improper load securement, and failure to make required repairs.*

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

- HM Compliance BASIC—Unsafe handling of Hazardous Materials (HM) on a CMV. *Example violations: leaking containers, improper placarding, improperly packaged HM.*

Additionally, the SMS evaluates an entity's crash history. The crash history used by the Crash Indicator is not specifically a behavior; rather, it is the consequence of behavior and may indicate a problem that warrants attention. 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 focuses 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: the Carrier Safety Measurement System (CSMS) and the Driver Safety Measurement Systems (DSMS). The public can obtain a subset of the CSMS results at the SMS Website (http://ai.fmcsa.dot.gov/sms/) and each carrier can obtain its full CSMS results by logging in to the website.

The DSMS is a tool that enables enforcement personnel to assess individual drivers in the BASICs using 36 months of roadside performance data across employers. At this time, FMCSA does not use DSMS to assign formal safety ratings or SFDs to individual drivers. DSMS does not impact a driver's CDL. DSMS results are not available to the public, motor carriers, or drivers. DSMS results are strictly used as an investigative tool by law enforcement. The current DSMS methodology can be found in a separate document at: http://csa.fmcsa.dot.gov/Documents/Driver_SMSMethodology.pdf.

2.2 Data Sources

CSMS assesses an individual carrier's performance by BASIC and Crash Indicator 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 the 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 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 CSMS 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 crash[3]; (2) assigned to another entity such as a shipper or Intermodal Equipment Provider (IEP); (3) indicated as "dismissed/not guilty" based on the Adjudicated Citation process..

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 CSMS whether or not a citation is issued.

- State-Reported Commercial Vehicle Crash Data are taken from the MCMIS and provide information on crashes as reported by State and local police officials. The reporting of these crashes follows National Governors Association standards.
- Motor Carrier Census Data are first collected when a carrier obtains a U.S. Department of Transportation (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 CSMS

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

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

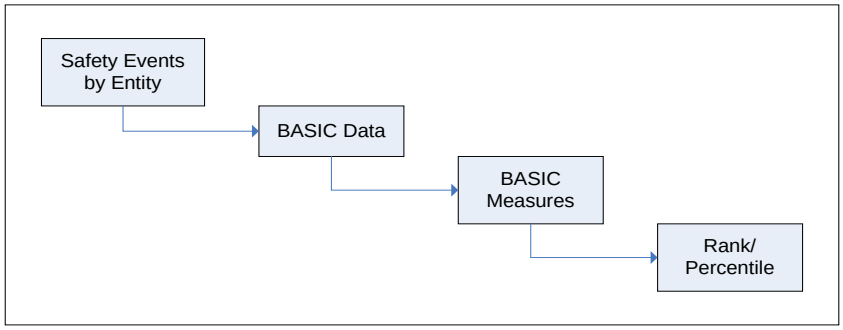


Figure 2-1. BASICs Ranking Process

2.4 CSMS Design Features

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

2.4.1 Violation Severity

All roadside inspection violations that pertain to a BASIC are assigned a severity weight that reflects its 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 in the tables in Appendix A have been converted to a scale from 1 to 10 for each BASIC, where 1 represents the lowest crash risk and 10 represents the highest crash risk relative to the other violations in the BASIC. Since these severity weights are BASIC-specific, two weights that appear identical but are in different BASICs do not represent the same crash risk. For example, a 5 in one BASIC is not equivalent to a 5 in another BASIC. Instead, the 5 represents the midpoint between a crash risk of 1 and 10 within a BASIC.

A violation's severity weight is *only* reflective of crash risk when compared to other violations *within* the same BASIC. Severity weights from one BASIC should not be added, subtracted, equated, or otherwise combined with the severity weight of a violation from any other BASIC.

Within certain BASICs, additional severity weight is applied to violations that resulted in driver or vehicle OOS orders. This additional severity weight for OOS conditions, as with the severity weight assigned to each violation, is based on analysis that quantified the extent of these associations between violation and crash risk, as well as input from enforcement subject matter experts. Appendix A describes the severity weights' derivation and provides the specific weights assigned to each roadside inspection violation used in the SMS.

2.4.2 Addressing Adjudicated Citations

States may issue a citation (i.e., ticket) associated with a violation noted in the roadside inspection. Such citations may subsequently be adjudicated in a due process system. FMCSA has implemented an adjudicated citations policy that impacts the use of roadside

inspection violations in the SMS. Under this policy, violations can be removed or set to a severity weight of 1 in the SMS if the adjudicated citations associated with those violations result in certain outcomes, as indicated in the following table.

Citation Result for a Violation	Violation in SMS
Dismissed/Not guilty	Remove violation (as stated in Section 2.2)
Convicted of a different charge	Severity weight set to 1 and not subject to OOS weight

For violations to be considered for removal or set to a lower severity weight in the SMS, drivers or carriers must submit certified documentation of the judicial proceeding results through a Request for Data Review (RDR) in FMCSA's DataQs system to initiate this process. The results of the process will determine if the violation is removed, set to a severity weight of 1, or retained for use in the SMS. This process only applies to inspections conducted on or after August 23, 2014. It is not retroactive as outlined in the Federal Register Notice published on June 5, 2014.

2.4.3 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 HM than to crashes only resulting in a vehicle being towed away at the scene of the crash.

2.4.4 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 a carrier's BASIC and Crash Indicator measures than older events. When safety events become older than two years, they are no longer used to assess a carrier's safety in the CSMS.

2.4.5 Normalization

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

The CSMS 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 HOS Compliance, Driver Fitness, and Controlled Substances/Alcohol measures, while the number of vehicle inspections normalizes the Vehicle Maintenance and HM Compliance BASIC measures. The HM Compliance BASIC measure is further qualified to use only vehicle inspections where the carrier was noted as transporting placardable quantities of HM.

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 CSMS normalizes the Unsafe Driving BASIC measure by carrier size (i.e., a hybrid PU and VMT measure) as this BASIC is largely comprised of violations such as speeding that initiate an inspection being conducted. Similarly, the Crash Indicator is also normalized by carrier size.

2.4.6 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. This segmentation ensures that carriers with fundamentally different types of vehicles/operations are not compared to each other. The two segments are: (1) "Combo" or combination trucks/motor coach buses constituting 70% or more of the total Power Units (PUs) and (2) "Straight" or straight trucks/other vehicles constituting more than 30% of the total PUs.

2.4.7 Safety Event Groups

To further account for the differences among carriers, the CSMS places carriers in safety event groups based on the number of safety events (e.g., inspections, crashes) in which they 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 higher 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.

2.4.8 Data Sufficiency

The CSMS 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 a carrier can potentially lead to CSA interventions or a detrimental SFD, additional data sufficiency tests are employed. These tests ensure that a carrier has a "critical mass" of poor performance data or a pattern of violations before adverse action is taken.

2.4.9 Percentile Rank

The CSMS 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 carrier that receives a non-zero measure, with 100 indicating the worst performance.

Percentiles are generated from measures of U.S.-domiciled interstate and HM carriers. The remaining carriers, intrastate non-HM and non-US domiciled, are assigned percentiles afterwards based on the equivalent measures-to-percentile relationship of the U.S.-domiciled carriers.

Carriers with percentiles above a certain set threshold and meeting minimum data sufficiency requirements in a BASIC or Crash Indicator will be identified for potential CSA interventions. The current thresholds can be found on the CSA Website.

3. CSMS Methodology

The following sections describe the CSMS methodology used to calculate the measure 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 a CMV 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 CSMS.

The CSMS assesses the Unsafe Driving BASIC using relevant violations of FMCSRs recorded during roadside inspections and reported in the MCMIS. Individual carriers' BASIC 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 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 multiplied by a Utilization Factor, as follows:

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

Equation 3-1

In this equation, the terms are defined as follows:

> An Applicable Violation is defined as any violation recorded in any Driver Inspection (Level 1, 2, 3, or 6) 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/ticket to the driver, but are used in the CSMS whether or not a citation/ticket 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. [4] 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 violation severity weights for any one inspection 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. Out-of-service (OOS) weights are not assigned for Unsafe Driving violations, as most violations in this category already are not considered OOS violations.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

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 six months receive a time weight of 3. Violations recorded over six months and up to 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.

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

Average PUs are used in part to account for each carrier's level of exposure when calculating the BASIC measure. 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 are used to calculate the PU totals. 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 six months ago, and (iii) the number of PUs the carrier had 18 months ago. The average PU calculation is shown below:

$$AveragePU = \frac{PU_{Current} + PU_{6Months} + PU_{18Months}}{3}$$

Equation 3-2

The Utilization Factor is a multiplier that adjusts the average PU values based on the utilization in terms of 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

[4] Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1.

positive VMT figure is used. The Utilization Factor is calculated by the following three steps:

(i) Carrier Segment

There are two segments into which each motor carrier can be categorized:

- "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 is determined from the following tables:

Combo Segment

VMT per Average PU	Utilization Factor
< 80,000	1
80,000 - 160,000	$1 + \frac{(VMT\ per\ PU - 80{,}000)}{133{,}333}$!
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

[!] This Utilization Factor UF) equation is a simplified version of the same mathematical equation shown in prior versions of the methodology. The UF calculation remains unchanged.

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 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 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 ten groups based on the carrier segment and the number of inspections with an Unsafe Driving violation:

Unsafe Driving BASIC: *Combo* Segment

Safety Event Group	Number of Inspections with Unsafe Driving Violations
Combo 1	3-8
Combo 2	9-21
Combo 3	22-57
Combo 4	58-149
Combo 5	150+

Table 3-3. Safety Event Groups for Unsafe Driving BASIC: Combo Segment

Unsafe Driving BASIC: *Straight Segment*

Safety Event Group	Number of Inspections with Unsafe Driving Violations
Straight 1	3-4
Straight 2	5-8
Straight 3	9-18
Straight 4	19-49
Straight 5	50+

Table 3-4. Safety Event Groups for Unsafe Driving BASIC: Straight Segment

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 12 months. Carriers that remain retain the previously calculated percentile.

3.2 HOS Compliance BASIC Assessment

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

> Operation of CMVs by drivers who are ill, fatigued, or in noncompliance with the 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 HOS Compliance 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 CSMS.

The CSMS assesses the HOS Compliance 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 HOS Compliance BASIC measures is as follows:

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

Equation 3-3

In this equation, the terms are defined as follows:

> An Applicable Violation is any violation recorded in any Driver Inspection (Level 1, 2, 3, or 6) that matches the FMCSRs listed for HOS Compliance (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.
>
> 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 HOS Compliance table (Table 2, Appendix A) for the violations' corresponding severity weights.[5]

(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 violation severity weights for any one inspection 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.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

A Time Weight of 1, 2, or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations/inspections recorded in the past six months receive a time weight of 3. Violations/inspections recorded over six months and up to 12 months ago receive a time weight of 2. All violations/inspections 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 results of recent inspections relative to older inspections.

Note: The time weight is applied to all relevant inspections, including those that do **not** result in a violation in the BASIC.

A 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 intervention or detrimental SFD. The calculation is as follows:

A. Determine the number of relevant inspections and the number of inspections with at least one BASIC violation. For the HOS Compliance 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:

[5] Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1 and are not subject to additional OOS severity weights of 2..

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

Table 3-5. Safety Event Groups for the HOS Compliance 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 12 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 HOS Compliance 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:

> 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 CDL and being medically unqualified to operate a CMV. See Appendix A for a complete list of roadside inspection violations used in the CSMS.

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:

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

Equation 3-4

In this equation, the terms are defined as follows:

An Applicable Violation is any violation recorded in any Driver Inspection (Level 1, 2, 3, or 6) 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.

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.[6]

(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 violation severity weights for any one inspection 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.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

A Time Weight of 1, 2, or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations/inspections recorded in the past six months receive a time weight of 3. Violations/inspections recorded over six months and up to 12 months ago receive a time weight of 2. All violations/inspections 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 results of recent inspections relative to older inspections.

Note: The time weight is applied to all relevant inspections, including those that do **not** result in a violation in the BASIC.

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

Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1 and are not subject to additional OOS severity weights of 2.

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 an intervention or detrimental SFD. The calculation is as follows:

A. Determine the number of relevant inspections and the 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	Number of Relevant Inspections
1	5-10
2	11-20
3	21-100
4	101-500
5	501+

Table 3-6. Safety Event Groups 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 12 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 follows:

> Operation of 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 CSMS.

The CSMS assesses the Controlled Substances/Alcohol BASIC using relevant violations of FMCSRs recorded during roadside inspections and reported in the 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:

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

Equation 3-5

In this equation, the terms are defined as follows:

An Applicable Violation is defined as any violation recorded in any Driver Inspection (Level 1, 2, 3, or 6) that matches the FMCSR 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/ticket to the driver, but are used in the CSMS whether or not a citation/ticket 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 an 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.[7] 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 violation severity weights for any one inspection in any one BASIC is capped

[7] Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1.

at a maximum of 30. This cap of 30 is applied *before* the severity weights are multiplied by the time weight. Out-of-service (OOS) weights are not assigned for Controlled Substance/Alcohol violations, as most violations in this category already are considered OOS violations.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

A Time Weight of 1, 2, or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations/inspections recorded in the past six months receive a time weight of 3. Violations/inspections recorded over six months and up to 12 months ago receive a time weight of 2. All violations/inspections 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 results of recent inspections relative to older inspections.

Note: The time weight is applied to all relevant inspections, including those that do **not** result in a violation in the BASIC.

A 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 an 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 inspections with applicable violations:

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

Table 3-7. Safety Event Groups 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 12 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 and prevent shifting loads. Example violations: brakes, lights, and other mechanical defects, improper loading, and failure to make required repairs. See Appendix A for a complete list of roadside inspection violations used in the CSMS.

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:

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

Equation 3-6

In this equation, the terms are defined as follows:

> An Applicable Violation is defined as any violation recorded in any Vehicle Inspection (Level 1, 2, 5, or 6) that matches the FMCSR 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.
>
> 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.[8]

(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 violation severity weights for any one inspection 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.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

A Time Weight of 1, 2, or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations/inspections recorded in the past six months receive a time weight of 3. Violations/inspections recorded over six months and up to 12 months ago receive a time weight of 2. All violations/inspections 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 results of recent inspections relative to older inspections.

Note: The time weight is applied to all relevant inspections, including those that do **not** result in a violation in the BASIC.

A 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 an intervention or detrimental SFD. The calculation is as follows:

A. Determine the 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:

[8] Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1 and are not subject to additional OOS severity weights of 2.

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

Table 3-8. Safety Event Groups 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 12 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 HM Compliance BASIC Assessment

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

> Unsafe handling of HM on a CMV. Example violations: leaking containers, improper placarding, improperly packaged HM. See Appendix A for a complete list of roadside inspection violations used in the CSMS.

The CSMS assesses the HM Compliance BASIC using relevant violations recorded during roadside inspections where placardable quantities of HM are being transported 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 HM Compliance BASIC measures is as follows:

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

Equation 3-7

In this equation, the terms are defined as follows:

An Applicable Violation is defined as any violation recorded in any Vehicle Inspection (Level 1, 2, 5, or 6), where placardable quantities of HM are being transported, that matches the FMCSR and HMR cites listed in the HM Compliance 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), where placardable quantities of HM are being transported.

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 HM table (Table 6, Appendix A) for the corresponding severity weights of each violation cite.[9]

(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 violation severity weights for any one inspection 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.

Note: The severity weights of violations outside of the BASIC being calculated **do not** count towards the violation cap.

A Time Weight of 1, 2, or 3 is assigned to each applicable violation and each relevant inspection based on its age. Violations/inspections recorded in the past six months receive a time weight of 3. Violations/inspections recorded over six months and up to 12 months ago receive a time weight of 2. All violations/inspections 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 results of recent inspections relative to older inspections.

Note: The time weight is applied to all relevant inspections, including those that do **not** result in a violation in the BASIC.

[9] Violations with an adjudicated citation result of "convicted of a different charge" are set to a severity weight of 1 and are not subject to additional OOS severity weights of 2.

A 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 an intervention or detrimental SFD. The calculation is as follows:

A. Determine the number of relevant 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	Number of Relevant Inspections
1	5-10
2	11-15
3	16-40
4	41-100
5	101+

Table 3-9. Safety Event Groups for the HM Compliance 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 12 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 an HM Compliance 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.

The crash history used by the Crash Indicator is not specifically a behavior; rather, it is the consequence of behavior and may indicate a problem that warrants attention.

The CSMS assesses the Crash Indicator using relevant State-reported crash data reported in the 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 Crash Indicator measure is calculated as the sum of severity- and time-weighted crashes divided by carrier average PUs multiplied by a Utilization Factor, as follows:

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

Equation 3-8

In this equation, the terms are defined as follows:

An 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).

A 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. An HM 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 an HM release	Crash Severity Weight (from above) + 1

Table 3-10. 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 six months of the measurement date receive a time weight of 3. Crashes that occurred over six months and up to 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.

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

Average Power Units (PUs) are used in part to account for each carrier's level of exposure when calculating the BASIC measure. 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 are used to calculate the PU totals. 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 six months ago, and (iii) the number of PUs the carrier had 18 months ago. The average PU calculation is shown below:

$$AveragePU = \frac{PU_{Current} + PU_{6Months} + PU_{18Months}}{3}$$

Equation 3-9

The Utilization Factor is a multiplier that adjusts the average PU values based on the utilization in terms of 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 into which each motor carrier is categorized:

- "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 the 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 is determined from the following tables:

Combo Segment

VMT per Average PU	Utilization Factor
< 80,000	1
80,000 - 160,000	$1 + \frac{(VMT\ per\ PU - 80{,}000)}{133{,}333}$!
160,000 - 200,000	1.6
> 200,000	1
No Recent VMT Information	1

Table 3-11. 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 3-12. 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 an 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 ten groups based on the carrier segment and number of crashes:

! This Utilization Factor UF) equation is a simplified version of the same mathematical equation shown in prior versions of the methodology. The UF calculation remains unchanged.

Crash Indicator: Combo Segment

Safety Event Group	Number of Crashes
Combo 1	2-3
Combo 2	4-6
Combo 3	7-16
Combo 4	17-45
Combo 5	46+

Table 3-13. Safety Event Groups for Crash Indicator: Combo Segment

Crash Indicator: Straight Segment

Safety Event Group	Number of Crashes
Straight 1	2
Straight 2	3-4
Straight 3	5-8
Straight 4	9-26
Straight 5	27+

Table 3-14. Safety Event Groups for Crash Indicator: Straight Segment

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 12 months. Carriers that remain retain the previously calculated percentile.

4. Sample CSMS Measurement Examples

A web-based interface was developed to display the CSMS results. The SMS Website provides a query capability allowing a user to search a carrier of interest or identify the worst-performing carriers in each BASIC. Also available is a drill-down capability that displays the BASIC results of an individual carrier and the safety events used in determining the BASIC percentile.

Sample CSMS Output

Figure 4-1 is a screenshot of the CSMS carrier overview 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., investigation, inspection, and crash activity), and CSMS performance information (e.g., BASIC on-road percentile, investigation status, and performance status). The BASIC percentiles above the CSA Intervention Thresholds are outlined in orange.

Note that the carrier in Figure 4-1 is at 99.8% in the Unsafe Driving BASIC, 96.7% in the HOS Compliance BASIC, and 99.4% in the Driver Fitness BASIC. These BASIC percentiles mean that this carrier has demonstrated worse safety performance than 99.8%, 96.7%, and 99.4%, respectively, of the other carriers evaluated in these BASICs (and will be prioritized for an intervention by FMCSA accordingly as indicated by the symbol in the “BASIC Status” column).

