



Proposed SMS Enhancements

October 2016

Background

The Federal Motor Carrier Safety Administration's (FMCSA) Safety Measurement System (SMS) is the foundation of our safety compliance and enforcement program, known as Compliance, Safety, Accountability (CSA). FMCSA first announced implementation of the SMS in the Federal Register on April 9, 2010. The SMS uses data, including safety violations, found during approximately 3.5 million inspections conducted each year, along with information gathered from investigations and crash reports to quantify the relative safety performance of carriers based on seven Behavior Analysis and Safety Improvement Categories (BASICS). FMCSA uses the SMS results to prioritize our workload, giving those carriers with the highest safety risk priority for interventions.

FMCSA has continually enhanced SMS in response to new data, stakeholder feedback, and analyses. These proposed enhancements to the SMS are the latest in a series of evolutions. FMCSA provided notice and sought comments on proposed enhancements to the SMS in the [Federal Register on June 29, 2015](#). In a second [Federal Register Notice](#) to be published on October 4, 2016, FMCSA will announce a preview and comment period on the latest set of proposed enhancements, which are outlined below.

Note: The proposed enhancements comply with the provisions in Section 5223 of the Fixing America's Surface Transportation Act (FAST Act) related to the public display of SMS data. They do not modify the property carrier safety data available to the public. BASIC percentiles and "Alerts" for property carriers will remain removed from public display.

Overview of Proposed Enhancements

These proposed SMS enhancements include:

1. Improving our focus on carriers with high crash risk by adjusting the Intervention Thresholds for the Vehicle Maintenance, Controlled Substances/Alcohol, and Driver Fitness BASICS.
 - Adjusting the Intervention Threshold for the Vehicle Maintenance BASIC from 80 percent to 75 percent to reflect its higher correlation to crash risk.
 - Adjusting the Intervention Threshold for the Controlled Substances/Alcohol BASIC from 80 percent to 90 percent to reflect its lower correlation to crash risk.
 - Adjusting the Intervention Threshold for the Driver Fitness BASIC from 80 percent to 90 percent to reflect its lower correlation to crash risk.

2. Focusing our investigative resources on carriers with more crash involvement by increasing the minimum number of crashes required to assign a percentile in the Crash Indicator BASIC from two to three.
3. Sharpening our focus on carriers with recent violations by simplifying data sufficiency standards to only assign BASIC percentiles to companies that have had an inspection with a violation within the past year.
4. More accurately accounting for carriers that drive on our roads the most by expanding the range over which the Utilization Factor is applied from 200,000 to 250,000 Vehicle Miles Travelled (VMT) per average Power Unit (PU).
5. Making the Hazardous Materials (HM) Compliance BASIC more effective at identifying carriers with HM compliance problems for interventions by:
 - Segmenting this BASIC by cargo tank and non-cargo tank operations.
 - Adjusting this BASIC's Intervention Threshold from 80 percent to 90 percent to reflect its lower correlation to crash risk.
6. More effectively identifying driver safety problems related to out-of-service (OOS) violations by moving violations of OOS Orders to the Unsafe Driving BASIC.

Why Is FMCSA Proposing These Enhancements?

Timely, reliable data translates into safer roads for everyone. FMCSA is proposing these enhancements to strengthen the SMS's ability to prioritize interventions for those carriers that pose the greatest safety risk. These proposed enhancements to the SMS would allow us to sharpen our focus on carriers with high crash rates, prioritize our investigative resources on carriers with more crash involvement, more accurately account for the carriers that possess increased exposure due to above average VMT, and strengthen HM compliance. FMCSA evaluated the impact of these proposed enhancements by applying the "SMS Effectiveness Test (ET)," which assesses the SMS's ability to prioritize carriers with safety problems for interventions. The Agency conducted this test using the following three-level approach:

1. Performing a simulated SMS implementation run that calculated carrier percentile ranks for each BASIC using historical data from calendar year 2009 to 2010.
2. Observing each carrier's crash involvement and HM violation rate over the 18-month period immediately following the simulated SMS timeframe (i.e., the post-identification crash and HM violation period, January 2011 to June 2012).
3. Observing the relationship between the percentile ranks (from 0 to 100) in each BASIC and the subsequent post-SMS carrier crash and HM violation rates.

