Driver Safety Measurement System (DSMS) Methodology

Compliance ★ Safety ★ Accountability

Version 3.0.5
Methodology Revised September 2015
Document Revised September 2015

The DSMS does not generate or issue driver safety ratings or "scores." It does not affect a driver's commercial driver's license, or a carrier's safety rating, which is subject to 49 CFR Part 385 of the Safety Fitness Procedures. DSMS results are not available to motor carriers, drivers, third-party providers, or the public. DSMS results are only available to enforcement officials for examining commercial motor vehicle driver performance as part of CSA investigations. Enforcement users should not draw conclusions about a driver's overall safety condition solely based on DSMS results.

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Federal Motor Carrier Safety Administration

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List of Abbreviations

BASIC	Behavior Analysis and Safety Improvement Category
CDL	Commercial Driver's License
CMV	Commercial Motor Vehicle
CSA	Compliance, Safety, Accountability
DSMS	Driver Safety Measurement System
FMCSA	Federal Motor Carrier Safety Administration
FMCSRs	Federal Motor Carrier Safety Regulations
HM	Hazardous Materials
HMRs	Hazardous Materials Regulations
HOS	Hours-of-Service
IEP	Intermodal Equipment Provider
MCMIS	Motor Carrier Management Information System
MCSAP	Motor Carrier Safety Assistance Program
OOS	Out-of-Service
PSP	Pre-Employment Screening Program
RODS	Records of Duty Status
SMS	Safety Measurement System

1. Introduction

The Driver Safety Measurement System (DSMS) is a tool that is built from many of the design components of the carrier-based Safety Measurement System (SMS).[1] The DSMS does not generate or issue driver safety ratings or "scores." It does not affect a driver's commercial driver's license (CDL), or a carrier's safety rating, which is subject to 49 CFR Part 385 of the Safety Fitness Procedures. DSMS results are not available to motor carriers, drivers, third-party providers, or the public. DSMS results are only available to enforcement officials for examining commercial motor vehicle (CMV) driver performance as part of Compliance, Safety, Accountability (CSA) investigations. Enforcement users should not draw conclusions about a driver's overall safety condition solely based on DSMS results. However, the raw safety information from roadside inspections and crashes that feeds the DSMS is compiled by the same system that provides CMV driver-based data to the Federal Motor Carrier Safety Administration's (FMCSA) Pre-Employment Screening Program (PSP). This program allows motor carriers to access driver inspection and crash records electronically as a part of the hiring process.[2]

[1] The SMS Methodology can be found on FMCSA's CSA Website at http://csa.fmcsa.dot.gov/Documents/SMSMethodology.pdf.

[2] More information about PSP can be found on FMCSA's PSP Website at http://www.psp.fmcsa.dot.gov/.

2. Data Sources

DSMS assesses an individual CMV driver's performance by Behavior Analysis and Safety Improvement Category (BASIC) 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). Below are more detailed descriptions of each data source:

- Roadside Inspections are examinations a Motor Carrier Safety Assistance Program (MCSAP) inspector (usually State or local law enforcement personnel) 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 a driver or vehicle being placed out-of-service (OOS). These OOS violations must be corrected before the affected driver or vehicle is allowed to return to service. The DSMS assessments are based on the safety violations listed in Appendix A of the SMS Methodology.[3] These assessments, however, do not include those violations that are: (1) a result of a crash; [4] (2) assigned exclusively to another entity such as a shipper or Intermodal Equipment Provider (IEP); or (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 DSMS whether or not a citation is issued.
- State-Reported Commercial Vehicle Crash Data are taken from MCMIS and provide information on crashes as reported by State and local law enforcement officials. All reportable crashes are used regardless of the driver's role in the crash. A reportable crash is defined in 49 CFR 390.5 as a crash that involves a CMV operating on a public roadway, which results in a fatality, an injury, and/or a tow-away.

[3] The SMS Methodology can be found on FMCSA's CSA Website at http://csa.fmcsa.dot.gov/Documents/SMSMethodology.pdf.