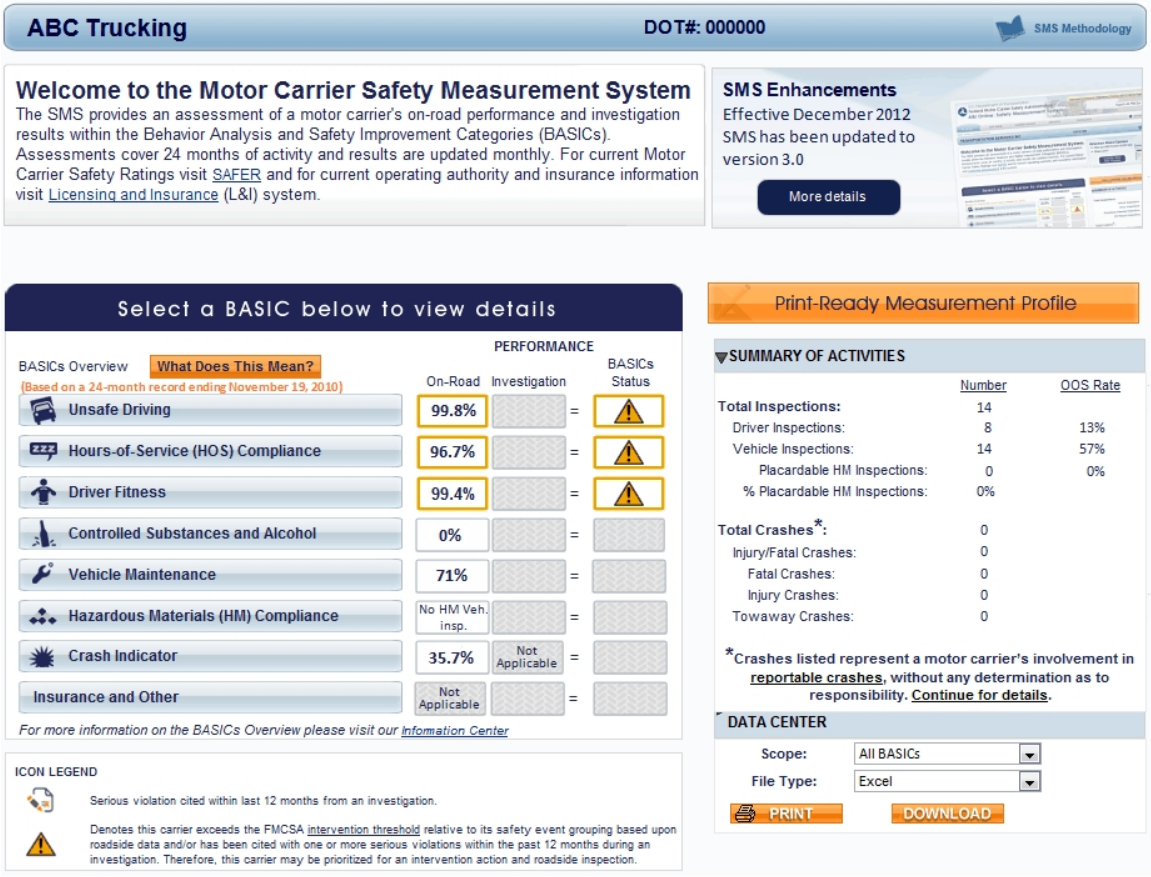


Figure 4-1. CSMS Screenshot

CSMS Measurement Examples

The following section shows three calculation examples for the following BASICs: HOS Compliance, Vehicle Maintenances, and Crash Indicator. Each example follows a three-step process:

Step 1: Obtain Relevant Data

Step 2: Quantify Data into the BASIC Measure

Step 3: Convert BASIC Measure to Percentile Rank

HOS Compliance BASIC Example

The technical details of the HOS Compliance BASIC calculation are described in detail in Section 3.2 of this document.

Step 1: Obtain Relevant Data

Twenty-four months of inspection and violation data are required to calculate the BASIC measure and percentile. The following screenshot displays 24 months of inspection data for the HOS Compliance BASIC:

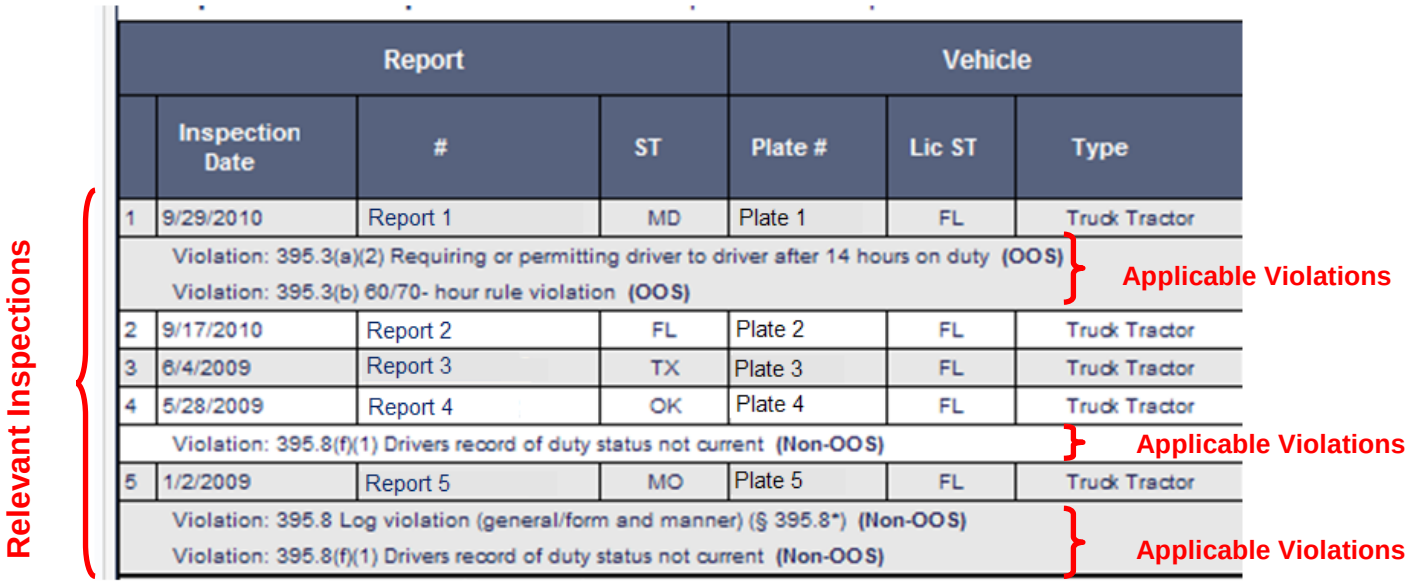


Figure 4-2. Example: HOS Compliance Inspection/Violation List

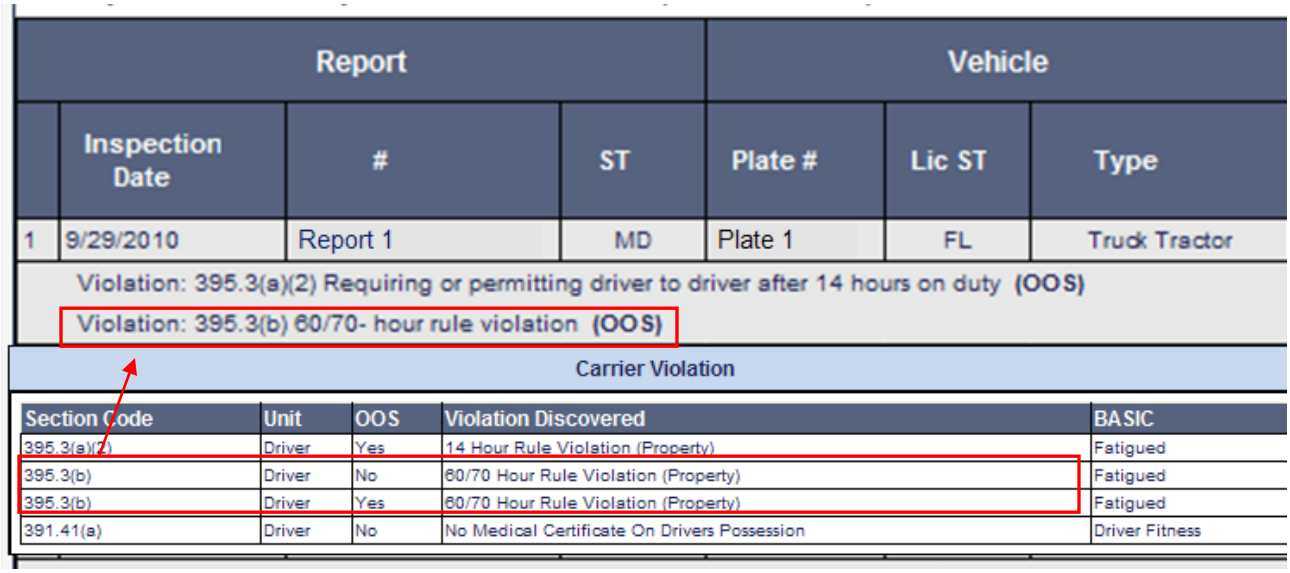
The figure above displays the following:

1. The five *relevant inspections* (numbered 1 through 5) for the HOS Compliance BASIC. Relevant inspections are all Driver Inspections (Levels 1, 2, 3, and 6), including those that do **not** result in a violation in the BASIC. Of the five relevant inspections, two do not result in a BASIC violation (inspection numbers 2 and 3) and three do result in violations in the BASIC (inspection numbers 1, 4, and 5).
2. The *applicable HOS Compliance violations* cited during relevant inspections as indicated in inspections 1, 4, and 5. Example violations include HOS, logbook, and operating a CMV while ill or fatigued. A complete list of applicable violations in the HOS Compliance BASIC is found in Appendix A, Table 2.

Factors to consider when compiling the list of relevant inspections and applicable violations are as follows:

- **Factor to consider**: Some inspections are conducted after a CMV has been involved in a crash. Such inspections are noted as post-crash inspections. In post-crash inspections, only violations found in the pre-crash phase are included in the measure calculation (See the Vehicle Maintenance example).
- **Factor to consider**: In cases of multiple counts of the same violation, the CSMS only uses the cited violation once. If any of these violations are out-of-service (OOS), the OOS violation will be used in CSMS. In Figure 4-3 there are two 395.3(b) violations shown in the detailed inspection report: one is an

OOS violation and the other is not. The CSMS only uses the OOS violation in the calculation.



	Report			Vehicle		
	Inspection Date	#	ST	Plate #	Lic ST	Type
1	9/29/2010	Report 1	MD	Plate 1	FL	Truck Tractor

Violation: 395.3(a)(2) Requiring or permitting driver to driver after 14 hours on duty **(OOS)**

Violation: 395.3(b) 60/70- hour rule violation **(OOS)**

Carrier Violation

Section Code	Unit	OOS	Violation Discovered	BASIC
395.3(a)(2)	Driver	Yes	14 Hour Rule Violation (Property)	Fatigued
395.3(b)	Driver	No	60/70 Hour Rule Violation (Property)	Fatigued
395.3(b)	Driver	Yes	60/70 Hour Rule Violation (Property)	Fatigued
391.41(a)	Driver	No	No Medical Certificate On Drivers Possession	Driver Fitness

Figure 4-3. Example: HOS Compliance Detailed Inspection Report

Step 2: Quantify Data into the BASIC Measure

Figure 4-4 displays the additional information required for the calculation in the "Measure" section:

Figure 4-4. Example: HOS Compliance Inspection/Violation/Measure Report

The following are the major components needed to calculate the BASIC measure. Each component (A-F) is labeled on Figure 4-4. Example: HOS Compliance Inspection/Violation/Measure Report with red letters.

A. Severity Weight of a violation is the Violation Weight + OOS Weight, where:

- Violation Weight – Applicable violations have a corresponding violation weight that can be found in Appendix A of this document. The violation weight ranges from 1 (less severe) to 10 (most severe)

and is assigned based on the violation's relationship to crash risk. The violation weights cannot be compared across BASICs.

- Out-of-Service (OOS) Weight – A violation resulting in an OOS condition is given a weight of 2, otherwise the weight is 0.

B. Time Weight of 1, 2, or 3 is assigned to each violation and inspection based on its age. The most recent violations and inspections are given higher weights. The weights are as follows:

- Less than 6 months = Time weight of 3
- 6 months – less than 1 year = Time weight of 2
- 1 year – less than 2 years = Time weight of 1
- 2 years and older = Not used in measurement system

C. Time and Severity Weight (A x B) – Severity weight multiplied by the time weight

D. Total Inspection Time Weight of all relevant inspections (sum of column B)

E. Total Time and Severity Weight of all relevant inspections (sum of column C)

F. HOS Compliance BASIC Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable violations (E) by the sum of the inspection time weight for all relevant inspections (D).

Example of Relevant Inspection with Applicable Violations - Inspection #1:

	Report			Vehicle			A	B	C
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
1	9/29/2010	Report 1	MD	Plate 1	FL	Truck Tractor	18	3	54
	Violation: 395.3(a)(2) Requiring or permitting driver to driver after 14 hours on duty (OOS)						9	=7 (viol weight) + 2 (OOS)	
	Violation: 395.3(b) 60/70- hour rule violation (OOS)						9	=7 (viol weight) + 2 (OOS)	

Figure 4-5. Example: HOS Compliance Inspection #1

A. Severity Weight – Violation Weight + OOS Weight for each applicable violation. The severity weight for each applicable violation is then summed to the inspection level.

- 395.3(a)(1) severity weight = 7 (violation weight) + 2 (OOS weight) = 9
- 395.3(b)(1) severity weight = 7 (violation weight) + 2 (OOS weight) = 9
- Total Severity Weight for Inspection (sum of the severity weight for each applicable violation) – a + b from above = 9 + 9 = 18

Factor to consider: The total severity weight for an inspection is the sum of the applicable violation severity weight, but cannot exceed 30. If the total severity weight for an inspection within a BASIC is greater than 30, then the

total severity weight will be set at 30 (See detailed information in the Vehicle Maintenance example).

B. Time Weight – Inspection occurred less than six months from the CSMS calculation (11/19/2010) so the inspection is given a weight of 3

C. Time and Severity Weight – Total severity weight x time weight = 18 x 3 = 54

Example of Relevant Inspection with No Violations (Clean Inspection) - Inspection #2:

	Report			Vehicle			A	B	C
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
2	9/17/2010	Report 2	FL	Plate 2	FL	Truck Tractor	0	3	0

Figure 4-6. Example: HOS Compliance Inspection #2

A. Severity Weight – Violation Weight + OOS Weight = 0 + 0 = 0

   a. Violation Weight – No violations, no violation weight

   b. Out-of-Service (OOS) Weight – No violations, no OOS weight

B. Time Weight – Inspection occurred within six months of the CSMS calculation (11/19/2010), inspection time weight = 3

C. Time and Severity Weight – Severity weight x time weight = 0 x 3 = 0

Factor to consider: When the measure is calculated, a clean inspection (i.e., inspections with no violations for a particular BASIC) will lower the measure. This is done by not adding a violation weight to the numerator but instead incorporating it in the time weight inspection count in the denominator.

The remaining three relevant inspections are processed in the same way as inspection #1 and inspection #2.

The figure below is a subset of Figure 4-4; refer to Figure 4-4 for complete information.

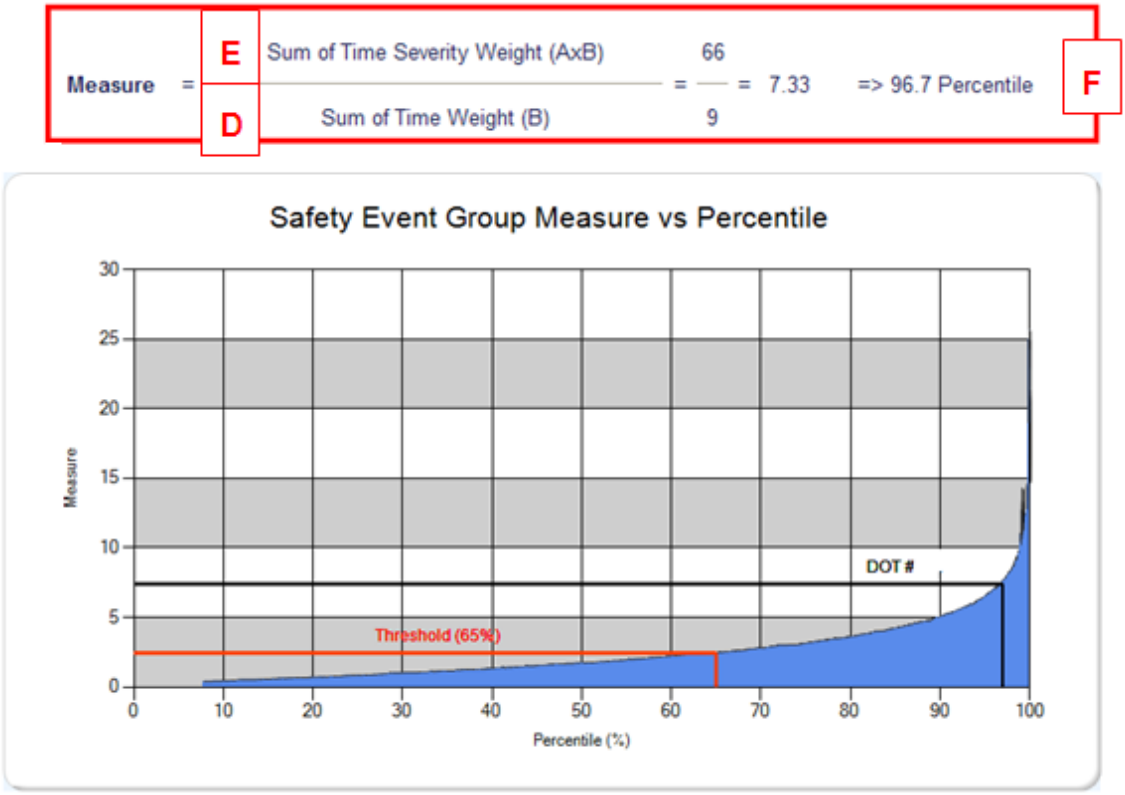


Figure 4-7. Example: HOS Compliance Measure Calculation

D. Sum of the inspection time weight for all relevant inspections = 3 + 3 + 1 +1 + 1 = 9

E. Sum of the time/severity weight for all relevant inspections = 54 + 0 + 0 + 5 + 7 = 66

F. HOS Compliance BASIC Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable violations (E) by the sum of the inspection time weight for all relevant inspections (D).

$$BASIC\ Measure = \frac{Total\ of\ \ time\ and\ \ severity\ \ weighted\ applicable\ violations}{Total\ time\ weight\ \ for\ all\ inspections} = \frac{D}{E} = \frac{66}{9} = 7.33$$

Step 3: Convert BASIC Measure to Percentile Rank

The percentile rank is a relative comparison among all active U.S.-domiciled interstate and intrastate HM motor carriers; therefore, this step cannot be calculated without all 700,000 plus motor carriers' HOS Compliance BASIC measures. However, with applicable data, the CSMS calculates the percentile rank as follows.

The percentile rank is calculated by ranking the carriers' BASIC measures. There are four components to consider when calculating the percentile rank. Data Sufficiency (A) and Safety Event Group (B) are applied prior to calculating the percentile rank and Critical Mass (C) and Recent Activity (D) are applied afterwards.