For more information on the SMS ET, review the [full report](#).

Summary of Proposed Enhancements

The section below provides detailed information and analysis about each proposed change.

1. Improving our focus on carriers with high crash risk by adjusting the Intervention Thresholds for the Vehicle Maintenance, Controlled Substances/Alcohol, and Driver Fitness BASICS.

- Adjusting the Intervention Threshold for the Vehicle Maintenance BASIC from 80 percent to 75 percent to reflect its higher correlation to crash risk.
- Adjusting the Intervention Threshold for the Controlled Substances/Alcohol BASIC from 80 percent to 90 percent to reflect its lower correlation to crash risk.
- Adjusting the Intervention Threshold for the Driver Fitness BASIC from 80 percent to 90 percent to reflect its lower correlation to crash risk.

Overview: Carriers are prioritized for interventions if their BASIC percentiles are at or above certain thresholds, or Intervention Thresholds. Industry stakeholders maintain that not all BASICS are highly correlated with crash risk, and as a result some Intervention Thresholds are ineffective in improving safety on our Nation's roads. After evaluating the SMS ET with a three-level approach, FMCSA determined that lowering the Intervention Threshold for the Vehicle Maintenance BASIC and raising the Intervention Thresholds for the Controlled Substances/Alcohol and Driver Fitness BASICS would more effectively prioritize carriers for interventions. The Agency would maintain the current Intervention Thresholds for the high-crash-related BASICS, as outlined below.

Note: the Federal Motor Carrier Safety Regulations (FMCSRs) related to the Controlled Substances/Alcohol and Driver Fitness BASICS are vitally important to safety on our roads. This proposed enhancement to the BASIC Intervention Thresholds would help the Agency more effectively prioritize our resources. It would not change how the Agency enforces the underlying FMCSRs.

Analysis: FMCSA conducted analysis to determine the most effective Intervention Thresholds. Using the three-level approach from the SMS ET, the Agency categorized the BASICS into three groups based on each BASIC's relationship to crash risk:

1. High — Unsafe Driving, Crash Indicator, Hours-of-Service (HOS) Compliance.
2. Medium — Vehicle Maintenance.
3. Low — Controlled Substances/Alcohol, Driver Fitness.

The Agency analyzed the HM Compliance BASIC separately as part of another proposed change to the SMS. Therefore, it is not included in this summary.

The Agency then developed threshold options to examine the impact of applying various threshold percentiles to these three levels. To determine the best option, the Agency conducted a crash analysis based on the SMS ET to compare each option's crash rate to the current thresholds for passenger carriers, HM carriers, and general carriers. The Agency found that the proposed Intervention Thresholds presented in Table 1 would more effectively prioritize carriers with high crash risk for interventions.

Table 1: Comparison of Current and Proposed Intervention Thresholds

BASIC	Current Intervention Thresholds			Proposed Intervention Thresholds		
	Passenger Carrier	HM Carrier	General Carrier	Passenger Carrier	HM Carrier	General Carrier
Unsafe Driving/Crash Indicator/HOS Compliance	50 percent	60 percent	65 percent	50 percent	60 percent	65 percent
Vehicle Maintenance	65 percent	75 percent	80 percent	60 percent	70 percent	75 percent
Controlled Substances/Alcohol/Driver Fitness	65 percent	75 percent	80 percent	75 percent	85 percent	90 percent

These proposed thresholds emphasize the Vehicle Maintenance BASIC’s higher correlation to crash risk and de-emphasize the Controlled Substances/Alcohol and Driver Fitness BASICs’ lower correlations to crash risk, while maintaining the current threshold for other high-crash-related BASICs.