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

3. The BASICs

The DSMS has the same BASIC format as the SMS for carriers. This section describes the computational logic used to calculate the measures and percentiles for each BASIC for individual CMV drivers.

3.1 Unsafe Driving BASIC Assessment

The Unsafe Driving BASIC is defined as follows:

- Operation of CMVs in a dangerous or careless manner. *Example violations include: speeding, reckless driving, improper lane change, texting while operating a CMV, not wearing safety belts.*

The DSMS assesses the Unsafe Driving BASIC by using applicable violations recorded during driver inspections to calculate a BASIC measure for individual drivers. These measures are used to generate percentile ranks that reflect drivers' safety postures relative to drivers with applicable violations.

Calculation of Unsafe Driving BASIC Measure

The equation used for calculating the Unsafe Driving BASIC measure is as follows:

$$BASIC\,Measure = Total\,of\,time\,and\,severity\,weighted\,applicable\,violations$$

Equation 3–1

In this equation, the terms are defined as follows:

An Applicable Violation is defined as any violation recorded in a driver inspection (Level 1, 2, 3, or 6) that matches the FMCSRs and HMRs cites listed in Table A–1: SMS Unsafe Driving BASIC Violations (Appendix A of the SMS Methodology) during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only 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 DSMS 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 Table A–1 in Appendix A of the SMS Methodology for the corresponding severity weights of each violation cite. The severity weighting of each violation cite accounts for the level of crash risk relative to the other violation cites used in the BASIC measurement. The sum of all 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 based on how long ago a violation on the inspection was recorded. Violations recorded in the past 12 months receive a time weight of 3. Violations recorded between 12 and 24 months ago receive a time weight of 2. All violations recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on recent violations relative to older violations.

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

Calculation of Unsafe Driving BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank. The calculation is as follows:

A. Determine the total number of inspections with at least one BASIC violation. Remove drivers with no BASIC violations.

B. Rank all the drivers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Then, assign the percentile values for that BASIC to each driver.

3.2 Crash Indicator BASIC Assessment

The Crash Indicator BASIC is defined as follows:

- Historical pattern of crash involvement, including frequency and severity. This BASIC is based on information from State-reported crashes that meet reportable crash standards. All reportable crashes are used regardless of the driver's role in the crash. This BASIC uses crash history that is not specifically a behavior but instead the consequence of a behavior or a set of behaviors.

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

Calculation of Crash Indicator BASIC Measure

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

$$BASIC\ Measure = Total\ of\ \ time\ and\ \ severity\ weighted\ \ applicable\ crashes$$

Equation 3–2

In this equation, the terms are defined as follows:

An Applicable Crash is based on crash reports provided by the States for each crash that meets the reportable crash standard during the past 36 months. A reportable crash is one that results

in at least one fatality; one injury where the 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).

Note: All reportable crashes are used regardless of the driver's role in the crash.

Crash Severity Weight places more weight on crashes with more severe consequences. For example, a crash involving an injury or fatality is weighted more heavily than a crash where only a tow-away occurred. A hazardous materials (HM) release also increases the weighting of a crash, as shown in Table 3–1.

Table 3–1. Crash Severity Weights for Crash Indicator BASIC

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

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

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

Calculation of Crash Indicator BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank. The calculation is as follows:

A. Identify drivers with at least one applicable crash.

B. Rank all the drivers' Crash Indicator BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Then, assign the percentile values to each driver.

3.3 HOS Compliance BASIC Assessment

The HOS Compliance BASIC is defined as follows:

- Operation of CMVs by drivers who are ill, fatigued, or in noncompliance with the Hours-of-Service (HOS) regulations. This BASIC includes violations of regulations pertaining to records of duty status (RODS) as they relate to HOS requirements and the management of CMV driver fatigue. *Example violations include: operating a CMV while ill or fatigued, requiring or*

permitting a property-carrying CMV driver to drive more than 11 hours.