The following shows information required to determine the percentile:

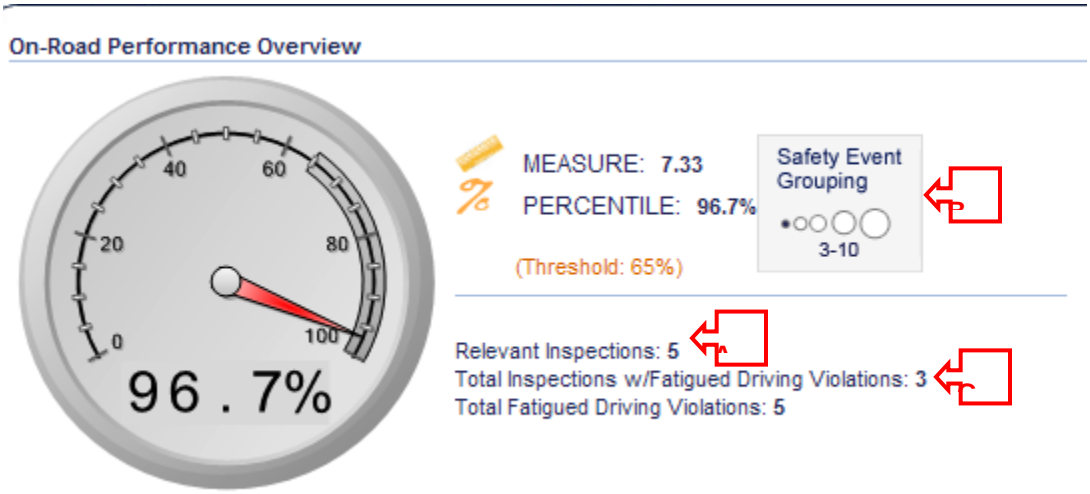


Figure 4-8. Example: HOS Compliance On-Road Performance Summary

A. Data Sufficiency

The CSMS applies data sufficiency standards to assign a percentile rank; if the data sufficiency standards are not met, the carrier will not be assigned a percentile rank. For the HOS Compliance BASIC, both of the following conditions are required:

1. At least three relevant inspections.
    - The example carrier has five relevant inspections, shown by the letter A in the Figure above; data sufficiency is met.
2. At least one inspection resulting in a BASIC violation.
    - The example carrier has three inspections with an HOS Compliance violation, shown by the letter C in the Figure above; data sufficiency is met.

B. Safety Event Group

The CSMS uses safety event groups to assign percentiles. Each carrier meeting the conditions in A is placed into a safety event group based on the number of relevant inspections. The example carrier above has five relevant inspections so they are placed in safety event group 1, 3-10 relevant inspections.

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

Table 4-1. Safety Event Group Categories for HOS Compliance

Calculate percentile rank by ranking all the carriers' BASIC measures in ascending order within the same safety event group. In this case, the example carrier would have its BASIC measure ranked against all carriers with 3-10 relevant inspections. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). The example carrier's percentile rank is 96.7 as shown by Figure 4-7. Example: HOS Compliance Measure Calculation.

C. Critical Mass

Remove carriers' percentiles that do not have at least three inspections with an HOS Compliance violation. As shown by letter C in Figure 4-8, the carrier has three inspections with a violation, so it meets the critical mass condition.

D. Recent Activity

Remove carriers' percentiles that do not have any recent activity. Recent activity in this BASIC is defined as follows:

a. No violation recorded in the BASIC during the previous 12 months
   - The example carrier's most recent violation was recorded on 9/29/2010, which is less than 12 months from the snapshot date 11/19/2010 as shown in Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report**.

   AND

b. No violation recorded in the BASIC during the latest relevant inspection
   - The example carrier's most recent relevant inspection on 9/29/2010 had applicable HOS Compliance violations as shown in Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report**.

Therefore, the carrier's percentile remains at 96.7.

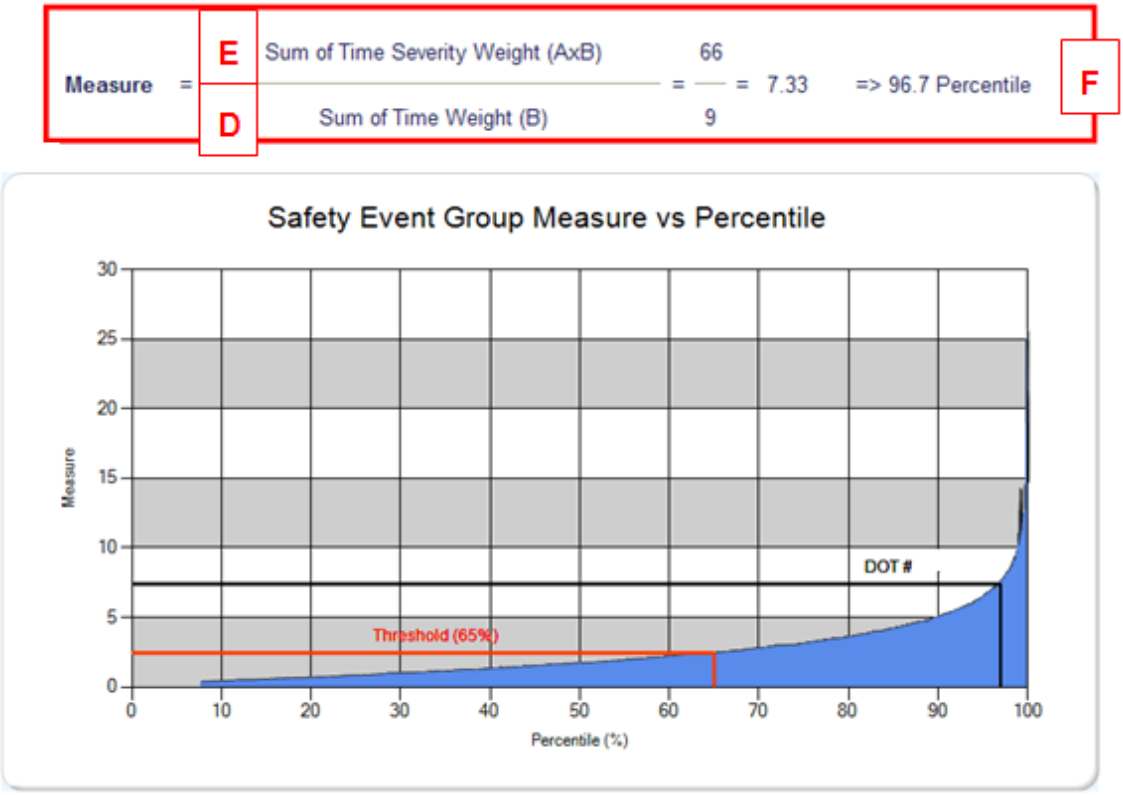


Figure 4-9. Example: HOS Compliance Measure and Percentile Calculation

Vehicle Maintenance BASIC Example

The technical details of the Vehicle Maintenance calculation are described in detail in Section 3.5 of this document.

Step 1: Obtain Relevant Data

Twenty-four months of inspection and violation data are required to calculate the BASIC measure and percentile. The following screenshot displays 24 months of inspection data for the Vehicle Maintenance BASIC:

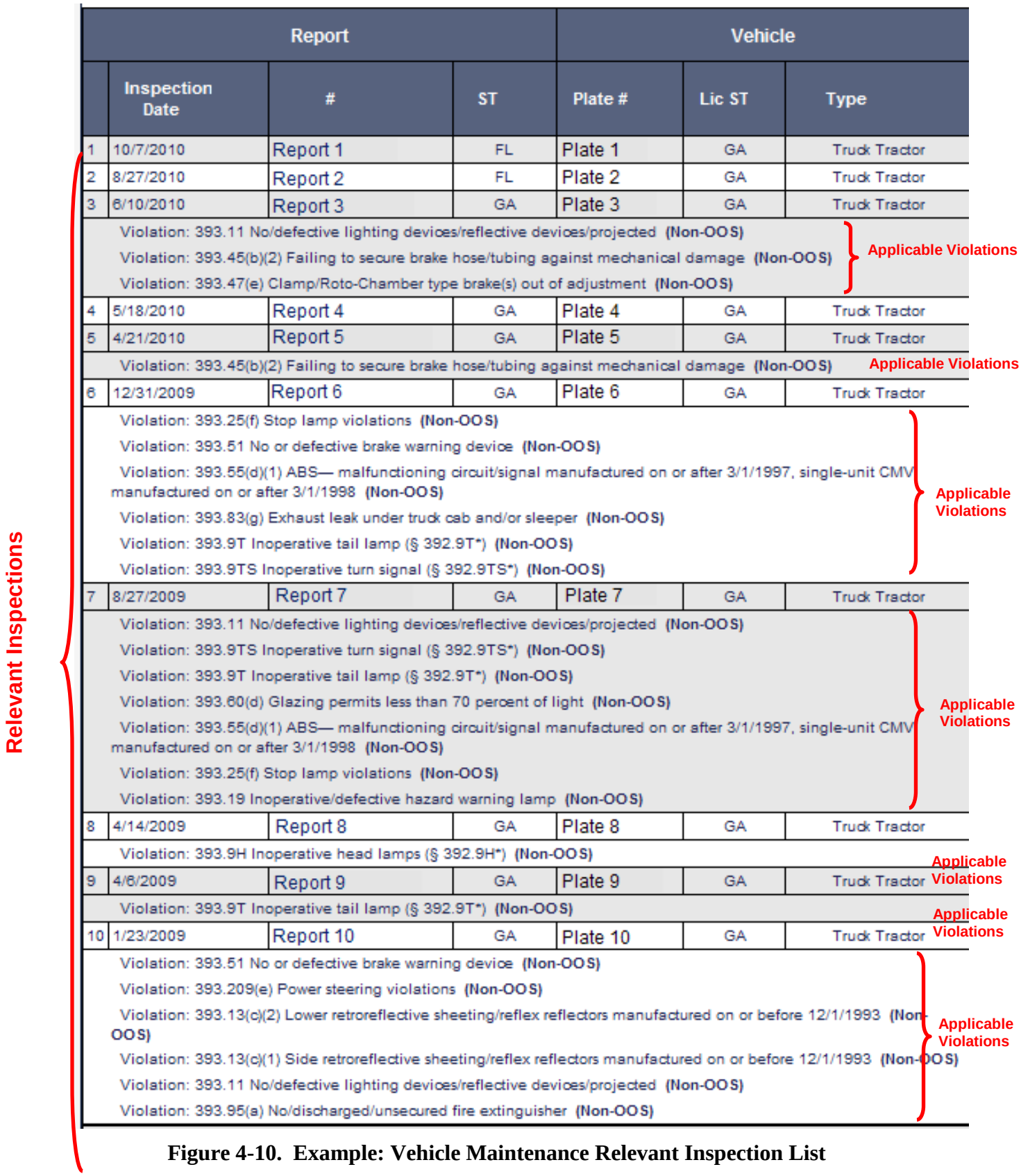


Figure 4-10. Example: Vehicle Maintenance Relevant Inspection List

The figure above displays the following:

1. The *10 relevant inspections* (numbered 1–10) for the Vehicle Maintenance BASIC. Relevant inspections are all Vehicle Inspections (Level 1, 2, 5, and 6), including those that do **not** result in a violation in the BASIC. Of the 10 relevant inspections, three do not result in a BASIC violation (inspection numbers 1, 2, and 4) and seven do result in a BASIC violation.

2. The *applicable Vehicle Maintenance violations* cited during relevant inspections as indicated in inspections 3, 5, 6, 7, 8, 9, and 10. Example violations include brakes, lights, other mechanical defects, and failure to make required repairs. A complete list of applicable violations in the Vehicle Maintenance BASIC can be found in Table 5, Appendix A.

Factors to consider when compiling the list of relevant inspections and applicable violations are as follows:

- **Factor to consider:** In cases of multiple counts of the same violation on a single inspection, the CSMS only uses the cited violation once. If any of these violations are OOS, the OOS violation will be used in CSMS (See the HOS Compliance example).

- **Factor to consider:** Some inspections are conducted after a CMV has been involved in a crash. Such inspections are noted as post-crash inspections. In post-crash inspections, only violations found in the pre-crash phase are included in the calculation. In Figure 4-11 below, violations 393.60(c) and 393.9TS are listed in the Detailed Inspection Report as post-crash violations (denoted by an asterisk) and are not listed in the CSMS Relevant Inspection Report.

	Report			Vehicle		
	Inspection Date	#	ST	Plate #	Lic ST	Type
5	4/21/2010	Report 5	GA	Plate 5	GA	Truck Tractor

Violation: 393.45(b)(2) Failing to secure brake hose/tubing against mechanical damage **(Non-OOS)**

Detailed Inspection Report

Violations

Section Code	Unit	OOS	Violation Category	Violations Discovered
393.45(B)(2)	1	N	BRAKES, ALL OTHERS	BRAKE HOSE/TUBING CHAFFING AND/OR KINKING
* 393.60(C)	1	N	WINDSHIELD	Damaged or discolored windshield
* 393.9TS	1	N	LIGHTING	INOPERATIVE TURN SIGNAL RIGHT

* Post Crash Violation

Figure 4-11. Example: Vehicle Maintenance Detailed Inspection Report

Step 2: Quantify Data into the BASIC Measure

Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report** displays the additional information required for the calculation in the "Measure" section:

	Report			Vehicle			A	B	C
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
1	10/7/2010	Report 1	FL	Plate 1	GA	Truck Tractor	0	3	0
2	8/27/2010	Report 2	FL	Plate 2	GA	Truck Tractor	0	3	0
3	6/10/2010	Report 3	GA	Plate 3	GA	Truck Tractor	11	3	33
	Violation: 393.11 No/defective lighting devices/reflective devices/projected (Non-OOS)						3		
	Violation: 393.45(b)(2) Failing to secure brake hose/tubing against mechanical damage (Non-OOS)						4		
	Violation: 393.47(e) Clamp/Roto-Chamber type brake(s) out of adjustment (Non-OOS)						4		
4	5/18/2010	Report 4	GA	Plate 4	GA	Truck Tractor	0	2	0
5	4/21/2010	Report 5	GA	Plate 5	GA	Truck Tractor	4	2	8
	Violation: 393.45(b)(2) Failing to secure brake hose/tubing against mechanical damage (Non-OOS)						4		
6	12/31/2009	Report 6	GA	Plate 6	GA	Truck Tractor	27	2	54
	Violation: 393.25(f) Stop lamp violations (Non-OOS)						6		
	Violation: 393.51 No or defective brake warning device (Non-OOS)						4		
	Violation: 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 (Non-OOS)						4		
	Violation: 393.83(g) Exhaust leak under truck cab and/or sleeper (Non-OOS)						1		
	Violation: 393.9T Inoperative tail lamp (§ 392.9T*) (Non-OOS)						6		
	Violation: 393.9TS Inoperative turn signal (§ 392.9TS*) (Non-OOS)						6		
7	8/27/2009	Report 7	GA	Plate 7	GA	Truck Tractor	30***	1	30
	Violation: 393.11 No/defective lighting devices/reflective devices/projected (Non-OOS)						3		
	Violation: 393.9TS Inoperative turn signal (§ 392.9TS*) (Non-OOS)						6		
	Violation: 393.9T Inoperative tail lamp (§ 392.9T*) (Non-OOS)						6		
	Violation: 393.60(d) Glazing permits less than 70 percent of light (Non-OOS)						1		
	Violation: 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 (Non-OOS)						4		
	Violation: 393.25(f) Stop lamp violations (Non-OOS)						6		
	Violation: 393.19 Inoperative/defective hazard warning lamp (Non-OOS)						6		
8	4/14/2009	Report 8	GA	Plate 8	GA	Truck Tractor	6	1	6
	Violation: 393.9H Inoperative head lamps (§ 392.9H*) (Non-OOS)						6		
9	4/6/2009	Report 9	GA	Plate 9	GA	Truck Tractor	6	1	6
	Violation: 393.9T Inoperative tail lamp (§ 392.9T*) (Non-OOS)						6		
10	1/23/2009	Report 10	GA	Plate 10	GA	Truck Tractor	21	1	21
	Violation: 393.51 No or defective brake warning device (Non-OOS)						4		
	Violation: 393.209(e) Power steering violations (Non-OOS)						6		
	Violation: 393.13(c)(2) Lower retroreflective sheeting/reflex reflectors manufactured on or before 12/1/1993 (Non-OOS)						3		
	Violation: 393.13(c)(1) Side retroreflective sheeting/reflex reflectors manufactured on or before 12/1/1993 (Non-OOS)						3		
	Violation: 393.11 No/defective lighting devices/reflective devices/projected (Non-OOS)						3		
	Violation: 393.95(a) No/discharged/unsecured fire extinguisher (Non-OOS)						2		

Measure E / D: Sum of Time Severity Weight (AxB) 158 / Sum of Time Weight (B) 19 = 8.31 => 71 Percentile F

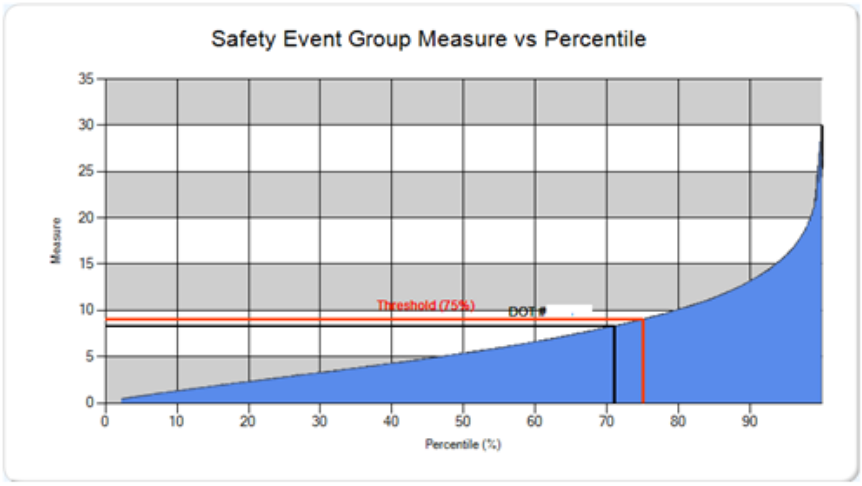


Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure Report

The following are the major components needed to calculate the BASIC measure. Each component (A-F) is labeled on Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report** with red letters.

A. Severity Weight of a violation is the Violation Weight + OOS Weight where:

- Violation Weight – Applicable violations have a corresponding violation weight that can be found in Appendix A of this document. The violation weight ranges from 1 (less severe) to 10 (most severe) and is assigned based on the violation's relationship to crash risk. The violation weights cannot be compared across BASICs.
- Out-of-Service (OOS) Weight – A violation resulting in an OOS condition is given a weight of 2, otherwise the weight is 0.

B. Time Weight of 1, 2, or 3 is assigned to each violation and inspection based on its age. The most recent violations and inspections are given higher weights. The weights are as follows:

- Less than 6 months = time weight of 3
- 6 months – less than 1 year = time weight of 2
- 1 year – less than 2 years = time weight of 1
- 2 years and older = not used in measurement system

C. Time and Severity Weight – Severity weight multiplied by the time weight

D. Total Inspection Time Weight of all relevant inspections (sum of column D)

E. Total Time and Severity Weight of all relevant inspections (sum of column E)

F. Vehicle Maintenance BASIC Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable violations (G) by the sum of the inspection time weight for all relevant inspections (F).