Proposal: FMCSA proposes maintaining the current Intervention Thresholds for the Unsafe Driving, Crash Indicator, and HOS Compliance BASICs; adjusting the Intervention Threshold for the Vehicle Maintenance BASIC from 80 percent to 75 percent; and adjusting the Intervention Thresholds for the Driver Fitness and Controlled Substances/Alcohol BASICs from 80 percent to 90 percent. The Agency proposes adjusting the passenger carrier and HM thresholds for each BASIC listed above using the same approach.

Impact: Adjusting these BASIC Intervention Thresholds would prioritize more carriers with high crash rates for interventions. The SMS snapshot data from Fiscal Year (FY) 2015 shows that this change would prioritize an additional 2,431 carriers for interventions and no longer prioritize 455 carriers for interventions. The group of carriers prioritized for interventions, according to the SMS ET, would have a crash rate 7 percent higher than those carriers prioritized by the current methodology. Under the proposed change, the crash rate would increase from 5.12 to 5.49 crashes per 100 PUs.

2. Focusing our investigative resources on carriers with more crash involvement by increasing the minimum number of crashes required to assign a percentile in the Crash Indicator BASIC from two to three.

Overview: On January 23, 2015, FMCSA released a Federal Register Notice announcing the results of our study on the feasibility of using a motor carrier’s role in crashes in the assessment of the company’s safety.¹ In response to comments received, the Agency conducted additional analysis to potentially improve the effectiveness of the Crash Indicator BASIC. One of the areas assessed included increasing the minimum number of crashes for the data sufficiency standard in the Crash Indicator BASIC. Currently, the Agency assigns a percentile to carriers in the Crash Indicator BASIC if they have at least two reportable crashes in the past two years.

¹ The Federal Register Notice titled “Crash Weighting Analysis” is available at: <http://www.regulations.gov/#!documentDetail;D=FMCSA-2014-0177-0001>

Analysis: For this analysis, the Agency used the SMS ET to examine two alternative scenarios for the data sufficiency standard in the Crash Indicator BASIC:

1. Raising the minimum number of crashes from two to three crashes; and
2. Raising the minimum from two to five crashes.

To determine the impact of these scenarios, the Agency ran each scenario in the SMS ET and compared the results to those from the current Crash Indicator BASIC. Results show that scenario 1 is more effective at identifying high crash risk carriers than scenario 2. The overall crash rate for scenario 1 is about the same as the crash rate for the current Crash Indicator BASIC (6.33 vs. 6.34 crashes per 100 PUs), while the overall crash rate for scenario 2 is lower (6.23 vs. 6.34 crashes per 100 PUs). In addition, scenario 1 covers a slightly lower total number of crashes than the current BASIC (14, 838 vs. 15,638 crashes), while scenario 2 reduces the crashes covered even further (13,337 vs. 15,638 crashes).

Proposal: FMCSA proposes increasing the minimum number of crashes required to assign a percentile in the Crash Indicator BASIC from two to three.

Impact: The SMS snapshot from FY 2015 shows that this proposed change would prioritize 75 new carriers for interventions and 2007 carriers would no longer be prioritized for interventions. In addition, the SMS ET results in the above Analysis section suggest that increasing the minimum number of crashes from two to three identifies a similar group of carriers with high crash rates as the current Crash Indicator BASIC. While this proposed change does not substantively impact the effectiveness of the Crash Indicator BASIC, it would focus the Agency's investigative resources on carriers with more crash involvement.

3. Sharpening our focus on carriers with recent violations by simplifying data sufficiency standards to only assign BASIC percentiles to companies that have had an inspection with a violation within the past year.

Overview: Currently, FMCSA assigns percentiles to carriers in the HOS Compliance, Vehicle Maintenance, HM Compliance, and Driver Fitness BASICs if they meet the following criteria: the most recent inspection in the past two years resulted in a violation.

Analysis: FMCSA used the SMS ET to assess these criteria and found that modifying this criteria would sharpen the SMS's focus on carriers with recent violations.

Proposal: FMCSA proposes only assigning percentiles to companies that have had an inspection with a violation in the past year.

