



**Motor Carrier Safety Assistance Program
Performance Standards, Measurements, and Benchmarks Working
Group
Special Emphasis Areas, Passenger and Hazmat Carriers - Methodology**

Proposal and Anecdotal Rationale for Measurement

It is critical that FMCSA and its state partners evaluate how passenger and hazardous materials (placarded HM) carriers are prioritized during roadside enforcement. This can be accomplished with a performance-based plan that maximizes resource focus within a simple, risk-based management system. While passenger and placarded HM carrier vehicles constitute a small percentage of the overall crash profile of any given jurisdiction, they represent high risk for property damage, injury and fatality to the motoring public. Due to the increased potential for loss of life, it is imperative that we remain proactive in our stance to eliminate crashes by considering the risk potential and structuring resources around what the analysis indicates rather than relying solely on crash outcomes. States are first tiered in terms of risk of high profile crashes.

Type of Measurement and Calculation

FMCSA and States (analysts) can determine the prevalence of a specific type of crashes by establishing the rate of those crashes to all crashes that occur in the State.

$$\text{HM Crash Rate} = \frac{\text{Crashes with placarded HM}}{\text{All CMV Crashes}}$$

This establishes a rate that analysts can use to approximate the risk that States have for potentially-severe hazardous materials incidents. That is, assuming that hazardous material vehicles are not more prone to crashes than non-hazardous material vehicles, this rate is a representation of the exposure of hazardous material vehicles to significant crashes.

Analysts can also use this calculation to approximate the response to this risk. That is, the rate of inspections of hazardous material placarded vehicles to all CMV inspections.

$$\text{HM Inspection Rate} = \frac{\text{Inspections with placarded HM}}{\text{All CMV Inspections}}$$

Finally, analysts can use the statistical function of normalizing the data to ensure proper analysis and distribution of the value into a bell curve. From this, analysts can establish a three-tiered approach to measuring State risk and response. States whose HM crash rates are especially low, thus reflecting a below-average exposure to HM risk, will be in Tier 1. States whose HM crash rates are consistent with the national norm are Tier 2. States with an above average risk, because the rate of hazardous material crashes are above the norm, are Tier 3. Analysts can use the same approach of below, consistent, and above the norm for the inspection (response) rate. FMCSA proposes that a State's inspection (response) tier must be equal to or greater than its crash (risk) Tier. That is, a State with a Tier 2 crash (risk) rate but with a Tier 1 inspection (response) rate may need to adjust its resources to properly respond to the risk.

The Tiers, by themselves, have no significant value. That is, being a Tier 1 inspection State, while indicating a below norm inspection rate, is not necessarily a bad thing. If the State is also a Tier 1 crash State, then being a Tier 1 inspection State means that the State is properly responding to the risk. Similarly, being a Tier 3 crash State is not a negative connotation, it simply means that the State has a higher exposure to hazardous material crashes (potentially because of many factors, including industries, ports, oilfield operations, etc).

A standard normal distribution has a mean of 0 and standard deviation (sigma) of 1. The numeric representation of Tier 1, Tier 2, and Tier 3 isn't associated with deviations from the mean, but rather arranges the two measurements in hierarchical order.

The Tiers are defined as follows:

Tier 1: A rate below one-half standard deviation below the mean (< -0.5)