Example of Relevant Inspection with No Violations (Clean Inspection) – Inspection #1:

	Report			Vehicle			A	B	C
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
1	10/7/2010	Report 1	FL	Plate 1	GA	Truck Tractor	0	3	0

Figure 4-13. Example: Vehicle Maintenance Inspection #1

A. Severity Weight Violation Weight + OOS Weight = 0 + 0 = 0

- Violation Weight – No violations, no violation weight
- Out-of-Service (OOS) Weight – No violations, no OOS weight

B. Time Weight – Inspection occurred within six months of the CSMS calculation (11/19/2010), inspection time weight = 3

C. Time and Severity Weight – Severity weight x time weight = 0 x 3 = 0

Factor to consider: When the measure is calculated, a clean inspection (i.e., inspections with no violations for a particular BASIC) will lower the measure. This is done by not adding a violation weight to the numerator but instead incorporating it in the time weight inspection count in the denominator.

Example of Relevant Inspection with Applicable Violations – Inspection #3

	Report			Vehicle			A	B	C
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
3	6/10/2010	Report 3	GA	Plate 3	GA	Truck Tractor	11	3	33
	Violation: 393.11 No/defective lighting devices/reflective devices/projected (Non-OOS)						3		
	Violation: 393.45(b)(2) Failing to secure brake hose/tubing against mechanical damage (Non-OOS)						4		
	Violation: 393.47(e) Clamp/Roto-Chamber type brake(s) out of adjustment (Non-OOS)						4		

Figure 4-14. Example: Vehicle Maintenance Inspection #3

A. Severity Weight – Violation Weight + OOS Weight for each applicable violation. The severity weight for each violation is then summed to the inspection level.

- 393.11 severity weight = 3 (violation weight) + 0 (OOS weight) = 3
- 393.45(b)(2) severity weight = 4 (violation weight) + 0 (OOS weight) = 4
- 393.47(e) severity weight = 4 (violation weight) + 0 (OOS weight) = 4
- Total Severity Weight for Inspection (sum of the severity weight for each applicable violation –a + b + c from above = 3 + 4 + 4 = 11)

Factor to consider: The total severity weight for an inspection is set to the sum of the applicable violation severity weight, but cannot exceed 30. If the total severity weight for an inspection within a BASIC is greater than 30, then the total severity weight will be set at 30 (see Figure 4-16. Example: Vehicle Maintenance Inspection #5 example in Vehicle Maintenance).

B. Time Weight of inspection – Inspection occurred within six months of the CSMS calculation (11/19/2010) so the inspection is given a weight of 3

C. Time and Severity Weight – Severity weight x time weight = 11 x 3 = 33

Example of Relevant Inspection with Applicable Violations and a Violation "Cap" - Inspection #7:

	Report			Vehicle			Measure		
	Inspection Date	#	ST	Plate #	Lic ST	Type	Severity Weight (A)	Time Weight (B)	Time Severity Weight (AxB)
7	8/27/2009	Report 7	GA	Plate 7	GA	Truck Tractor	30***	1	30
	Violation: 393.11 No/defective lighting devices/reflective devices/projected **(Non-OOS)**						3		
	Violation: 393.9TS Inoperative turn signal (§ 392.9TS*) **(Non-OOS)**						6		
	Violation: 393.9T Inoperative tail lamp (§ 392.9T*) **(Non-OOS)**						6		
	Violation: 393.60(d) Glazing permits less than 70 percent of light **(Non-OOS)**						1		
	Violation: 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 **(Non-OOS)**						4		
	Violation: 393.25(f) Stop lamp violations **(Non-OOS)**						6		
	Violation: 393.19 Inoperative/defective hazard warning lamp **(Non-OOS)**						6		

Figure 4-15. Example: Vehicle Maintenance Inspection #7

A. Severity Weight – Violation Weight + OOS Weight for each applicable violation. The severity weight for each violation is then summed to the inspection level.

- 393.11 severity weight = 3 (violation weight) + 0 (OOS weight) = 3
- 393.9TS severity weight = 6 (violation weight) + 0 (OOS weight) = 6
- 393.9T severity weight = 6 (violation weight) + 0 (OOS weight) = 6
- 393.60(d) severity weight = 1 (violation weight) + 0 (OOS weight) = 1
- 393.55(d)(1) severity weight = 4 (violation weight) + 0 (OOS weight) = 4
- 393.25(f) severity weight = 6 (violation weight) + 0 (OOS weight) = 6
- 393.19 severity weight = 6 (violation weight) + 0 (OOS weight) = 6
- Total Severity Weight for Inspection (sum of the severity weight for each applicable violation) – from above = 3 + 6 + 6 + 1 + 4 + 6 + 6 = 32. This is greater than 30, so the severity weight is set at 30.

  Factor to consider: The total severity weight for an inspection is set to the sum of the applicable violation severity weight, but cannot exceed 30. If the total severity weight for an inspection within a BASIC is greater than 30, then the total severity weight will be set at 30.

B. Time Weight of inspection – Inspection occurred more than 1 year after the CSMS calculation (11/19/2010), so the inspection is given a weight of 1.

C. Time and Severity Weight – Severity weight x time weight = 30 x 1 = 30

The remaining five relevant inspections are processed in the same way as inspection #1, inspection #3, and inspection #7.

The figure below is a subset of Figure 4-12; refer to Figure 4-12 for complete information.

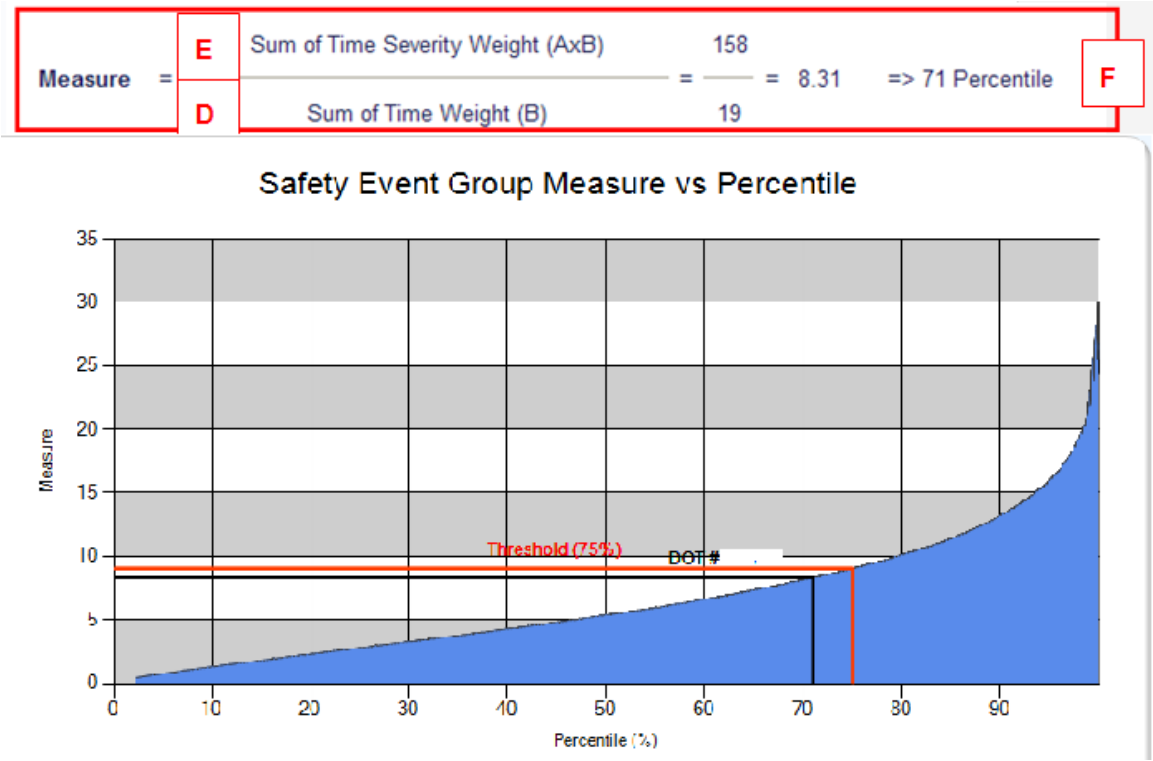


Figure 4-16. Example: Vehicle Maintenance Inspection #5

D. Sum of the inspection time weight for all relevant inspections = 3 + 3 + 3 + 2 + 2 + 2 + 1 + 1 + 1 + 1 = 19

E. Sum of the time/severity weight for all relevant inspections = 0 + 0 + 33 + 0 + 8 + 54 + 30 + 6 + 6 + 21 = 158

F. Vehicle Maintenance BASIC Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable violations (E) by the sum of the inspection time weight for all relevant inspections (D).

$$BASIC\ Measure = \frac{Total\ of\ \ time\ and\ \ severity\ \ weighted\ applicable\ violations}{Total\ time\ weight\ \ for\ all\ inspections} = \frac{D}{E} = \frac{158}{19} = 8.31$$

Step 3: Convert BASIC Measure to Percentile Rank

The percentile rank is a relative comparison among all active U.S.-domiciled interstate and intrastate HM motor carriers; therefore, this step cannot be calculated without all 700,000 plus motor carriers' Vehicle Maintenance BASIC measures. However, with applicable data, the CSMS calculates the percentile rank as follows.

The percentile rank is calculated by ranking the carriers' BASIC measures. There are four components to consider when calculating the percentile rank. Data Sufficiency (A) and Safety Event Group (B) are applied prior to calculating the percentile rank and Critical Mass (C) and Recent Activity (D) are applied afterwards.

The following shows information required to determine the percentile:

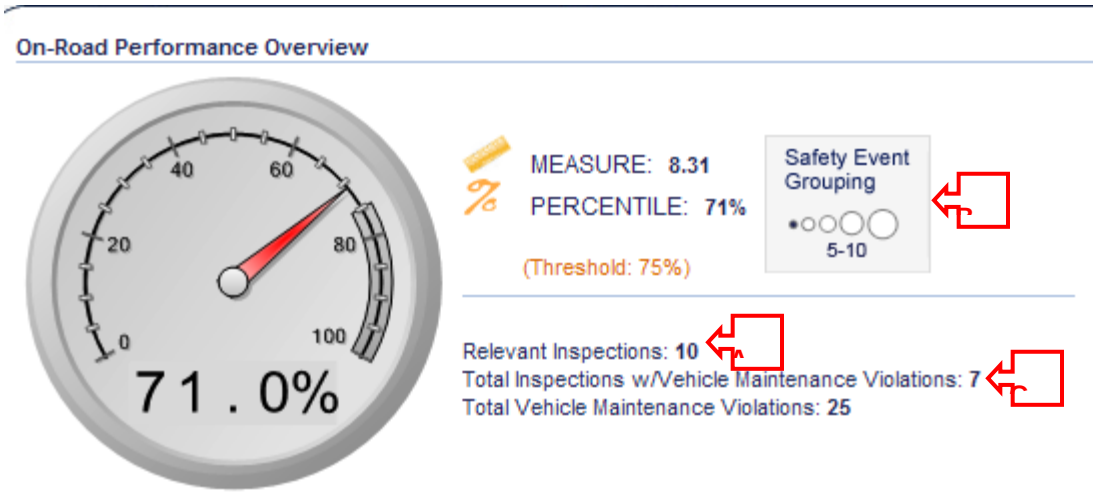


Figure 4-17. Example: Vehicle Maintenance On-Road Performance Summary

A. Data Sufficiency

The CSMS applies data sufficiency standards to assign a percentile rank; if the data sufficiency standards are not met, the carrier will not be assigned a percentile rank. For the Vehicle Maintenance BASIC, carriers are not assigned a percentile if they meet the following two conditions. Both of the following conditions are required:

2. At least five relevant inspections.
    - The example carrier has 10 relevant inspections, shown by the letter A in the Figure above; data sufficiency is met.
3. At least one inspection resulting in a BASIC violation.

- The example carrier has seven inspections with a Vehicle Maintenance violation, shown by the letter C in the Figure above; data sufficiency is met.

B. Safety Event Group

The CSMS uses safety event groups to assign percentiles. Each carrier meeting the conditions in A is placed into a safety event group based on the number of relevant inspections. The example carrier above has 10 relevant inspections, so it is placed in safety event group 1, 4-10 relevant inspections.

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

Table 4-2. Safety Event Group Categories for Vehicle Maintenance

Calculate percentile rank by ranking all of the carriers' BASIC measures in ascending order within each safety event group. In this case, the example carrier would have its BASIC measure ranked against all carriers with 5-10 relevant inspections. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). The example carrier's percentile rank is 71.0 as shown by Figure 4-17. Example: Vehicle Maintenance On-Road Performance Summary.

C. Critical Mass

Remove carriers' percentiles that do not have at least five inspections with a Vehicle Maintenance Violation, as shown by letter C in Figure 4-17. Example: Vehicle Maintenance On-Road Performance Summary the carrier has seven inspections with a violation, so it meets the critical mass condition.

D. Recent Activity

Remove carriers' percentiles that do not have any recent activity. Recent activity in this BASIC is defined as follows:

a. No violation recorded in the BASIC during the previous 12 months
   - The example carrier's most recent violation was recorded on 6/10/2010, which is less than 12 months from the snapshot date 11/19/2010 as shown in Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report**.

AND

b. No violation recorded in the BASIC during the latest relevant inspection
    - The example carrier's most recent relevant inspection on 10/7/2010 had no applicable Vehicle Maintenance violations as shown in Figure 4-12. Example: Vehicle Maintenance Inspection/Violation/ Measure **Report**

Therefore, the carrier's percentile remains at 71.0.

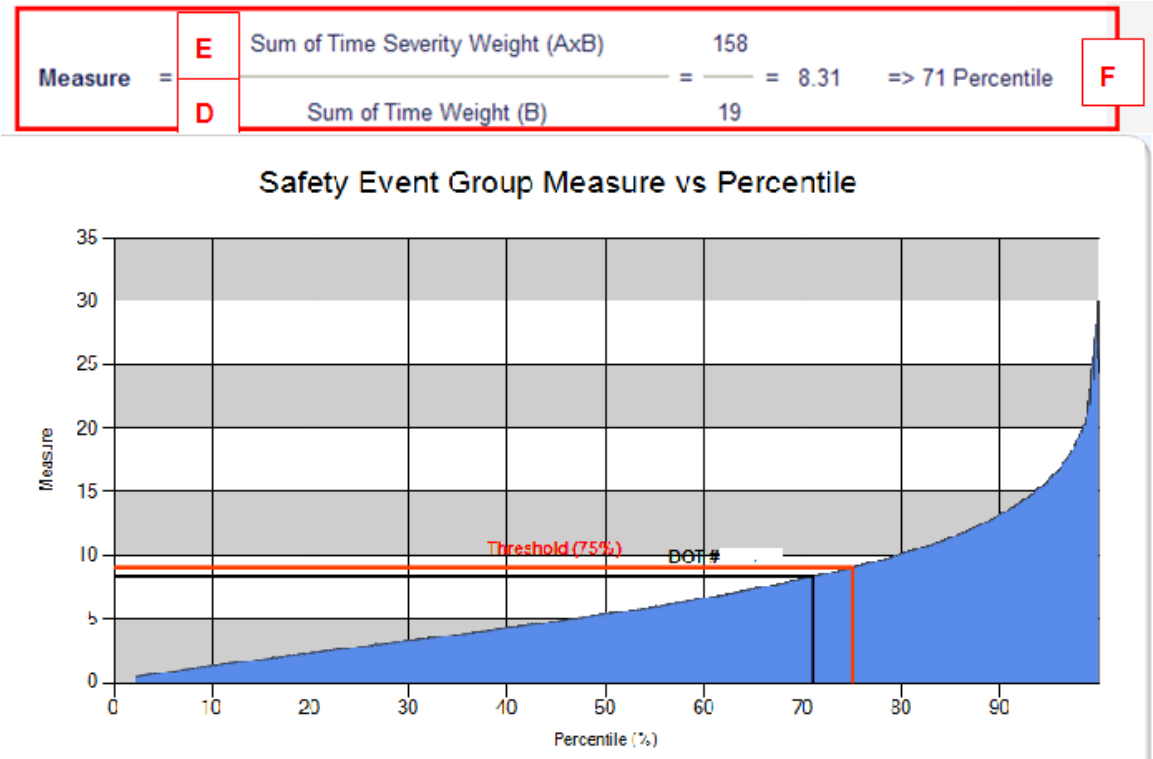


Figure 4-18. Example: Vehicle Maintenance Measure and Percentile Calculation

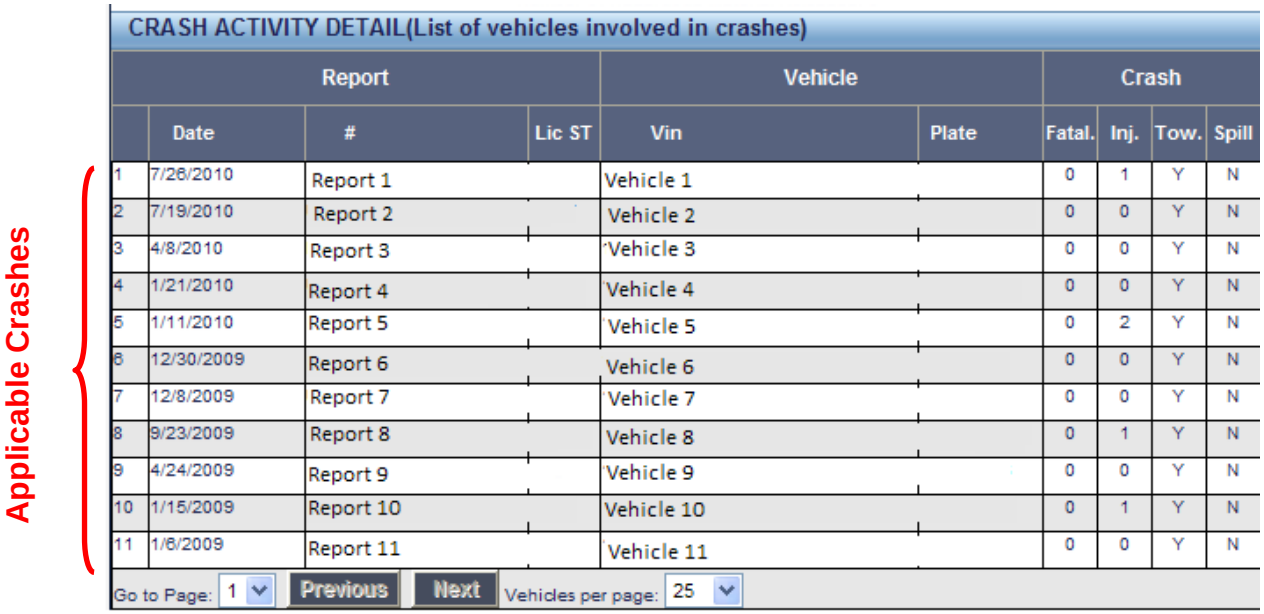
Crash Indicator Example

The technical details of the Crash Indicator calculation are described in detail in section 3.7 of this document.

Step 1: Obtain Relevant Data

The Crash Indicator requires two forms of relevant data: A) 24 months of crash data are required to calculate the BASIC measure and percentile and B) relevant exposure information in the form of Power Units (PUs) and Vehicle Miles Traveled (VMT).