The DSMS assesses the HOS Compliance BASIC using applicable violations recorded during driver inspections to calculate a BASIC measure for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

Calculation of HOS Compliance BASIC Measure

The equation used for calculating the HOS Compliance BASIC measure 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 defined as any violation recorded in a driver inspection (Level 1, 2, 3, or 6) that matches the FMCSRs and HMRs cites listed in Table A–3: SMS HOS Compliance BASIC Violations (Appendix A of the SMS Methodology) during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only once per inspection.

A Relevant Inspection for the HOS Compliance BASIC 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 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 Table A–3 in Appendix A of the SMS Methodology for the violations' corresponding severity weights.

ii. OOS violations receive an additional severity weight of 2. In cases where there are multiple occurrences of the same violation this weight applies to any of those violations that meet the OOS conditions.

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 12 months receive a time weight of

3. Violations/inspections recorded between 12 and 24 months ago receive a time weight of 2. All violations/inspections recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on 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.

Calculation of HOS Compliance BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank. The calculation is as follows:

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

Table 3–2. Safety Event Groups for HOS Compliance BASIC

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

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

3.4 Vehicle Maintenance BASIC Assessment

The Vehicle Maintenance BASIC is defined as follows:

- Failure to properly maintain a CMV and prevent shifting loads, spilled or dropped cargo, and overloading of a CMV. *Example violations include: inoperative brakes, lights, and other mechanical defects, improper load securement.*

The DSMS assesses the Vehicle Maintenance BASIC using relevant violations recorded during vehicle inspections to calculate a BASIC measure for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

Calculation of Vehicle Maintenance BASIC Measure

The equation used for calculating the Vehicle Maintenance measure 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 a vehicle inspection (Level 1, 2, or 6) that matches the FMCSRs and HMRs cites listed in Table A–5: SMS Vehicle Maintenance BASIC Violations Table (Appendix A of the SMS Methodology) BASICs during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only once per inspection.

A Relevant Inspection for the Vehicle Maintenance BASIC is any vehicle inspection (Level 1, 2, 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 Table A–5 in Appendix A of the SMS Methodology for the corresponding severity weights of each violation cite.

ii. OOS violations receive an additional severity weight of 2. In cases where there are multiple occurrences of the same violation this weight applies to any of those violations that meet the OOS conditions.

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 12 months receive a time weight of 3. Violations/inspections recorded between 12 and 24 months ago receive a time weight of 2. All violations/inspections recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on 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.

Calculation of Vehicle Maintenance BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile. The calculation is as follows:

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

Table 3–3. Safety Event Groups for Vehicle Maintenance BASIC

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

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

3.5 Controlled Substances/Alcohol BASIC Assessment

The Controlled Substances/Alcohol BASIC is defined as follows:

- Operation of CMVs by drivers who are impaired due to alcohol, illegal drugs, and misuse of prescription or over-the-counter medications*. Example violations include: use or possession of controlled substances or alcohol.*

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

Calculation of Controlled Substances/Alcohol BASIC Measure

The equation used for calculating the Controlled Substances/Alcohol BASIC measure is defined as follows:

$$BASIC\,Measure = Total\,of\,time\,and\,severity\,weighted\,applicable\,violations$$

Equation 3–5

In this equation, the terms are defined as follows:

An Applicable Violation is defined as any violation recorded in a driver inspection (Level 1, 2, 3, or 6) that matches the FMCSRs and HMRs cites listed in Table A–7: SMS Controlled Substances/Alcohol BASIC Violations (Appendix A of the SMS Methodology) during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only 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 DSMS 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 Table A–7 in Appendix A of the SMS Methodology for the corresponding severity weights of each violation cite. The severity weighting of each violation cite accounts for the level of crash risk relative to the other violation cites used in the BASIC measurement. The sum of all 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 based on how long ago a violation on the inspection was recorded. Violations recorded in the past 12 months receive a time weight of 3. Violations recorded between 12 and 24 months ago receive a time weight of 2. All violations recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on recent violations relative to older violations.