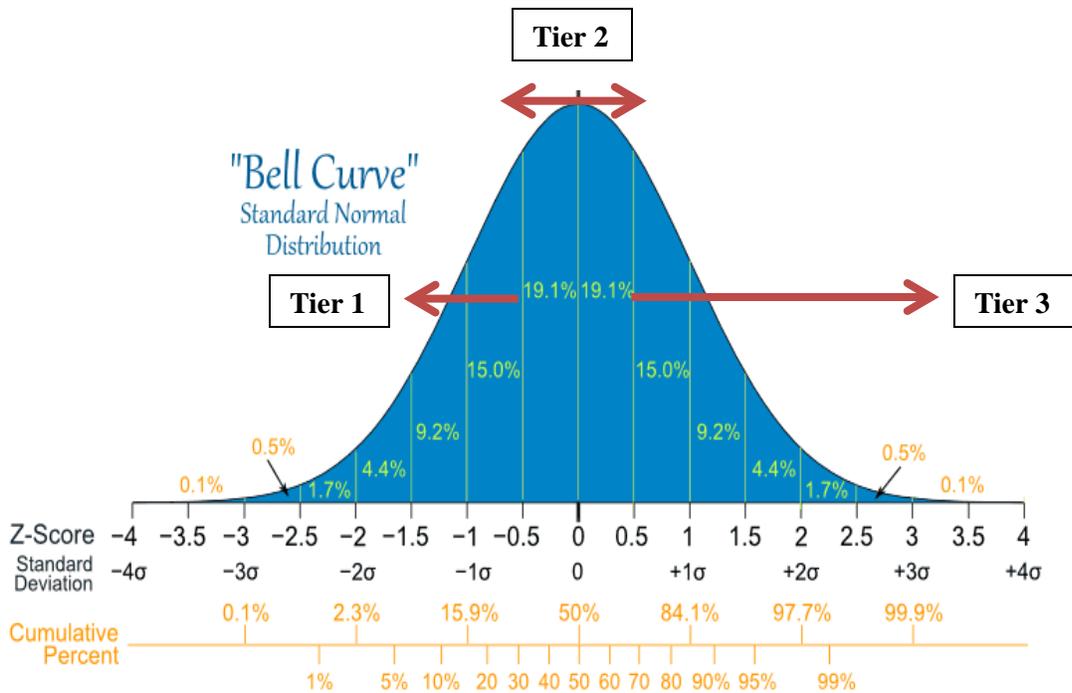
Tier 2: Within one-half standard deviation above and below of the mean ($-0.5 - 0.5$)

Tier 3: More than one-half standard deviation above the mean (> 0.5)

Data-Driven Rationale for Measurement

When jurisdictions are ranked by overall probability for crashes within the passenger and hazmat carrier subsets as an overall portion of their crash profile, there are only a portion of states that require a greater need for special emphasis carrier crashes. Therefore, the CVSPs for these states should reflect a greater emphasis on these areas and allows for the creation of a "floor" below which states would be expected not to fall in relative ranking with other states. Conversely, this will allow other States, at their discretion and based on an overall crash risk assessment, to appropriately reduce passenger and hazmat carriers where they are, in fact, over-represented if they choose to focus more inspections on general population carriers. States that fall within the higher risk tiers will be requested in Phase I to present deployment plans that address the specific areas they need to focus on in order to meet a minimum standard of inspections for that floor.

The purpose of this analysis is to provide a broad, easily understood and executable approach to identifying crash risks for specific types of operations and establish an objective criteria for measuring the response to that risk. This analysis is a work in progress and may be refined over time. As with any statistical analysis, there exists the potential for the data to inaccurately represent the true situation. Therefore, States will have the ability to present data that can document why the analysis is not accurate. If the specific data the State presents supports the assertion, FMCSA can modify the required response activity for that State.



Tier 1: A rate below one-half standard deviation below the mean (< -0.5)

Tier 2: Within one-half standard deviation above and below of the mean ($-0.5 - 0.5$)

Tier 3: More than one-half standard deviation above the mean (> 0.5)

2014

State	Crashes with Hazmat Placard Present	All Crashes	2014 Crash Rate	Standardized 2014 Crash Rate	2014 Crash Tier	2014 HM Inspections	2014 Total Inspections	2014 HM Inspection Rate	Standardized 2014 Insp Rate	2014 Inspection Tier
A	27	736	0.04	0.29	TIER 2	1,464	20,138	0.07	0.27	TIER 2
B	18	597	0.03	0.04	TIER 2	363	6,707	0.05	-0.34	TIER 2
C	3	392	0.01	-0.80	TIER 1	68	5,160	0.01	-1.70	TIER 1
D	40	809	0.05	0.77	TIER 3	1,157	17,183	0.07	0.10	TIER 2
E	2	2,574	0.00	-1.06	TIER 1	4,575	112,857	0.04	-0.79	TIER 1
F	14	1,795	0.01	-0.80	TIER 1	1,782	15,373	0.12	1.70	TIER 3