A. Twenty-Four Months of Crash Data



CRASH ACTIVITY DETAIL(List of vehicles involved in crashes)

	Report			Vehicle		Crash			
	Date	#	Lic ST	Vin	Plate	Fatal.	Inj.	Tow.	Spill
1	7/26/2010	Report 1		Vehicle 1		0	1	Y	N
2	7/19/2010	Report 2		Vehicle 2		0	0	Y	N
3	4/8/2010	Report 3		Vehicle 3		0	0	Y	N
4	1/21/2010	Report 4		Vehicle 4		0	0	Y	N
5	1/11/2010	Report 5		Vehicle 5		0	2	Y	N
6	12/30/2009	Report 6		Vehicle 6		0	0	Y	N
7	12/8/2009	Report 7		Vehicle 7		0	0	Y	N
8	9/23/2009	Report 8		Vehicle 8		0	1	Y	N
9	4/24/2009	Report 9		Vehicle 9		0	0	Y	N
10	1/15/2009	Report 10		Vehicle 10		0	1	Y	N
11	1/6/2009	Report 11		Vehicle 11		0	0	Y	N

Go to Page: 1 Previous Next Vehicles per page: 25

Figure 4-19. Example: Crash Indicator Applicable Crash List

The figure above displays:

> The *11 applicable crashes* that are State-reported crashes that meet the report crash standard. 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).

B. Determine Carrier Exposure

To calculate the carrier measure for the Crash Indicator, there are three carrier exposure factors that are required: Carrier Segment (1), Average PUs (2), Utilization Factor (3).

1. 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

The following figure displays the carrier's PU types:

Vehicle Type	Segment Type	Power Units		
		Owned	Term Leased	Trip Leased
Straight Trucks	Straight	5		
Truck Tractors	Combo	125		
HazMat Cargo Tank Trucks	Straight			
Motor Coach	Combo			
School Bus (1-8 passengers) *	Not used			
School Bus (9-15 passengers)	Straight			
School Bus (16+ passengers)	Straight			
Mini-Bus (16+ passengers)	Straight			
Limousine (1-8 passengers) *	Not used			
Limousine (9-15 passengers)	Straight			
Limousine (16+ passengers)	Straight			
Van (1-8 passengers) *	Not used			
Van (9-15 passengers)	Straight			

* Indicates power units not used by the Carrier Safety Measurement System when calculating total power units

Figure 4-20. Example: Crash Indicator PU Type

To determine the carrier's segment, take the number of PUs in the Combo segment and divide by the total number of PUs.

$$\frac{Combo\ PU}{Total\ PU} = \frac{125}{125+5} \times 100 = \frac{125}{130} \times 100 = 96\% \geq 70\%$$

The carrier has more than 70% combination trucks or motor coaches. Therefore, the carrier is classified in the "Combo" segment.

2. Average Power Units (PUs)

The average PUs for each carrier are calculated by using (i) the carrier's current number of PUs, (ii) the number of PUs the carrier had six months ago, and (iii) the number of PUs the carrier had 18 months ago. The following figure shows the average PU calculation.

Average Power Units	Current Power Units	Power Units 6 months ago	Power Units 18 months ago
130.0	130	130	130

In order to account for changes in a carrier's fleet size during the previous 24 months an *average power unit* value is used in the calculation to determine a carrier's Crash Indicator measure. The *average power unit* value is calculated as follows:

$$Average\_PUs = \frac{\#ofCurrentPUs + \#ofPUs6MonthsAgo + \#ofPUs18MonthsAgo}{3}$$

$$Average\ PU = \frac{130+130+130}{3} = 130$$

Figure 4-21. Example: Crash Indicator Average Power Unit Calculation

3. Utilization Factor

Given that this carrier is in the "Combo" Segment, the carrier's Utilization Factor is determined based on the following table.

Combo Segment

VMT per Average PU	Utilization Factor
< 80,000	1
80,000 - 160,000	1+0.6[(VMT per PU-80,000) / 80,000]
160,000 - 200,000	1.6
> 200,000	1
No Recent VMT Information	1

Table 4-3. VMT per PU for Combo Segment

To apply this table, the VMT per average PU needs to be calculated. In #2 above, we showed that the average PU for this carrier is 130. The following figure shows that the VMT is 13,514,000.

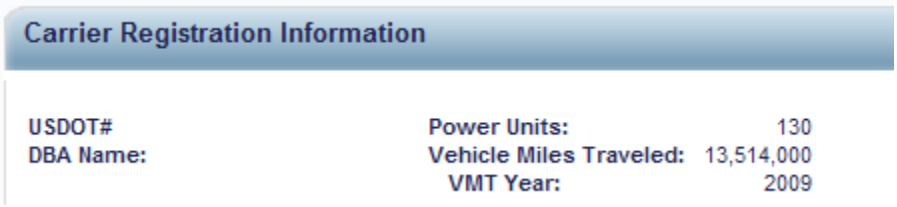


Figure 4-22. Example: Crash Indicator VMT data

$$VMT\ \ per\ average\ PU = \frac{13{,}514{,}000}{130} = 103{,}954$$

Given the carrier's VMT per average PU, it fits into the 80,000 to 160,000 group. To determine the Utilization Factor, the following formula is used:

$$Utilization\ Factor = 1 + 0.6 \times \left[\frac{VMT\ \ per\ PU - 80{,}000}{80{,}000}\right] = 1 + 0.6 \times \left[\frac{103{,}954 - 80{,}000}{80{,}000}\right]$$

$$= 1 + 0.6 \times \left[\frac{23{,}954}{80{,}000}\right] = 1 + 0.6 \times [0.2994] = 1 + 0.1797 = 1.1797$$

Step 2: Quantify Data into the BASIC Measure

To calculate the BASIC measure, additional information is required. Figure 4-23 displays the additional information in the "Crash Detail" and "Crash Measure" section:

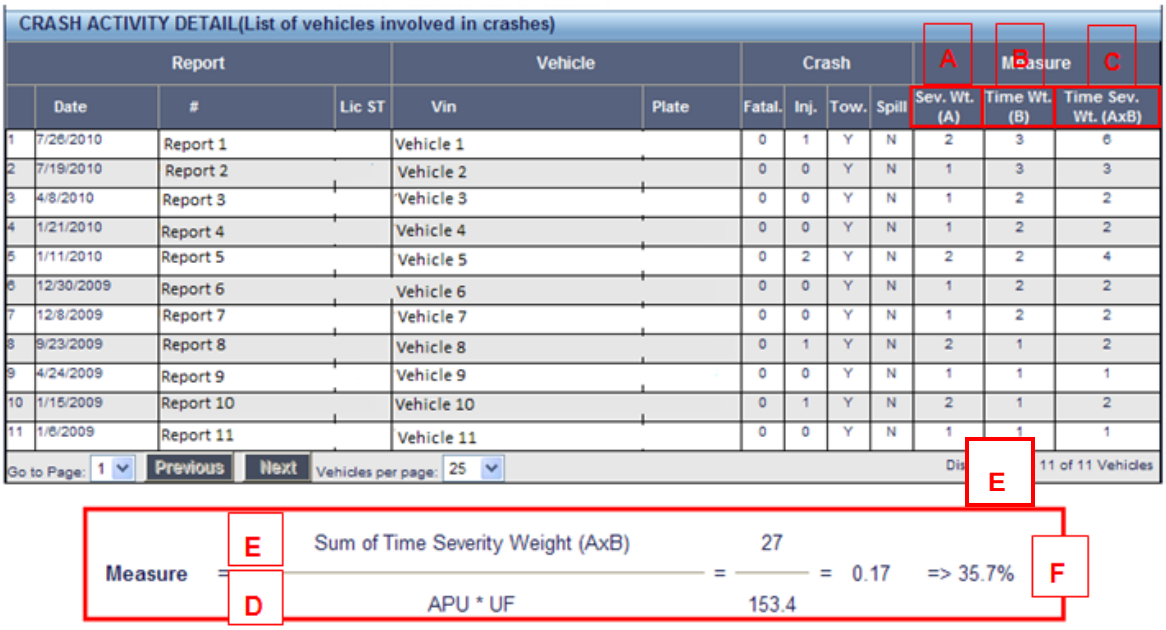


Figure 4-23. Example: Crash Activity Detail/Crash Measure Report

A. 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. An HM release also increases the weighting of a crash, as shown in Table 4-4.

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

Table 4-4. Crash Severity Weights for Crash Indicator

B. Time Weight of 1, 2, or 3 is assigned to each violation and inspection based on its age. The most recent violations and inspections are given higher weights. The weights are as follows:

   a. Less than 6 months = time weight of 3

   b. 6 months – less than 1 year = time weight of 2

   c. 1 year – less than 2 years = time weight of 1

   d. 2 years and older = not used in measurement system

C. Time and Severity Weight – Severity weight multiplied by the time weight

D. Total Time and Severity Weight for all applicable crashes (sum of column C)

E. Crash Indicator Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable crashes (D) by the Average PUs * Utilization Factor.

Example of Applicable Crash – Crash #1

CRASH ACTIVITY DETAIL(List of vehicles involved in crashes)

	Report			Vehicle		Crash				Measure A	Measure B	Measure C
	Date	#	Lic ST	Vin	Plate	Fatal.	Inj.	Tow.	Spill	Sev. Wt. (A)	Time Wt. (B)	Time Sev. Wt. (AxB)
1	7/26/2010	Report 1		Vehicle 1		0	1	Y	N	2	3	6

Figure 4-24. Example: Crash Indicator Crash #1

A. Crash Severity Weight – Shown in Table 4-4 above, the crash involves an injury, but no HM release. Crash Severity Weight = 2

B. Time Weight of Crash – Crash occurred within six months of the CSMS calculation (11/19/2010), so the crash is given a weight of 3

C. Time and Severity Weight – Crash severity weight x time weight = 2 x 3 = 6

The remaining 10 applicable crashes are processed in the same way as crash #1.

The figure below is a subset of Figure 4-23; refer to Figure 4-23 for complete information.

Figure 4-25. Example: Crash Indicator Measure Calculation

D. Total Time and Severity Weight for all applicable crashes = 6 + 3 + 2 + 2 + 4 + 2 + 2 + 2 + 1 + 2 + 1 = 27

E. Crash Indicator Measure – The BASIC measure is calculated by dividing the sum of the time/severity weight for all applicable crashes (D) by the Average PUs * Utilization Factor. The Average PU and Utilization Factor values are provided in Step 1 of this example.

$$BASIC\ Measure = \frac{Total\ of\ \ time\ and\ \ severity\ weighted\ applicable\ crashes}{Average\ PUs * Utilization\ Factor} = \frac{D}{130 * 1.1797} = \frac{27}{153} = 0.17$$

Step 3: Convert BASIC Measure to Percentile Rank

The percentile rank is a relative comparison among all active U.S. domiciled interstate and intrastate HM motor carriers; therefore, this step cannot be calculated without all 700,000 plus motor carriers' Crash Indicator BASIC measures. However, with applicable data, the CSMS calculates the percentile rank as follows.

The percentile rank is calculated by ranking the carriers' BASIC measures. There are four components to consider when calculating the percentile rank. Data Sufficiency (A) and Safety Event Group (B) are applied prior to calculating the percentile rank and Critical Mass (C) and Recent Activity (D) are applied afterwards.

The following shows information required to determine the percentile:

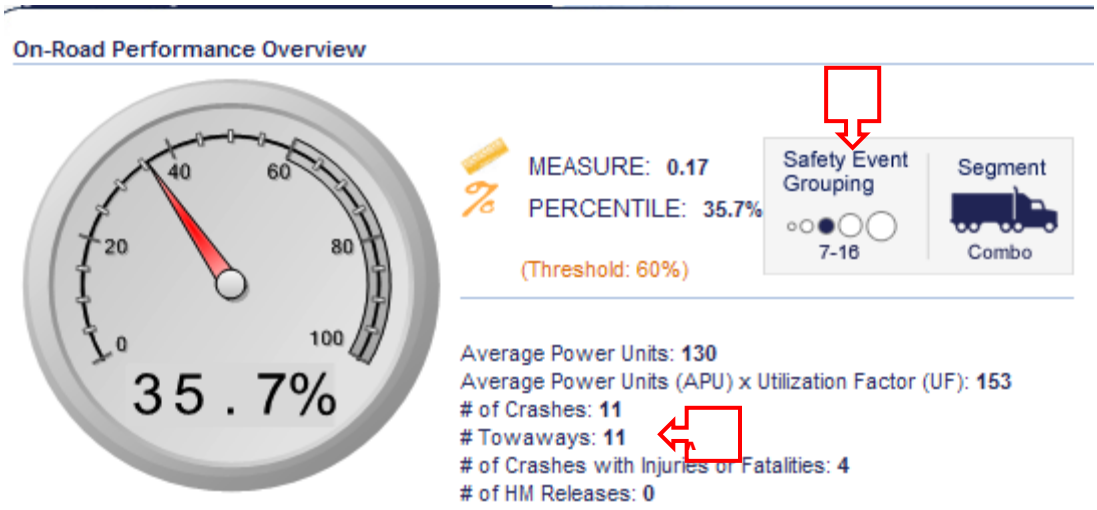


Figure 4-26. Example: Crash Indicator Crash Activity

A. Data Sufficiency

The CSMS applies data sufficiency standards to assign a percentile rank; if the data sufficiency standards are not met, the carrier will not be assigned a percentile rank. For the Crash Indicator, the following condition is required:

1. At least two applicable crashes.
    - The example carrier has 11 applicable crashes, shown by the letter A in the Figure above; data sufficiency is met.

B. Safety Event Group

The CSMS uses safety event categories to assign percentiles. Each carrier meeting the conditions in A is placed into a safety event group based on the carrier segment and number of crashes. The example carrier above is in the Combo Segment (shown in step 1) and has 10 applicable crashes, so it is placed in safety event group 3, 7-16 crashes.

Safety Event Group	Combo Segment: Number of Crashes
1	2-3
2	4-6
3	7-16
4	17-45
5	46+

Table 4-5. Safety Event Group Categories for Crash Indicator

Calculate percentile rank by ranking all the carriers' BASIC measures in ascending order within each safety event group. In this case, the example carrier would have its BASIC measure ranked against all carriers with 7-16 crashes. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). The example carrier's percentile rank is 35.7 as shown by Figure 4-26. Example: Crash Indicator Crash Activity

C. Critical Mass

In the Crash Indicator, the Critical Mass is the same as the Data Sufficiency: two applicable crashes. The example carrier has 11 applicable crashes; critical mass condition is met.

D. Recent Activity

Remove carriers' percentiles that do not have any recent activity. Recent activity in the Crash Indicator is defined as:

1. No crash recorded during the previous 12 months
    - The example carrier's most recent crash was on 7/26/2010, which is less than 12 months from the snapshot date 11/19/2010 as shown in Figure 4-23. Example: Crash Activity Detail/Crash Measure **Report**

Therefore, the percentile remains at 35.7.

5. SMS Report – Summary/Next Steps

The SMS methodology is part of a continuous improvement process in support of CSA and the implementation of the FMCSA Operational Model. Several major enhancements (see Appendix B) were made to the SMS as part of lessons learned from the CSA Op-Model Test, public listening sessions, and stakeholder 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 Operational Model 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.

6. Appendix A

Violation Severity by BASIC

Overview

The tables in this Appendix contain all violations used in the Carrier Safety Measurement System (CSMS), along with the corresponding Federal Motor Carrier Safety Regulation (FMCSR) or Hazardous Material Regulation (HMR) section. Each table represents a unique Behavior Analysis and Safety Improvement Category (BASIC). Each violation is assigned a severity weight that reflects its relevance to crash risk. Crash risk is defined as the risk of crashes occurring and the consequences of the crash after it occurs. Within each BASIC, the violations are grouped based on their attributes, so that similar violations can be assigned the same severity weights. Severity weights, discussed in more detail below, only reflect relative crash risk *within* a BASIC, and 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 approximate 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.

Violations in the tables that follow are used by SMS at the specified severity weight unless the citation result associated with the violation is documented as "dismissed/ not guilty". Additionally, when the citation result for a violation is documented as "convicted of a different charge", then the severity weight is set to 1 and it is not subject to an additional OOS severity weight of 2.

In order for a citation result to be documented for a violation (and subsequently impact SMS), drivers or carriers must submit certified documentation of the judicial proceeding results through a Request for Data Review (RDR) in FMCSA's DataQs system system to initiate this process. This process only applies to inspections conducted on or after August 23, 2014.

Derivation of the Severity Weights

In order to determine the severity weights crash involvement and crash consequence the following five-step process[10] was invoked:

1. **BASIC Mapping**—All roadside safety-related violations were mapped to an appropriate BASIC so that the severity weight analysis could be conducted on each 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 taken due to strong demonstrable relationships between driver crashes and violations documented in prior Volpe Center research. The earlier research was conducted in support of FMCSA's Compliance Review Work Group (CRWG), the CSA program's predecessor.
   Based on the conclusions from the earlier 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 for individual commercial drivers. Multivariate negative binomial regression models were used to quantify the strength of relationships between driver violation rates in individual violation groups and crash involvement.
4. **Crash Consequences Analysis**—While the statistical modeling described in step 3 provides an empirical basis for associating violations and crash occurrence, it does not address the violations relationship to crash consequence. To factor in the risk associated with crash consequence enforcement subject matter experts representing State and Federal Field Staff provided input for modifying preliminary severity weight defined in step 3. This approach helped balance the violation risk associated with crash involvement (occurrence) and crash consequence.
5. **CSMS Effectiveness Test**—Various severity weighting schemes developed in Steps 1 through 4 were applied to the Carrier Safety Measurement System (CSMS) to provide an empirical evaluation of the weighting schemes. This empirical evaluation, or "CSMS Effectiveness Test," was modeled after the

[10] Carrier Safety Measurement System (CSMS) Violation Severity Weights (Revised November 2009). Prepared for FMCSA by John A. Volpe National Transportation Systems Center (http://www.regulations.gov/#!documentDetail;D=FMCSA-2004-18898-0161).

SafeStat Effectiveness Test.[11] The CSMS Effectiveness Test was accomplished through the following steps: (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 weighting schemes in terms of their impact in identifying high-risk carriers. It also provides a means of testing other weight schemes, such as the out-of-service (OOS) weight, to help optimize CSMS's effectiveness.

Severity Weight 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 fifth column "Violation in the DSMS (Y/N)" indicates whether or not the violation is used in the DSMS. The methodology for DSMS can be found at: http://csa.fmcsa.dot.gov/Documents/Driver_SMSMethodology.pdf.

[11] 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 (http://www.regulations.gov/#!documentDetail;D=FMCSA-2004-18898-0223).

Table 1. CSMS Unsafe Driving BASIC Violations[12]

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
177.804B	Failure to comply with 49 CFR 392.80 - Texting while Oper a CMV - Placardable HM	Texting	10	Y
177.804C	Fail to comply with 392.82 - Using Mobile Phone while Oper a CMV - HM	Phone Call	10	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	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
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

[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.

* 392.2S violations from January 1, 2011 or later will be weighted at 1. The rest are weighted 5.