Impact: Simplifying data sufficiency standards would help the Agency focus on carriers with crash rates above the national average. The SMS snapshot data from FY 2015 shows that this change would result in 1,243 carriers no longer having a BASIC at or above the Intervention Threshold. In addition, SMS ET results indicate that these carriers would have a crash rate of 0.71 crashes per 100 PUs—a crash rate that is 4.8 times lower than the national average of 3.43 crashes per 100 PUs.

4. More accurately accounting for carriers that drive on our roads the most by expanding the range over which the Utilization Factor is applied from 200,000 to 250,000 VMT per average PU.

Overview: Up-to-date VMT data is essential to calculating the Utilization Factor and accounting for the higher than average exposure of carriers that drive on our roads the most, also known as high-utilization carriers. The Utilization Factor accounts for increased exposure by adjusting their average PU values when calculating measures in the Unsafe Driving and Crash Indicator BASICS. Carriers with higher Utilization Factors would see a reduction in their measures for the Unsafe Driving and Crash Indicator BASICS. Industry stakeholders noted that the current limit for the Utilization Factor of 200,000 VMT per average PU does not accurately reflect the increased exposure of high-utilization carriers.

Analysis: FMCSA reviewed carrier-reported VMT data from 2014 and found that more carriers are reporting higher VMT now than they were when the Utilization Factor was developed in 2009. After reviewing carrier-reported VMT data from 2014, FMCSA determined that extending the Utilization Factor from 200,000 to 250,000 VMT per average PU would allow for better measure of exposure for high-utilization carriers.

Proposal: FMCSA proposes expanding the range over which the Utilization Factor is applied from 200,000 to 250,000 VMT per average PU.

Impact: Extending the Utilization Factor would increase exposure for 204 carriers in the Unsafe Driving BASIC and 100 carriers in the Crash Indicator BASIC. The SMS snapshot data from FY 2015 indicates that carriers with increased exposure would see a reduction in their BASIC measures, which may improve their percentiles. In addition, this change would have a minimal impact on the carriers prioritized for interventions. The SMS snapshot data from FY 2015 shows that this change would prioritize 33 additional carriers for interventions and no longer prioritize 26 carriers for interventions. SMS ET results indicate that this change would not affect the crash rate of the group of carriers prioritized for interventions.

5. Making the HM Compliance BASIC more effective at identifying carriers with HM compliance problems for interventions by:

- Segmenting this BASIC by cargo tank and non-cargo tank operations.
- Adjusting this BASIC's Intervention Threshold from 80 percent to 90 percent to reflect its lower correlation to crash risk.

Overview: Industry stakeholders raised concerns to FMCSA that large non-cargo tank HM carriers have difficulty improving in the HM Compliance BASIC because they are compared to cargo tank HM carriers. These operations often receive different violations. FMCSA determined criteria for classifying HM carriers in either a cargo tank or non-cargo tank group and assessed the impact of this segmentation. Then the Agency applied the SMS ET to determine the best Intervention Threshold for the segmented HM Compliance BASIC. Taken together, these changes address the potential bias of comparing different HM operations while improving the SMS's ability to identify carriers with HM compliance problems for interventions.

Analysis: FMCSA studied the feasibility of segmenting the HM Compliance BASIC by cargo tank and non-cargo tank operations, and then determined the appropriate Intervention Threshold for the new

segmented BASIC. First, the Agency examined cargo tank data recorded in HM placardable vehicle inspections. An HM placardable vehicle inspection is classified as a cargo tank inspection if the carrier’s cargo tank type on its inspection report is MC 300 Series, DOT 400 Series, or Other. All other HM placardable inspections are classified as non-cargo tank inspections. The Agency found this data sufficient to determine if the inspected vehicle contained a cargo tank, and used this data to divide carriers assessed in the HM Compliance BASIC into two groups: those that had HM placardable vehicle inspections with cargo tanks and those that had HM placardable vehicle inspections with no cargo tanks. The Agency found that most of the carriers had almost exclusively cargo tank inspections or inspections without cargo tanks. Based on these results, the Agency defined the cargo tank segment as those carriers with cargo tank inspections that comprise half or more of their total HM placardable vehicle inspections, and the Agency defined the non-cargo tank segment as carriers with cargo tank inspections that comprise less than half of their HM placardable vehicle inspections. These definitions produced a sufficient number of carriers in both segment types for all safety event groups to segment the HM Compliance BASIC.