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

Calculation of Controlled Substances/Alcohol BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank. The calculation is as follows:

A. Determine the total number of inspections with at least one BASIC violation. Remove drivers with no BASIC violations.

B. Rank all the drivers' BASIC measures in ascending order. Transform the ranked values into percentiles from 0 (representing the lowest BASIC measure) to 100 (representing the highest BASIC measure). Then, assign the percentile values for that BASIC to each driver.

3.6 HM Compliance BASIC Assessment

The HM Compliance BASIC is defined as follows:

- Unsafe handling of HM on a CMV. *Example violations include: failing to mark, label, or placard in accordance with the regulations, not properly securing a package containing HM.*

The DSMS assesses the HM Compliance BASIC using relevant violations recorded during vehicle inspections where placardable quantities of HM are being transported to calculate a BASIC measure for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

Calculation of HM Compliance BASIC Measure

The equation used for calculating the HM Compliance BASIC measure 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 any violation recorded in a placardable vehicle inspection (Level 1, 2, or 6) that matches the FMCSRs and HMRs cites listed in Table A–9: SMS HM Compliance BASIC Violations (Appendix A of the SMS Methodology) during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only once per inspection.

A Relevant Inspection for the HM Compliance BASIC is any Vehicle Inspection (Level 1, 2, or 6), where placardable quantities of HM are being transported. This includes inspections 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 Table A–9 in Appendix A of the SMS Methodology for the corresponding severity weights of each violation cite.

ii. OOS violations receive an additional severity weight of 2. In cases where there are multiple occurrences of the same violation this weight applies to any of those violations that meet the OOS conditions.

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 12 months receive a time weight of 3. Violations/inspections recorded between 12 and 24 months ago receive a time weight of 2. All violations/inspections recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on 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.

Calculation of HM Compliance BASIC Percentile Rank

Based on the BASIC measures, the DSMS applies data sufficiency standards to assign a percentile rank. The calculation is as follows:

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

Table 3–4. Safety Event Groups for HM Compliance BASIC

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

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

3.7 Driver Fitness BASIC Assessment

The Driver Fitness BASIC is defined as follows:

- Operation of CMVs by drivers who are unfit to operate a CMV due to lack of training, experience, or medical qualifications. *Example violations include: failing to have a valid and appropriate CDL, being medically unqualified to operate a CMV.*

The DSMS assesses the Driver Fitness BASIC using applicable violations recorded during driver inspections to calculate a Driver Fitness BASIC measure for individual drivers. These measures are used to generate percentile ranks that reflect drivers' relative safety posture.

Calculation of Driver Fitness BASIC Measure

The equation used for calculating the Driver Fitness BASIC measure 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 a driver inspection (Level 1, 2, 3, or 6) that matches the FMCSRs and HMRs cites listed in Table A–11: SMS Driver Fitness BASIC Violations (Appendix A of the SMS Methodology) during the past 36 months, and for which the CMV driver can be held responsible (see 'Violation in the DSMS (Y/N)' column). In cases of multiple counts of the same violation, the DSMS uses each violation cite only once per inspection.

A Relevant Inspection for the Driver Fitness BASIC 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 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 Table A–11 in Appendix A of the SMS Methodology for the corresponding severity weights of each violation cite.

ii. OOS violations receive an additional severity weight of 2. In cases where there are multiple occurrences of the same violation this weight applies to any of those violations

that meet the OOS conditions.

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 12 months receive a time weight of 3. Violations/inspections recorded between 12 and 24 months ago receive a time weight of 2. All violations/inspections recorded earlier (older than 24 months but within the past 36 months) receive a time weight of 1. This time weighting places more emphasis on 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.

Calculation of Driver Fitness BASIC Percentile Rank

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

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

Table 3–5. Safety Event Groups for Driver Fitness BASIC

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

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

4. DSMS Improvement Process

The SMS methodology is part of a continuous improvement process in support of FMCSA's CSA program. Based on this process, changes are periodically made to the carrier-based SMS methodology, which result in modifications made to the violation list and severity weights noted in Appendices A and B of the SMS Methodology document. These violation/severity weight modifications also apply to the DSMS methodology and will be reflected in calculating the DSMS results at the same time they are applied to the carrier-based SMS.