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)
392.10(a)(1)	Failure to stop at railroad crossing - Bus transporting passengers	Dangerous Driving	5	Y
392.10(a)(2)	Failure to stop at railroad crossing - CMV transporting Division 2.3 Chlorine	Dangerous Driving	5	Y
392.10(a)(3)	Failure to stop at railroad crossing - CMV requiring display of HM placards	Dangerous Driving	5	Y
392.10(a)(4)	Failure to stop at railroad crossing - HM Cargo Tank vehicle	Dangerous Driving	5	Y
392.11	Commercial Vehicle failing to slow down approaching a railroad crossing.	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
392.80(a)	Driving a CMV while Texting	Texting	10	Y
392.82(a)(1)	Using a hand-held mobile telephone while operating a CMV	Phone Call	10	Y
392.82(a)(2)	Allowing or requiring driver to use a hand-held mobile telephone while operating a CMV	Phone Call	10	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 a vehicle to transport migrant workers in noncompliance with part 398	Other Driver Violations	1	Y

Table 2. HOS Compliance 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	Violation in the DSMS (Y/N)
392.2H	State/Local Hours-of-Service	Hours	7	Y
392.3	Operating a CMV while ill/fatigued	Jumping OOS/Driving Fatigued	10	Y
392.3-FPASS	Fatigue - Operate a passenger-carrying CMV while impaired by fatigue.	Jumping OOS/Driving Fatigued	10	Y
392.3-FPROP	Fatigue - Operate a property-carrying CMV while impaired by fatigue.	Jumping OOS/Driving Fatigued	10	Y
392.3-I	Illness - Operate a CMV while impaired by illness or other cause.	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
395.3A2-PROP	Driving beyond 14 hour duty period (Property carrying vehicle)	Hours	7	Y
395.3A3-PROP	Driving beyond 11 hour driving limit in a 14 hour period. (Property Carrying Vehicle)	Hours	7	Y
395.3(a)(3)(ii)[14]	Driving beyond 8 hour limit since the end of the last off duty or sleeper period of at least 30 minutes	Hours	7	Y
395.3(b)	60/70 - hour rule violation	Hours	7	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] Violation added to the SMS as of July 1, 2013. Instances of this violation before, July 1, 2013 will not be included in the SMS.

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)
395.3B1-PROP	Driving after 60 hours on duty in a 7 day period. (Property carrying vehicle)	Hours	7	Y
395.3B2	Driving after 70 hours on duty in a 8 day period. (Property carrying vehicle)	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
395.5A1-PASS	Driving after 10 hour driving limit (Passenger carrying vehicle)	Hours	7	Y
395.5(a)(2)	15 - hour rule violation (Passenger)	Hours	7	Y
395.5A2-PASS	Driving after 15 hours on duty (Passenger carrying vehicle)	Hours	7	Y
395.5(b)	60/70 - hour rule violation (Passenger)	Hours	7	Y
395.5B1-PASS	Driving after 60 hours on duty in a 7 day period. (Passenger carrying vehicle)	Hours	7	Y
395.5B2-PASS	Driving after 70 hours on duty in a 8 day period. (Passenger carrying vehicle)	Hours	7	Y
395.8	Driver's record of duty status (general/form and manner)	Other Log/Form & Manner	1	Y
395.8(a)	No driver’s record of duty status	Incomplete/Wrong Log	5	Y
395.8(e)	False report of driver’s record of duty status	False Log	7	Y
395.8(f)(1)	Driver’s 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	Incomplete/Wrong Log	5	Y
395.15(c)	Onboard recording device improper form and manner	Other Log/Form & Manner	1	Y
395.15(f)	Onboard recording device failure and driver failure to reconstruct duty status	Incomplete/Wrong Log	5	Y

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)
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	Other Log/Form & Manner	1	N
398.6	Violation of hours of service regulations—migrant workers	Hours	7	Y

Table 3. CSMS Driver Fitness BASIC Violations[15]

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)
177.816	Driver training requirements	General Driver Qualification	4	N
383.21	Operating a CMV with more than one driver's license	License-related: High	8	Y
383.21(a)	Operating a CMV with more than one driver's license	License-related: High	8	Y
383.23(a)(2)	Operating a CMV without a CDL	License-related: High	8	Y
383.23(c)	Operating on learner's permit without CDL holder	License-related: High	8	Y
383.23(c)(1)	Operating on learner's permit without CDL holder	License-related: High	8	Y
383.23(c)(2)	Operating on learner's permit without valid driver's license	License-related: High	8	Y
383.51(a)	Driving a CMV (CDL) while disqualified	License-related: High	8	Y
383.51A-NSIN*	Driving a CMV while CDL is suspended for a non-safety-related reason and in the state of driver's license issuance.	License-related: Medium	5	Y

[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.

*Lower weights for license-related violations are only applicable to inspections occurring on or after 7/20/2012.

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)
383.51A-NSOUT*	Driving a CMV while CDL is suspended for a non-safety-related reason and outside the state of driver's license issuance.	License-related: Low	1	Y
383.51A-SIN	Driving a CMV while CDL is suspended for a safety-related or unknown reason and in the state of driver's license issuance.	License-related: High	8	Y
383.51A-SOUT*	Driving a CMV while CDL is suspended for safety-related or unknown reason and outside the driver's license state of issuance.	License-related: Medium	5	Y
383.91(a)	Operating a CMV with improper CDL group	License-related: High	8	Y
383.93(b)(1)	No double/triple trailer endorsement on CDL	License-related: High	8	Y
383.93(b)(2)	No passenger vehicle endorsement on CDL	License-related: High	8	Y
383.93(b)(3)	No tank vehicle endorsement on CDL	License-related: High	8	Y
383.93(b)(4)	No hazardous materials endorsement on CDL	License-related: High	8	Y
383.93(b)(5)	No school bus endorsement on CDL	License-related: High	8	Y
383.93B5LCDL	License (CDL) - Operating a school bus without a school bus endorsement as described in 383.93(b)(5)	License-related: High	8	Y
383.95(a)	Violating airbrake restriction	License-related: High	8	Y
386.72(b)	Failing to comply with Imminent Hazard OOS Order	Fitness/ Jumping OOS	10	Y
391.11	Unqualified driver	License-related: High	8	Y
390.35B-MED	Operating a CMV while possessing a fraudulent medical certificate	Fraud	10	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

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)
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: High	8	Y
391.11B5-DEN	Driver operating a CMV without proper endorsements or in violation of restrictions.	License-related: High	8	Y
391.11B5-DNL	Driver does not have a valid operator's license for the CMV being operated.	License-related: High	8	Y
391.11(b)(7)	Driver disqualified from operating CMV	License-related: High	8	Y
391.15(a)	Driving a CMV while disqualified	License-related: High	8	Y
391.15A-NSIN*	Driving a CMV while disqualified. Suspended for non-safety-related reason and in the state of driver's license issuance.	License-related: Medium	5	Y
391.15A-NSOUT*	Driving a CMV while disqualified. Suspended for a non-safety-related reason and outside the state of driver's license issuance.	License-related: Low	1	Y
391.15A-SIN	Driving a CMV while disqualified. Suspended for safety-related or unknown reason and in the state of driver’s license issuance.	License-related: High	8	Y
391.15A-SOUT*	Driving a CMV while disqualified. Suspended for a safety-related or unknown reason and outside the driver's license state of issuance.	License-related: Medium	5	Y
391.41(a)	Driver not in possession of medical certificate	Medical Certificate	1	Y
391.41A-F	Operating a property-carrying vehicle without possessing a valid medical certificate.	Medical Certificate	1	Y

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)
391.41A-FPC	Operating a property-carrying vehicle without possessing a valid medical certificate. Previously Cited	Medical Certificate	1	Y
391.41A-P	Operating a passenger-carrying vehicle without possessing a valid medical certificate.	Medical Certificate	1	Y
391.43(h)	Improper medical examiner's 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
398.3(b)	Driver not physically qualified	Physical	2	Y
398.3(b)(8)	No doctor's certificate in possession	Medical Certificate	1	Y

*Lower weights for license-related violations are only applicable to inspections occurring on or after 7/20/2012.

Table 4. CSMS Controlled Substances/Alcohol BASIC Violations[16]

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)
392.4(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
392.5(a)(3)[17]	Driver in possession of intoxicating beverage while on duty or driving	Alcohol Possession	3	Y
392.5(c)(2)	Violating OOS order pursuant to 392.5(a)/(b)	Alcohol Jumping OOS	10	Y

[16] Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICs.

[17] Violation added to the SMS as of July 1, 2013. Instances of this violation before, July 1, 2013 will not be included in the SMS.

Table 5. CSMS Vehicle Maintenance BASIC Violations [18]

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
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
392.9	Failing to secure load	General Securement	1	Y
392.9(a)	Failing to secure load	General Securement	1	Y
392.9(a)(1)	Failing to secure cargo	General Securement	1	Y
392.9(a)(2)	Failing to secure vehicle equipment	General Securement	1	Y
392.9(a)(3)	Driver's view/movement is obstructed	General Securement	1	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
392.62(c)(1)	Bus - baggage/freight restricts driver operation	General Securement	1	Y
392.62(c)(2)	Bus - Exit(s) obstructed by baggage/freight	General Securement	1	Y

[18] Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICs.

[19] 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.

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
392.62(c)(3)	Passengers not protected from falling baggage	General Securement	1	Y
392.63	Pushing/towing a loaded bus	Towing Loaded Bus	10	Y
393.9	Inoperative required lamps	Clearance Identification Lamps/Other	2	Y
393.9H	Inoperative head lamps	Lighting	6	Y
393.9T	Inoperative tail lamp	Lighting	6	Y
393.9TS	Inoperative turn signal	Lighting	6	Y
393.9(a)	Inoperative required lamps	Clearance Identification Lamps/Other	2	Y
393.11	No/defective lighting devices/reflective devices/projected	Reflective Sheeting	3	Y
393.11LR	Lower retroreflective sheeting/reflex reflectors - Trailer manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11N	No retroreflective sheeting/reflex reflectors - Trailer manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11RT	Retroreflective sheeting not affixed as required - Trailer manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.11S	Side retroreflective sheeting or reflex reflector requirements for vehicles manufactured after December 1993	Reflective Sheeting	3	Y
393.11TL	No retro reflective sheeting or reflex reflectors on mud flaps - Truck Tractor manufactured on or after 7/1/1997	Reflective Sheeting	3	Y
393.11TT	No retroreflective sheeting/reflex reflectors - Truck Tractor manufactured on or after 7/1/1997	Reflective Sheeting	3	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.11TU	No upper body corners retroreflective sheeting/reflex reflectors - Truck Tractor manufactured on or after 7/1/1997	Reflective Sheeting	3	Y
393.11UR	No upper reflex reflectors retroreflective sheeting/reflex reflectors - Trailer manufactured on or after 12/1/1993	Reflective Sheeting	3	Y
393.13(a)	Retroreflective tape not affixed as required for Trailers manufactured after 12/1/1993	Reflective Sheeting	3	Y
393.13(b)	No retroreflective sheeting or reflex reflective material as required for vehicles manufactured before December 1993	Reflective Sheeting	3	Y
393.13(c)(1)	No side retroreflective sheeting or reflex reflective material as required for vehicles manufactured before 12/1/1993	Reflective Sheeting	3	Y
393.13(c)(2)	No lower rear retroreflective sheeting or reflex reflective material as required for vehicles manufactured before 12/1/1993	Reflective Sheeting	3	Y
393.13(c)(3)	No upper rear retroreflective sheeting or reflex reflective material as required for vehicles manufactured before 12/1/1993	Reflective Sheeting	3	Y
393.13(d)(1)	Improper Side Placement of retroreflective sheeting or reflex reflective material as required for vehicles manufactured before December 1993	Reflective Sheeting	3	Y
393.13(d)(2)	Improper lower rear placement of retroreflective sheeting or reflex reflective material requirements for vehicles manufactured before 12/1/1993	Reflective Sheeting	3	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.13(d)(3)	Upper rear retroreflective sheeting or reflex reflective material as required for vehicles 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)	Noncompliance with headlamp requirements	Lighting	6	Y
393.24(b)	Noncompliant fog/driving lamps	Lighting	6	Y
393.24BR	Noncompliant 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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.42	No brakes as required	Brakes, All Others	4	Y
393.42A-BM	Brake - Missing required brake.	Brakes, All Others	4	Y
393.42A-BMAW	Brake - All wheels not equipped with brakes as required.	Brakes, All Others	4	Y
393.42A-BM-TSA	Brake - Missing on a trailer steering axle.	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
393.45PC	Brake Tubing and Hose Adequacy - Connections to Power Unit	Brakes, All Others	4	N
393.45UV	Brake Tubing and Hose Adequacy Under Vehicle	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
393.45B2PC	Brake Hose or Tubing Chafing and/or Kinking - Connection to Power Unit	Brakes, All Others	4	Y
393.45B2UV	Brake Hose or Tubing Chafing and/or Kinking Under Vehicle	Brakes, All Others	4	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
393.45DCPC	Brake Connections with Constrictions - Connection to Power Unit	Brakes, All Others	4	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.45DCUV	Brake Connections with Constrictions Under Vehicle	Brakes, All Others	4	N
393.45DLPC	Brake Connections with Leaks - Connection to Power Unit	Brakes, All Others	4	Y
393.45DLUV	Brake Connections with Leaks Under Vehicle	Brakes, All Others	4	Y
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
393.48A-BCM	Brakes - Hydraulic Brake Caliper movement exceeds 1/8" (0.125") (3.175 mm)	Brakes, All Others	4	N
393.48A-BMBC	Brakes - Missing or Broken Components including Pad Retaining Components	Brakes, All Others	4	N
393.48A-BRMMC	Brakes - Rotor (disc) metal-to-metal contact	Brakes, All Others	4	N
393.48A-BSRFS	Brakes - Severe rusting of brake rotor (disc)	Brakes, All Others	4	N
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.50(a)	Failing to have sufficient air/vacuum reserve	Brakes, All Others	4	N
393.50(b)	Failing to equip vehicle air brake system with adequate reserve capacity or reservoir	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
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 - truck tractor manufactured on or after 3/1/1997, single-unit CMV manufactured on or after 3/1/1998	Brakes, All Others	4	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/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)	No or Defective ABS Malfunction Indicator for towed vehicles on vehicles manufactured after February 2001	Brakes, All Others	4	N
393.55(e)	ABS - malfunctioning lamps towed CMV manufactured on or after 3/1/1998	Brakes, All Others	4	Y
393.60EWS	Windshield - Obstructed	Windshield/ Glass/ Markings	1	Y
393.60(b)	Windshields required	Windshield/ Glass/ Markings	1	Y
393.60(c)	Damaged or discolored windshield	Windshield/ Glass/ Markings	1	Y
393.60(d)	Glazing permits less than 70 percent of light	Windshield/ Glass/ Markings	1	Y
393.61	Inadequate or missing truck side windows	Windshield/ Glass/ Markings	1	Y
393.61(a)	Inadequate or missing truck side windows	Windshield/ Glass/ Markings	1	Y
393.62(a)	No or defective bus emergency exits - Bus manufactured on or after 9/1/1994	Windshield/ Glass/ Markings	1	Y
393.62(b)	No or defective bus emergency exits - Bus manufactured on or after 9/1/1973 but before 9/1/1994	Windshield/ Glass/ Markings	1	Y
393.62(c)	No or defective bus emergency exit windows - Bus manufactured before 9/1/1973	Windshield/ Glass/ Markings	1	Y
393.62(d)	No / defective Safety glass/push-out window - Bus manufactured before 9/1/1973	Windshield/ Glass/ Markings	1	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.62(e)	No or inadequate bus emergency exit marking - Bus manufactured on or after 9/1/1973	Windshield/ Glass/ Markings	1	Y
393.65	Fuel system requirements	Fuel Systems	1	N
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
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
393.70B1II	Defective / Improper fifth wheel assembly upper half	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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
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
393.75(e)	Tire — regrooved on front wheel of truck/truck-tractor	Tire vs. Load	3	Y
393.75(f)	Tire — exceeding weight rating of tire	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 underinflated	Tire vs. Load	3	Y
393.75(h)	Tire underinflated	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)(11)	Bus heater fuel tank location	Other Vehicle Defect	3	Y
393.77(b)(5)	Protection of operating controls from tampering	Other Vehicle Defect	3	Y
393.78	Windshield wipers inoperative/defective	Windshield/ Glass/ Markings	1	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.79	Defroster / Defogger inoperative	Windshield/ Glass/ Markings	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
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.86(a)(5)	Rear Impact Guard Cross-section vertical height insufficient for trailer manufactured on or after January 26, 1998	Cab, Body, Frame	2	N
393.86(b)(1)	Rear Impact Guards - motor vehicles manufactured after 12/31/52, see exceptions	Cab, Body, Frame	2	Y
393.87	Warning flag required on projecting load	Warning Flags	1	Y
393.87(a)	Warning flag required on projecting load	Warning Flags	1	Y
393.87(b)	Improper warning flag placement	Warning Flags	1	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 seatbelt	Cab, Body, Frame	2	Y
393.93(a)(3)	Seats not secured in conformance with FMVSS	Cab, Body, Frame	2	N
393.93(b)	Truck not equipped with seatbelt	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
393.100	Failure to prevent cargo shifting	General Securement	1	Y
393.100(a)	Failure to prevent cargo shifting	General Securement	1	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.100(b)	Leaking/spilling/blowing/falling cargo	Improper Load Securement	7	Y
393.100(c)	Failure to prevent cargo shifting	General Securement	1	Y
393.102(a)	Improper securement system (tiedown assemblies)	Tiedown	3	Y
393.102(a)(1)	Insufficient means to prevent forward movement	Failure to Prevent Movement	3	Y
393.102(a)(1)(i)	Insufficient means to prevent forward movement	Failure to Prevent Movement	3	Y
393.102(a)(1)(ii)	Insufficient means to prevent rearward movement	Failure to Prevent Movement	3	Y
393.102(a)(1)(iii)	Insufficient means to prevent lateral movement	Failure to Prevent Movement	3	Y
393.102(a)(2)	Tiedown assembly with inadequate working load limit	Tiedown	3	Y
393.102(b)	Insufficient means to prevent vertical movement	Failure to Prevent Movement	3	Y
393.102(c)	No equivalent means of securement	Improper Load Securement	7	Y
393.104(a)	Inadequate/damaged securement device/system	Securement Device	1	Y
393.104(b)	Damaged securement system/tiedowns	Securement Device	1	Y
393.104(c)	Damaged vehicle structures/anchor points	Securement Device	1	Y
393.104(d)	Damaged dunnage/bars/blocking-bracing	Securement Device	1	Y
393.104(f)(1)	Knotted tiedown	Tiedown	3	Y
393.104(f)(2)	Use of tiedown with improper repair.	Tiedown	3	Y
393.104(f)(3)	Loose/unfastened tiedown.	Tiedown	3	Y
393.104F4R	No edge protection for tiedowns	Tiedown	3	Y
393.106(a)	No/improper front end structure/headerboard	Securement Device	1	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.106(b)	Cargo not immobilized or secured	Failure to Prevent Movement	3	Y
393.106(c)(1)	No means to prevent cargo from rolling	Failure to Prevent Movement	3	Y
393.106(c)(2)	Cargo without direct contact/prevention from shifting	Failure to Prevent Movement	3	Y
393.106(d)	Insufficient aggregate working load limit	Tiedown	3	Y
393.110	Failing to meet minimum tiedown requirements	General Securement	1	Y
393.110(b)	Insufficient tiedowns; without headerboard/blocking	Tiedown	3	Y
393.110(c)	Insufficient tiedowns; with headerboard/blocking	Tiedown	3	Y
393.110(d)	Large/odd-shaped cargo not adequately secured	Failure to Prevent Movement	3	Y
393.112	Tiedown not adjustable by driver	Securement Device	1	Y
393.114	No/improper front end structure	General Securement	1	Y
393.114(b)(1)	Insufficient height for front-end structure	Securement Device	1	Y
393.114(b)(2)	Insufficient width for front-end structure	Securement Device	1	Y
393.114(d)	Front-end structure with large opening(s)	Securement Device	1	Y
393.116	No/improper securement of logs	General Securement	1	Y
393.116(d)(1)	Short, over 1/3 length past structure	Improper Load Securement	7	Y
393.116(d)(2)	Short, insufficient/no tiedowns	Improper Load Securement	7	Y
393.116(d)(3)	Short, tiedowns improperly positioned	Improper Load Securement	7	Y
393.116(d)(4)	Short, no center stakes/high log not secured	Improper Load Securement	7	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.116(e)	Short, length; improper securement	Improper Load Securement	7	Y
393.118	No/improper lumber/building materials. securement	General Securement	1	Y
393.118(b)	Improper placement of bundles	Improper Load Securement	7	Y
393.118(d)	Insufficient protection against lateral movement	Failure to Prevent Movement	3	Y
393.118(d)(3)	Insufficient/improper arrangement of tiedowns	Tiedown	3	Y
393.120	No/improper securement of metal coils	General Securement	1	Y
393.120(b)(1)	Coil/vertical improper securement	Improper Load Securement	7	Y
393.120(b)(2)	Coils, rows, eyes vertical - improper securement	Improper Load Securement	7	Y
393.120(c)(1)	Coil/eye crosswise improper securement	Improper Load Securement	7	Y
393.120(c)(2)	X-pattern on coil(s) with eyes crosswise	Improper Load Securement	7	Y
393.120(d)(1)	Coil with eye lengthwise-improper securement	Improper Load Securement	7	Y
393.120(d)(4)	Coils, rows, eyes length - improper securement.	Improper Load Securement	7	Y
393.120(e)	No protection against shifting/tipping	Failure to Prevent Movement	3	Y
393.122	No/improper securement of paper rolls	General Securement	1	Y
393.122(b)	Rolls vertical - improper securement	Improper Load Securement	7	Y
393.122(c)	Rolls vertical /split - improper securement	Improper Load Securement	7	Y
393.122(d)	Rolls vertical /stacked - improper securement	Improper Load Securement	7	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.122(e)	Rolls crosswise - improper securement	Improper Load Securement	7	Y
393.122(f)	Rolls crosswise/stacked load - improperly secured	Improper Load Securement	7	Y
393.122(g)	Rolls length - improper securement	Improper Load Securement	7	Y
393.122(h)	Rolls lengthwise/stacked - improper securement	Improper Load Securement	7	Y
393.122(i)	Improper securement - rolls on flatbed/curtain-sided vehicle	Improper Load Securement	7	Y
393.124	No/improper securement of concrete pipe	General Securement	1	Y
393.124(b)	Insufficient working load limit - concrete pipes	Tiedown	3	Y
393.124(c)	Improper blocking of concrete pipe	Improper Load Securement	7	Y
393.124(d)	Improper arrangement of concrete pipe	Improper Load Securement	7	Y
393.124(e)	Improper securement, up to 45 in. diameter	Improper Load Securement	7	Y
393.124(f)	Improper securement, greater than 45 inch diameter	Improper Load Securement	7	Y
393.126	Fail to ensure intermodal container secured	General Securement	1	Y
393.126(b)	Damaged/missing tiedown/securement device	Securement Device	1	Y
393.126(c)(1)	Lower corners of container not on vehicle/structure	Securement Device	1	Y
393.126(c)(2)	All corners of chassis not secured	Improper Load Securement	7	Y
393.126(c)(3)	Front and rear of container not secured independently	Improper Load Securement	7	Y
393.126(d)(1)	Empty container not properly positioned	Improper Load Securement	7	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.126(d)(2)	Empty container, more than 5 foot overhang	Improper Load Securement	7	Y
393.126(d)(4)	Empty container - not properly secured	Improper Load Securement	7	Y
393.128	No/improper securement of vehicles	General Securement	1	Y
393.128(b)(1)	Vehicle not secured - front and rear	Improper Load Securement	7	Y
393.128(b)(2)	Tiedown(s) not affixed to mounting points.	Improper Load Securement	7	Y
393.128(b)(3)	Tiedown(s) not over/around wheels.	Improper Load Securement	7	Y
393.130	No/improper heavy vehicle/machinery securement	General Securement	1	Y
393.130(b)	Item not properly prepared for transport	Improper Load Securement	7	Y
393.130(c)	Improper restraint/securement of item	Improper Load Securement	7	Y
393.132	No/improper securement of crushed vehicles	General Securement	1	Y
393.132(b)	Prohibited use of synthetic webbing.	Securement Device	1	Y
393.132(c)	Insufficient tiedowns per stack cars	Tiedown	3	Y
393.132(c)(5)	Insufficient means to retain loose parts	Improper Load Securement	7	Y
393.134	No/improper securement of roll/hook container	General Securement	1	Y
393.134(b)(1)	No blocking against forward movement	Failure to Prevent Movement	3	Y
393.134(b)(2)	Container not secured to front of vehicle	Improper Load Securement	7	Y
393.134(b)(3)	Rear of container not properly secured	Improper Load Securement	7	Y
393.136	No/improper securement of large boulders	General Securement	1	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
393.136(b)	Improper placement/positioning of boulder	Improper Load Securement	7	Y
393.136(c)(1)	Boulder not secured with chain	Improper Load Securement	7	Y
393.136(d)	Improper securement - cubic boulder	Improper Load Securement	7	Y
393.136(e)	Improper securement - non-cubic boulder with stable base	Improper Load Securement	7	Y
393.136(f)	Improper securement - non-cubic boulder with unstable base	Improper Load Securement	7	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
393.203(e)	Cab front bumper missing/ unsecured/protruding	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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
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, or 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
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 system pressure loss	Brakes, All Others	4	N
396.3A1DSCB	Center Bearing (Carrier Bearing) Cracked / Loose / Broken / Missing	Other Vehicle Defect	3	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
396.3A1DSDT	Drive Shaft Tube Cracked or Twisted	Other Vehicle Defect	3	Y
396.3A1DSUJ	Universal Joint Loose / Broken / Missing Component	Other Vehicle Defect	3	Y
396.3A1DSYE	Drive Shaft Yoke Ends Cracked / Loose / Broken / Missing	Other Vehicle Defect	3	Y
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
396.5A-HNLIW	Hubs - No visible or measurable lubricant showing in the hub - inner wheel	Wheels, Studs, Clamps, Etc.	2	N
396.5A-HNLOW	Hubs - No visible or measurable lubricant showing in the hub - outer wheel	Wheels, Studs, Clamps, Etc.	2	Y
396.5(b)	Oil and/or grease leak	Other Vehicle Defect	3	N
396.5B-HLIW	Hubs - Oil and/or Grease Leaking from hub - inner wheel	Wheels, Studs, Clamps, Etc.	2	N
396.5B-HLOW	Hubs - oil and/or Grease Leaking from hub - outer wheel	Wheels, Studs, Clamps, Etc.	2	Y
396.5B-HWSLIW	Hubs - Wheel seal leaking - inner wheel	Wheels, Studs, Clamps, Etc.	2	N
396.5B-HWSLOW	Hubs - Wheel seal leaking - outer wheel	Wheels, Studs, Clamps, Etc.	2	Y
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[19]	Violation in the DSMS (Y/N)
396.17(c)	Operating a CMV without periodic inspection	Inspection Reports	4	N
398.5	Operating a motor vehicle not in compliance with parts and accessories regulations - migrant workers	Other Vehicle Defect	3	Y
398.7	Failure to inspect or maintain motor vehicle to ensure safe and proper operating condition-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 HM Compliance BASIC Violations[20]