The Agency then assessed the impact of segmenting the HM Compliance BASIC at its current threshold of 80 percent. Overall, segmenting the BASIC identifies more large cargo tank carriers for interventions. As shown in Table 2, carriers with 40 or fewer HM vehicle placardable inspections would not see a change in their BASIC percentiles, while non-cargo tank carriers with 41 or more HM vehicle placardable inspections would see a decrease in percentiles and cargo tank carriers would see an increase in percentiles.

Table 2: Cargo Tank Segmentation Impact on HM Compliance BASIC Percentile*

Number of HM Placardable Vehicle Inspections	Current HM Compliance BASIC Percentile (Before Segmentation)	New BASIC Non-Cargo Tank Percentile (With Segmentation)	New BASIC Cargo Tank Percentile (With Segmentation)
40 or Less	80 percent	Same	Same
41-100	80 percent	71 percent (-9 percent)	85 percent (+5 percent)
100 or More	80 percent	62 percent (-18 percent)	90 percent (+10 percent)

Source: *SMS Snapshot Data from FY 2015

The Agency then applied the SMS ET to look at subsequent violation rates from roadside inspections and investigation results to determine the appropriate Intervention Threshold for the new segmented HM Compliance BASIC. These results are presented in Table 3 below.

Table 3: Violation Rates with Segmented HM Compliance BASIC Intervention Threshold

Threshold	Carriers with HM Compliance BASIC Percentile (With Segmentation)*	HM Compliance BASIC Violation Rate (HM Violations per 100 HM Placardable Vehicle Inspections)*	HM Compliance BASIC Investigation Violation Rate (HM Violations per 100 HM Investigations)**
All Carriers	1,509	13.1	12.2
Over 80 Percent	542	22.0	16.1
Over 90 Percent (Proposed)	285	28.0	18.2

Source: *SMS ET Results
 **FY 2013 Compliance Review Results

Based on this analysis, FMCSA proposes adjusting the Intervention Threshold for the segmented HM Compliance BASIC to 90 percent. As Table 3 shows, the group of carriers prioritized by the proposed HM Compliance BASIC would have higher roadside inspection violation and investigation violation rates² than those carriers identified by the current methodology. There are two primary types of violations recorded during investigations: one-time occurrence violations, triggered by noncompliance so severe that immediate corrective action is required; and pattern of occurrence violations, triggered by a pattern of noncompliance related to the carrier’s management or operational controls.

This change would align the HM Compliance BASIC with the other proposed Intervention Threshold changes outlined above.

Proposal: FMCSA proposes segmenting the HM Compliance BASIC by cargo tank and non-cargo tank operations and adjusting this BASIC’s Intervention Threshold from 80 percent to 90 percent.

Impact: The SMS snapshot data from FY 2015 shows that segmenting and adjusting the Intervention Threshold for the HM Compliance BASIC would have a small impact on prioritization. These changes would not prioritize any additional carriers for interventions, and 236 carriers (91 cargo tank and 145 non-cargo tank) would no longer be prioritized for interventions. However, as Table 3 shows, carriers prioritized in the proposed HM Compliance BASIC would have a roadside inspection violation rate that is 27 percent higher than those identified by the current methodology (from 22 to 28 violations per 100 placardable vehicle inspections). In addition, carriers prioritized in this proposed BASIC would have an investigation violation rate that is 13 percent higher than those previously identified (from 16.1 to 18.2 violations per 100 investigations).

6. More effectively identifying driver safety problems related to OOS violations by moving violations of OOS Orders to the Unsafe Driving BASIC.