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	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(f)	Transporting Hazardous Materials not in accordance with this part	Package Integrity - HM	8	Y
171.2(g)	Cargo tank does not comply with HM Regulations	Package Integrity - HM	8	N
171.2(k)	Representing vehicle with HM, none present	Markings - HM	5	Y
172.200(a)	No shipping paper provided by offeror	Documentation - HM	3	N
172.201(a)(1)	Hazardous Materials not distinguished from non-Hazardous Materials	Documentation - HM	3	N
172.201(a)(2)	Hazardous Materials description not printed legibly in English	Documentation - HM	3	N
172.201(a)(3)	Hazardous Materials description contains abbreviation or code	Documentation - HM	3	N
172.201(a)(4)	Additional information not after Hazardous Materials basic description	Documentation - HM	3	N

[20] Violation severity weights reflect the relative importance of each violation within each BASIC. These weights *cannot* be compared or added meaningfully across the BASICs.

[21] 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.

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
172.201(c)	Failure to list page number of pages	Documentation - HM	3	N
172.201(d)	Emergency Response phone number not listed	Documentation - HM	3	N
172.202(a)(1)	Improper shipping name	Documentation - HM	3	N
172.202(a)(2)	Improper hazard class	Documentation - HM	3	N
172.202(a)(3)	Wrong or no ID number	Documentation - HM	3	N
172.202(a)(4)	No packing group listed	Documentation - HM	3	N
172.202(a)(5)	Total quantity not listed	Documentation - HM	3	N
172.202(b)	Basic description not in proper sequence	Documentation - HM	3	N
172.202(c)	Total quantity improper location	Documentation - HM	3	N
172.202(e)	Non Hazardous Material entered with class or ID#	Documentation - HM	3	N
172.203(a)	Exemption number not listed	Documentation - HM	3	N
172.203(b)	Limited quantity not shown	Documentation - HM	3	N
172.203(c)(1)	Hazardous substance entry missing	Documentation - HM	3	N
172.203(c)(2)	RQ not on shipping paper	Documentation - HM	3	N
172.203(d)(1)	Radionuclide name not on shipping paper	Documentation - HM	3	N
172.203(d)(10)	No indication for Highway Route Controlled Quantity of Class 7 "HRCQ" on shipping paper	Documentation - HM	3	N
172.203(d)(2)	No RAM physical or chemical form	Documentation - HM	3	N
172.203(d)(3)	No RAM activity	Documentation - HM	3	N
172.203(d)(4)	No RAM label category	Documentation - HM	3	N
172.203(d)(5)	No RAM transport index	Documentation - HM	3	N
172.203(d)(6)	No fissile radioactive entry	Documentation - HM	3	N
172.203(d)(7)	No DOE/NRC package approval notation	Documentation - HM	3	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
172.203(d)(8)	Export package or foreign made package not marked with IAEA Certificate	Documentation - HM	3	N
172.203(d)(9)	No Exclusive Use notation	Documentation - HM	3	N
172.203(e)	No empty packaging noted	Documentation - HM	3	N
172.203(h)(1)	No qt/nqt for anhydrous ammonia	Documentation - HM	3	N
172.203(h)(2)	No notation for QT / NQT for Liquefied Petroleum Gas	Documentation - HM	3	N
172.203(k)	No technical name for nos entry	Documentation - HM	3	N
172.203(m)	No Poison Inhalation Hazard and / or Hazard Zone	Documentation - HM	3	N
172.203(n)	No "hot" on shipping paper	Documentation - HM	3	N
172.203(o)	No temperature controls noted for Class 4.1 or Class 5.2	Documentation - HM	3	N
172.205	Hazardous waste manifest not as required	Documentation - HM	3	N
172.300	Failing to comply with marking requirements	Markings - HM	5	N
172.301	Non-bulk package marking - general	Markings - HM	5	N
172.301(a)	No ID number on side/ends of non-bulk package - large quantity of single HM	Markings - HM	5	N
172.301(a)(1)	No proper shipping name and/or ID# marking on non-bulk	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	Marking requirements bulk packagings	Markings - HM	5	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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
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
172.308(a)	Package marked with unauthorized abbreviation	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)(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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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	No "hot" marking for bulk elevated temperature	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(a)	Portable tank not marked with proper shipping name or ID#	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	No ID number displayed on a cargo tank	Markings - HM	5	N
172.328(a)	Shipper failed to provide or affix ID number for cargo tank	Markings - HM	5	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
172.331	Markings for other bulk packages	Markings - HM	5	N
172.332	Required ID markings displayed	Markings - HM	5	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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	Labeling requirements	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	Failing to affix additional labels when required	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
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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
172.502(a)(1)	Prohibited placarding	Markings - HM	5	N
172.502(a)(2)	Sign or device could be confused with HM placard	Markings - HM	5	N
172.504	Placards not in table 1 or 2	Markings - HM	5	N
172.504(a)	Vehicle not placarded as required	Markings - HM	5	Y
172.504(b)	Dangerous placard violation	Markings - HM	5	N
172.505(a)	No placard for poison inhalation hazard	Markings - HM	5	N
172.505(b)	Not placarded for RAM and Corrosive when required	Markings - HM	5	N
172.505(c)	Placard for subsidiary dangerous when wet	Markings - HM	5	N
172.506(a)	Failed to provide placards shipper	Markings - HM	5	N
172.506(a)(1)	Placards not affixed to vehicle	Markings - HM	5	Y
172.507	Not placarded for RAM highway route controlled quantity	Markings - HM	5	N
172.512(a)	Freight container not placarded	Markings - HM	5	N
172.514(a)	Bulk package offered without placard	Markings - HM	5	N
172.514(b)	Bulk package with residue of HM not properly placarded	Markings - HM	5	N
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
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
172.519	Placard does not meet specifications	Markings - HM	5	N
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
172.604(a)	Failing to provide an emergency response phone number	Documentation - HM	3	N
173.24(a)(c)	Non-bulk package mixed contents requirements	Cargo Protection - HM	4	N
173.24(b)	Failed to meet general package requirements	Load Securement - HM	10	N
173.24((b))(1)	Release of HM from package	Load Securement - HM	10	N
173.24(b)(a)	Bulk package outage or filling limit requirements	Load Securement - HM	10	N
173.24(b)(d)(2)	Exceed max weight of rating on spec plate	Load Securement - HM	10	N
173.24(c)	Unauthorized packaging	Load Securement - HM	10	N
173.24(f)(1)	Closures for packagings must not be open or leaking	Load Securement - HM	10	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
173.25(a)	Failed to meet overpack conditions	Markings - HM	5	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
173.32(h)(3)	IM101/102 bottom outlets prohibited	Fire Hazard - HM	6	N
173.32(h)(3)(i)	IM101/102 bottom outlets authorized	Fire Hazard - HM	6	N
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	4	N
173.35(a)	Intermediate bulk container requirements	Package Integrity - HM	8	Y
173.35(d)	Liquid filled IBC with Ullage over 98%	Load Securement - HM	10	N
173.35(f)(2)	Intermediate bulk container (IBC) not secured to or within vehicle	Load Securement - HM	10	Y
173.40	General packages requirements for poisons in cylinders	HM Other	2	N
173.54	Transporting or Offering for Transportation forbidden explosives	Fire Hazard - HM	6	N
173.60	General packaging requirements for explosives	HM Other	2	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
173.315(a)	Cargo or portable tank class 2 exceeds maximum filling density	Load Securement - HM	10	N
173.315(j)(3)	Residential gas tank not secure in transport	Fire Hazard - HM	6	Y
173.318(b)(10)	Fail to mark inlet, outlet, pressure relief device, or pressure control valve of cryogenic tanks	Package Integrity - HM	8	N
173.318(g)	No or Improper One Way Travel Time (OWTT) marking on cryogenic cargo tank	Markings - HM	5	N
173.412	General Type A package failing to meet additional design requirements	Package Integrity - HM	8	N
173.421(a)	Transporting limited quantity-radioactive material exceeds 0.5 millirem/hour	Cargo Protection - HM	4	N
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(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
173.431	Exceeded activity limits Type A or Type B package	Load Securement - HM	10	N
173.441(a)	Exceeding radiation level limitations allowed for transport	Cargo Protection - HM	4	N
173.441(b)	Exceeding radiation level allowed for transport of RAM under exclusive use provisions	Load Securement - HM	10	N
173.442(b)(1)	External temperature of package exceeds 50 degrees Celcius (122 degrees F)	Cargo Protection - HM	4	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
173.442(b)(2)	External temperature of package exceeds 85 degrees C (185 degrees F) in an exclusive use shipment	Cargo Protection - HM	4	N
173.443(a)	Radioactive contamination exceeds limits	Load Securement - HM	10	N
173.447	RAM transport storage violation	Cargo Protection - HM	4	N
173.448	General RAM transport requirements	Cargo Protection - HM	4	N
177.801	Accepting/transporting HM not prepared properly	HM Other	2	N
177.804	Failure to comply with FMCSR 49 CFR part 383 and 49 CFR parts 390 through 397	HM Other	2	Y
177.817	Shipping papers required	Documentation - HM	3	N
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	Load securement of different HM packages	Fire Hazard - HM	6	N
177.834(a)	Package not secure in vehicle	Load Securement - HM	10	Y
177.834(b)	Package not loaded according to orientation marks	Cargo Protection - HM	4	N
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 - HM	10	Y
177.834(i)	Attendance of cargo tank- (load or unload)	Cargo Protection - HM	4	Y

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
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	Improper transportation of explosives (Class 1)	Fire Hazard - HM	6	Y
177.835(a)	Loading or Unloading Class 1 hazardous materials 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	Improper transporting of Class 3 hazardous materials	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	N
177.839	Improper transportation of Class 8 hazardous materials	Cargo Protection - HM	4	Y
177.840	Improper transportation of Class 2 hazardous materials	Fire Hazard - HM	6	N
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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
177.841	Improper transportation of Division 6.1 or Division 2.3 hazardous materials	Fire Hazard - HM	6	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
177.870(b)	Transporting unauthorized HM in a passenger-carrying vehicle	Load Securement - HM	10	Y
177.870(c)	Prohibited Hazardous Materials on passenger carrying vehicle	Load Securement - HM	10	Y
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
178.255-14	DOT 60 ID plate	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
178.270-1	IM101/102 general design	Package Integrity - HM	8	N
178.270-11(d)(1)	IM101/102 pressure relief	Package Integrity - HM	8	N
178.270-14	IM101/102 spec plate	Package Integrity - HM	8	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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
178.336-1	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
178.336-9(a)	Safety relief devices MC330	Package Integrity - HM	8	N
178.336-9(c)	Marking of inlets/outlets MC330	Package Integrity - HM	8	N
178.337-10(a)	Protection of fittings MC331	Package Integrity - HM	8	N
178.337-11(a)(2)	Internal valve MC331	Package Integrity - HM	8	N
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
178.337-8(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	Pressure relief devices MC331	Package Integrity - HM	8	N
178.337-9(c)	Marking inlets/outlets MC331	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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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
178.338-6	Manhole MC338	Package Integrity - HM	8	N
178.338-8	Pressure relief devices MC338	Package Integrity - HM	8	N
178.340-10(b)	MC306/307/312 metal certification plate missing	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
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
178.341-3(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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
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
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
178.345-10	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
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
178.345-5(e)	DOT406/407/412 manhole marking	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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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
178.703(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
179.300-12	DOT106/110aw protection of fittings	Package Integrity - HM	8	N
179.300-13	DOT106/110aw venting and valves	Package Integrity - HM	8	N
179.300-15	DOT106/110aw safety relief devices	Package Integrity - HM	8	N
179.300-18	DOT106/110aw stamping of tanks	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
180.352(d)	IBC retest date marking	Package Testing - HM	7	N
180.352(e)	IBC retest date marking	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

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/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	Periodic testing of portable tanks	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	N
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
397.5(a)	Unattended explosives 1.1/1.2/1.3	Fire Hazard - HM	6	Y
397.5(c)	Unattended hazmat vehicle	Cargo Protection - HM	4	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
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	N

Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight[21]	Violation in the DSMS (Y/N)
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

7. Appendix B

The Federal Motor Carrier Safety Administration (FMCSA) and its stakeholders share a commitment to safety, which has been underscored by strong participation in FMCSA's listening sessions on CSA resulting in constructive input from organizations, enforcement personnel, industry, and motor carrier safety experts. During the Operational Model Test (Op-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 made changes to enhance the SMS methodology. FMCSA has continued to make changes to the SMS methodology as part of continuous improvement process and as part of using the most current set of violations being recorded from inspections. The following provides a history of the SMS methodology changes.

CSMS Methodology Changes from Version 1.2 to 2.0 (Implemented August 2010)

1. Modifications to the measure of exposure for the Unsafe Driving Behavior Analysis and Safety Improvement Category (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; and
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 Received*: The sole use of number of Power Units (PUs) owned by a motor carrier underestimates the on-road exposure for motor carriers that more extensively utilize their PUs. The use of Vehicle Miles Traveled (VMT) should be considered as a means of assessing the Unsafe Driving BASIC and Crash Indicator that currently rely on PUs.
    b. *Analysis Conducted*: FMCSA has conducted analysis and the results show that measuring exposure solely by PUs may overly identify high-utilization carriers (i.e., carriers with above-average VMT per PU) with high percentiles (which indicators poor performance), while the sole use of VMT overly identifies low-utilization carriers with high percentiles. 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 VMT information from other sources.

d. Implementation Approach:

i. Segmentation –The motor 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, 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 CSMS 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*: Op-Model Test results and law enforcement experts indicated that violations within this BASIC are more likely to be found during an inspection rather than be the cause for an inspection and therefore measuring exposure in this BASIC by number of PUs does not accurately reflect motor 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 the number of relevant inspections instead of the number of PUs as in the prior version of the CSMS. 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:

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

Note: Further information on time and severity weights is available in this CSMS 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 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 from FMCSA's field staff, including enforcement personnel and CSA development team members, examined severity weighting and submitted recommendations for changes to the Agency.
c. *Solution*: This version of CSMS includes updated violations and severity weightings.
d. *Implementation Approach*: Appendix A in the CSMS 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 Op-Model Test have demonstrated the difficulties of enforcing vehicle size and weight violations through CSA 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 a more refined collection of detailed size and weight violation data and warnings 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.

CSMS Methodology Changes from Version 2.0 to 2.1 (Implemented December 2010)

1. Recalibration of the Cargo-Related BASIC severity weights of roadside violations based on subject matter expert review; and
2. A new chapter that provides CSMS example calculations.

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

1. **Recalibration of the Cargo-Related BASIC severity weights of roadside violations based on subject matter expert review**
    a. *Feedback Received*: The motor carrier industry as well as law enforcement personnel suggested that the severity weight of all the load securement violations in the Cargo-Related BASIC that were set to the maximum of 10 were too high.
    b. *Analysis Conducted*: Subject matter experts from FMCSA's field staff and State Partners, including enforcement personnel and CSA development team members, examined severity weighting and submitted recommendations for changes to the Agency.
    c. *Solution*: This version of CMS includes updated violations and severity weightings in the Cargo-Related BASIC.
    d. *Implementation Approach*: Table 6 in Appendix A of the CSMS Methodology contains a complete listing of violations and severity weights in the Cargo-Related BASIC.

2. **A new chapter that provides CSMS example calculations**
    a. *Feedback Received*: The motor carrier industry as well as law enforcement personnel suggested that the inclusion of example measurement calculations would help them understand how the CSMS results were derived.
    b. *Analysis Conducted*: Analysis confirmed that example calculations will aid users in learning the details behind the CSMS.
    c. *Solution*: This version of SMS includes a chapter detailing example measurement calculations.
    d. *Implementation Approach*: Section 4 of the CSMS Methodology contains the example calculations.

CSMS Methodology Changes from Version 2.1 to 2. 2 (Implemented January 2012)

1. Adding four texting and cell phone use violations in the Unsafe Driving BASIC as shown, and

Table 1. Added CSMS Unsafe Driving BASIC Violations

BASIC	Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight
Unsafe Driving	177.804(b)	Failure to comply with 49 CFR 392.80 - Texting while Oper a CMV - Placardable HM	Texting	10
Unsafe Driving	177.804(c)	Fail to comply with 392.82 - Using Mobile Phone while Oper a CMV - HM	Phone Call	10
Unsafe Driving	392.80(a)	Driving a commercial motor vehicle while Texting	Texting	10
Unsafe Driving	392.82(a)(1)	Using a hand-held mobile telephone while operating a CMV	Phone Call	10
Unsafe Driving	392.82(a)(2)	Allowing or requiring driver to use a hand-held mobile tel while operating a CMV	Phone Call	10

2. Breaking out six current Vehicle Maintenance violations into 22 that provide more descriptive and detailed information about compliance with existing brake, wheel, and coupling regulations. This change will ensure that CSMS remains aligned with improvements recently made to roadside data collection systems. Those improvements are the results of a joint FMCSA and Commercial Vehicle Safety Alliance effort to increase data uniformity through improved processes and tools. This change will help to clarify who the responsible party is for the violations, either the motor carrier or the Intermodal Equipment Provider.

The changes are reflected in the violation tables in Appendix A.

CSMS Methodology Changes from Version 2.2 to 2.2.1 (Implemented August 2012)

Refinements to driver disqualification violations in the Driver Fitness BASIC.

a. *Feedback Received*: Stakeholder feedback that indicated that some driver disqualification violations used in SMS are a result of license suspensions for non-safety related reasons, such as failing to pay a parking ticket. Also, feedback from industry indicated that motor carriers often cannot detect driver suspensions when doing required background or annual checks of a driver's driving record in cases where the states outside of the driver's license-issuing State had disqualified the driver.
b. *Solution*: The refinement to the roadside inspection reporting systems will collect more precise information about drivers operating CMVs while disqualified to improve the Agency's ability to identify non-compliant and unsafe motor carriers. Specifically, the enhancement will allow roadside inspectors to classify disqualified driver violations into different categories depending on whether the driver's license is:

    i. Suspended by the driver's license-issuing State or another State; and
    ii. Suspended for a safety-related (e.g., speeding or false logs violations) or non-safety related (e.g., failure to pay parking tickets) reason.

This additional information will strengthen the effectiveness and accuracy of the Driver Fitness BASIC. More importantly, it will hold motor carriers accountable for using a driver with a license that has been suspended for safety-related reasons by the driver's license-issuing State.

Table 2 below shows the definitions and severity weights assigned to the updated violations in roadside inspection systems effective July 20, 2012. To ensure uniform implementation, these changes are not applied retroactively.

Table 2. Added CSMS Driver Fitness BASIC Violations

BASIC	Section	Violation Description Shown on Driver/Vehicle Examination Report Given to CMV Driver after Roadside Inspection	Violation Group Description	Violation Severity Weight
Driver Fitness	383.51A-SIN	Driving a CMV while CDL is suspended for a safety-related or unknown reason and in the state of driver's license issuance.	License-related: High	8
Driver Fitness	383.51A-SOUT	Driving a CMV while CDL is suspended for safety-related or unknown reason and outside the driver's license state of issuance.	License-related: Medium	5
Driver Fitness	383.51A-NSIN	Driving a CMV while CDL is suspended for a non-safety-related reason and in the state of driver's license issuance.	License-related: Medium	5
Driver Fitness	383.51A-NSOUT	Driving a CMV while CDL is suspended for a non-safety-related reason and outside the state of driver's license issuance.	License-related: Low	1
Driver Fitness	391.15A-SIN	Driving a CMV while disqualified. Suspended for safety-related or unknown reason and in the state of driver’s license issuance.	License-related: High	8
Driver Fitness	391.15A-SOUT	Driving a CMV while disqualified. Suspended for a safety-related or unknown reason and outside the driver's license state of issuance.	License-related: Medium	5
Driver Fitness	391.15A-NSIN	Driving a CMV while disqualified. Suspended for non-safety-related reason and in the state of driver's license issuance.	License-related: Medium	5
Driver Fitness	391.15A-NSOUT	Driving a CMV while disqualified. Suspended for a non-safety-related reason and outside the state of driver's license issuance.	License-related: Low	1

CSMS Methodology Changes from Version 2.2 to 3.0 (Implemented December 2012)

1. Moved load securement violations into the Vehicle Maintenance BASIC
2. Changed the Cargo-Related BASIC to the HM Compliance BASIC
3. Removed vehicle violations from driver-only inspections and driver violations from vehicle-only inspections
4. Better aligned the CSMS with IEP regulations
5. Aligned EOBRs to paper equivalent
6. Modified the treatment of 1-5 speeding violations
7. Modified the treatment of generic speeding violations
8. Changed the name of the Fatigued Driving (HOS) BASIC to the HOS Compliance BASIC

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

1. Moved load securement violations into the Vehicle Maintenance BASIC

a. *Feedback Received*: Industry and enforcement stakeholders have pointed out that carriers that predominantly haul open trailers (e.g., flatbeds) have excessively high Cargo-Related BASIC percentiles, as load securement issues for these types of carriers are more apparent.

b. *Analysis Conducted*: The analysis showed that this approach (1) identifies carriers with a higher crash risk for CSA interventions and (2) effectively addresses the bias associated with carriers that haul open trailers while still holding all carriers accountable for all cargo securement violations.

c. *Solution*: FMCSA moved the cargo/load securement violations from the Cargo-Related BASIC to the Vehicle Maintenance BASIC.

2. Changed the Cargo-Related BASIC to the Hazardous Materials (HM) Compliance BASIC to better identify HM-related safety problems.

a. *Feedback Received*: Stakeholders have asked FMCSA to review the SMS methodology to ensure HM safety problems are adequately identified and addressed. The specific concern was that because the Cargo-Related BASIC included HM violations and load securement violations, some HM safety issues could have been masked.

b. *Analysis Conducted*: FMCSA consulted subject matter experts to identify and apply severity weightings to the 239 HM violations contained in the Cargo-Related BASIC and 112 additional HM safety-based violations attributable to the motor carrier. The analysis found that the new BASIC identified carriers

with more future violations and with higher violation rates than the current Cargo-Related BASIC.

c. *Solution*: The Agency created a new HM Compliance BASIC that includes only HM-related violations from inspections where placardable quantities of HM were being transported.

3. Removed vehicle violations from driver-only inspections and driver violations from vehicle-only inspections

a. *Feedback Received*: The SMS version 2.2 and earlier included driver-only (Level 3) inspections in the Vehicle Maintenance BASIC only when vehicle violations were noted on the inspection. Industry and enforcement were concerned that many vehicle violations fall outside the scope of the inspection and could bias the Vehicle Maintenance BASIC data.

b. *Analysis Conducted*: Approximately 139,000 violations, or 2.6% of all vehicle violations used in the SMS, are vehicle violations cited during a driver-only inspection. While very few driver violations are ever documented in vehicle-only inspections, this change will also be made to ensure that only violations within the scope of a particular type of inspection are included in the SMS.

c. *Solution*: SMS removes vehicle violations found during driver-only inspections and driver violations found during vehicle-only inspections to align the SMS with existing CVSA policies regarding inspection levels.

4. Better aligned the SMS with IEP regulations

a. *Feedback Received*: Violations that should be found during the pre-trip inspection are the responsibility of the motor carrier and thus should be applied in the SMS.

b. *Analysis Conducted*: FMCSA conducted a collaborative effort between law enforcement officials and industry to identify the violations that can be found during a pre-trip inspection of an IEP trailer.

c. *Solution*: Violations that could be found from a carrier's driver performing a pre-trip inspection are now applied to the motor carrier SMS results.

5. Aligned EOBRs to paper equivalent

a. *Feedback Received*: In the previous SMS, Hours-of-Service form and manner violations have different weights for paper (weight of 2) and electronic form and manner logbook (weight of 1) violations.

b. *Solution*: Aligned EOBR violation to their paper equivalent by:

(1) Reducing the severity weight of the 'Other form and manner' group from 2 to 1, to match the EOBR equivalent violations

(2) Moving onboard recording form and manner violations to the 'Other form and manner' group with a weight of 1, and
(3) Increasing the severity of onboard recording device failures to a weight of 5 to match the 'Incomplete/Wrong log' paper equivalent.

A table of these changes in presented below.

Table 3. Modified EOBR/Form and Manner Violation Group and Severity Weights

BASIC	Section	Violation Description	Old Violation Group	SMS 2.2 Severity Weight	New Violation Group	SMS 3.0 Severity Weight
HOS	395.8	Log violation (general/form and manner)	Other Log/ Form & Manner	2	Other Log/ Form & Manner	1
HOS	395.15(b)	Onboard recording device information requirements not met	EOBR Related	1	Incomplete/ Wrong Log	5
HOS	395.15(c)	Onboard recording device improper form and manner	EOBR Related	1	Other Log/ Form & Manner	1
HOS	395.15(f)	Onboard recording device failure and driver failure to reconstruct duty status	EOBR Related	1	Incomplete/ Wrong Log	5
HOS	395.15(g)	On-board recording device information not available	EOBR Related	1	EOBR Related	1
HOS	395.15(i)(5)	Onboard recording device does not display required information	EOBR Related	1	Other Log/ Form & Manner	1

6. Modified the treatment of 1-5 speeding violations

a. *Feedback received*: In version 2.2 and earlier of SMS, the Unsafe Driving BASIC used all speeding violations regardless of the range exceeding the speed limit even violations of 1 to 5 mph over the speed limit. Speedometer regulations (49 CFR 393.82), however, only require accuracy within 5 mph.
b. *Solution*: To better align SMS with the speedometer regulations, commercial motor vehicle speeding violations in the 1 to 5 mph over the speed limit range (392.2-SLLS1) were removed from the SMS, regardless of when the inspection occurred. This change applies to the prior 24 months of data used by the SMS and all the SMS data moving forward.

7. Modified the treatment of generic speeding violations

a. *Feedback received*: In version 2.2 and earlier of SMS, the Unsafe Driving BASIC applied a severity weight of 5 to general speeding violations (i.e., 392.2S) that did not specify the range exceeding the speed limit. By January 1, 2011 many of the inspectors had access to updated roadside inspection software, ASPEN, to record violations broken out by mph categories above the speed limit. It was possible to have a higher severity weight assigned to the generic speeding violation of 5 for 392.2S, than if the inspector denoted a more specified speed violation such as 392.2-SLLS2 (speeding 6-10 miles per hour over the speed limit) with a severity weight of 4.
b. *Solution:* Therefore, the severity weight of all generic (392.2S) speeding violations from on or after January 1, 2011 has been decreased from 5 to 1. Generic speeding violations from before January 1, 2011 will still be treated with a weight of 5.

8. Changed the name of the Fatigued Driving (HOS) BASIC to the HOS Compliance BASIC

a. *Feedback received*: Version 2.2 and earlier of SMS had a Fatigued Driving (HOS) BASIC. This BASIC included violations such as "form and manner" and "logbook not current" that, by themselves, do not necessarily indicate fatigued driving or driving in excess of allowable hours.
b. *Solution:* The BASIC name was changed to Hours-of-Service (HOS) Compliance BASIC to more accurately indicate what behavior is being measured.

CSMS Methodology *Document Changes ONLY* (Updated February 2013)

1. Modified language to clarify what type of inspections are used in the calculation of each BASIC.
2. Added notation to violations clarifying when lower severity weight went into effect.
3. Fixed pagination between sections.

CSMS Methodology *Document Changes* (Updated April 2013)

Ten obsolete violations were removed as the referencing regulations no longer exist. Twelve violation descriptions were modified to more accurately reflect the safety problem. See the tab, "Violation Changes_04_2013" in Appendix A (http://csa.fmcsa.dot.gov/documents/SMS_AppendixA_ViolationList.xlsx) , for the list of removed and modified violations.

CSMS Methodology Changes from Version 3.0 to 3.0.1 (Implemented August 2013)

FMCSA has added two new violations to the SMS. One of the violations is based on the new Hours-of-Service (HOS) regulations and the other is based on a more detailed description of existing controlled substances and alcohol regulations. Both of these violations were implemented on July 1, 2013 and therefore will count in the SMS as of this date.

The table below includes descriptions of the new violations, the BASICs they relate to, and how they are weighted in the SMS.

BASIC Violations Added to the SMS

BASIC	Violation Code	Description	Severity Weight	Violation Group	Driver-Related (Y/N)
HOS Compliance	395.3(a)(3)(ii)	Driving beyond 8-hour limit since the end of the last off-duty or sleeper period of at least 30 minutes	7	Hours	Y
Controlled Substances/ Alcohol	392.5(a)(3)	Driver in possession of intoxicating beverage while on duty or driving	3	Alcohol Possession	Y

The new violation related to the HOS Compliance BASIC reflects FMCSA's HOS regulation that requires drivers to take a 30-minute rest break during the first eight hours of a shift. This new regulation and guidance can be found at http://www.fmcsa.dot.gov/rules-regulations/topics/hos/index.htm.

The new violation related to the Controlled/Substances Alcohol BASIC was added based on industry and law enforcement feedback. The inclusion of this violation enables roadside inspectors to distinguish between alcohol possession and alcohol use. The distinction allows the SMS to assign a lower severity weight to alcohol possession.

CSMS Methodology Changes from Version 3.0.1 to 3.0.2 (Implemented June 2014)

Several new violations were added to the roadside inspection collection software on April 1, 2014. As of the May 2014 snapshot, these violations are being added to the SMS. The table below includes descriptions of the new violations, the BASICs they relate to, and how they are weighted in the SMS.

BASIC Violations Added to the SMS

BASIC	Violation Code	Description	Severity Weight	Violation Group	Driver-Related (Y/N)
Driver Fitness	390.35B-MED	Operating a CMV while possessing a fraudulent medical certificate	Fraud	10	Y
Unsafe Driving	392.11	Commercial Vehicle failing to slow down approaching a railroad crossing.	Dangerous Driving	5	Y
Vehicle Maintenance	396.3A1DSCB	Center Bearing (Carrier Bearing) Cracked / Loose / Broken / Missing	Other Vehicle Defect	3	N
Vehicle Maintenance	396.3A1DSDT	Drive Shaft Tube Cracked or Twisted	Other Vehicle Defect	3	N
Vehicle Maintenance	396.3A1DSUJ	Universal Joint Loose / Broken / Missing Component	Other Vehicle Defect	3	N
Vehicle Maintenance	396.3A1DSYE	Drive Shaft Yoke Ends Cracked / Loose / Broken / Missing	Other Vehicle Defect	3	N

In addition, 22 violation descriptions have been modified to accurately reflect the current descriptions in the roadside inspection collection software. These changes do not affect how carriers are being assessed in SMS.

SMS Methodology Changes from Version 3.0.2 to 3.0.3 (Implemented October 2014)

FMCSA updated SMS in Version 3.03 to accommodate FMCSA's Adjudicated Citations Policy, which became effective August 23, 2014, for inspections that occurred on or after that date. The changes impact the use of certain violations in SMS when States issue a citation (i.e., ticket) associated with a violation noted in the roadside inspection, andsuch citations is subsequently adjudicated in a due process system. With this policy, FMCSA is taking important steps toward improving the quality and uniformity of roadside inspection violation data in the Agency's data systems. The policy allows the States to reflect the results of adjudicated citations related to roadside inspection violation data collected in MCMIS.

Drivers or carriers must submit certified documentation of the judicial proceeding results through a Request for Data Review (RDR) in FMCSA's DataQs system to initiate this process. MCMIS has been modified to accept adjudication results showing that a citation

was dismissed or resulted in a finding of not guilty; resulted in a conviction of a different charge; or, resulted in conviction of the original charge. The adjudication results will impact the use of roadside inspection violation data in other FMCSA data systems, including the SMS.

Citation Result for a Violation	Violation in SMS
Dismissed/Not guilty	Remove violation
Convicted of a different charge	Severity weight set to 1 and not subject to OOS weight