Overview: A violation of an OOS Order occurs when a driver or motor carrier continues operating after receiving an OOS Order. Currently, FMCSA categorizes violations of OOS Orders under the same BASIC as the initial OOS violation. However, the Agency determined that violations of OOS Orders are more closely related to the Unsafe Driving BASIC because they reflect the driver’s or motor carrier’s unsafe

² The HM Compliance BASIC investigation violation rate includes all HM-related Serious Violations and Acute and Critical Violations.

driving behavior following the issuance of the OOS Order. The Unsafe Driving BASIC focuses on unsafe driving behavior such as texting, speeding, using a hand-held cell phone, and reckless driving. Table 4 below lists descriptions of the operating while OOS violations, the current BASICs to which they relate, and their movement to the Unsafe Driving BASIC under the proposed change.

Table 4: Impact of Proposed Change on Violations of OOS Orders

Violation	Violation Description	BASIC Under Current SMS	BASIC Under Proposed Change
386.72(b)	Failing to comply with Imminent Hazard OOS Order	Driver Fitness	Unsafe Driving
392.5(c)(2)	Violating OOS order pursuant to 392.5(a)/(b)	Controlled Substances/Alcohol	Unsafe Driving
395.13(d)	Driving after being declared OOS	HOS Compliance	Unsafe Driving
396.9(c)(2)	Operating an OOS vehicle	Vehicle Maintenance	Unsafe Driving

Analysis: FMCSA reviewed the violations of operating while OOS and analyzed the impact of this change. The Agency found that moving these violations to the Unsafe Driving BASIC would not significantly impact the crash rate of carriers over the Intervention Threshold in the HOS Compliance, Vehicle Maintenance, Controlled Substances/Alcohol, or Unsafe Driving BASICs. In addition, consolidating these violations of OOS Orders would make it easier to identify and correct driver safety problems related to the behavior of operating while OOS.

Proposal: FMCSA proposes moving all violations of OOS Orders to the Unsafe Driving BASIC to make it easier to identify driver safety problems related to the behavior of operating while OOS.

Impact: The SMS snapshot data from FY 2015 shows that 574 carriers with operating while OOS violations would receive new BASIC measures; 48 additional carriers would be prioritized for interventions; and 82 carriers would no longer be prioritized for interventions. The SMS ET results show that this change would not impact the crash rate of those carriers identified for interventions.

Overall Impact of Proposed Enhancements

These proposed enhancements would help to sharpen the SMS’s focus on carriers that pose the greatest safety risk, while prioritizing a similar number of carriers for interventions as the current SMS methodology. Table 5 shows that these proposed changes would slightly decrease the number of carriers prioritized for interventions from 54,445 to 52,963 (-2.7 percent). Moreover, the group of carriers prioritized for interventions under these proposed changes would have a crash rate 8 percent higher than those currently prioritized (from 4.82 to 5.21 crashes per 100 PUs).

Table 5: Overall Impact of Proposed Enhancements

SMS Methodology Version	Carriers Prioritized for Interventions*	Crash Rate (Crashes per 100 PUs)**	Percent Increase in Crash Rate Compared to National Average (3.43)**
Current	54,445	4.82	41 percent
Proposed	52,963	5.21	52 percent
Percent Difference	-2.7 percent	+8 percent	

Source: *SMS Snapshot Data from FY 2015

**SMS ET Results

How Will FMCSA Inform Stakeholders?

FMCSA continues to actively seek stakeholder feedback and build upon our commitment to transparency. FMCSA published [a notice in the Federal Register](#) announcing planned enhancements to the SMS and requesting comments from our stakeholders. In a follow-on [Federal Register Notice](#), the Agency will announce a preview and comment period of the more robust set of enhancements outlined above based, in part, on that initial input. Following a 60-day comment period, the Agency will review feedback and make refinements prior to implementation. The Agency will specifically seek comments on when changes should be implemented in the SMS in light of the [Correlation Study](#) required by Section 5221 of the FAST Act. FMCSA is listening, because together we can save more lives.

Visit the [SMS Preview Website](#) for more information and to see example carriers that illustrate the proposed enhancements in action.