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## **WHITE PAPER**

# **Research Integrity: Review of Motor Carrier Safety Research Analysis Committee Letter Report**

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## Introduction

In December 2016, an ad hoc committee comprised of fifteen nationally recognized experts in transportation-related research from the Transportation Research Board held its first meeting to assist the Federal Motor Carrier Safety Administration (FMCSA) to strengthen its “research and technology (R&T) program to better meet the needs of the Agency’s safety mission as well as to inform commercial motor vehicle carrier enforcement, the research community, safety advocates, and industry of active and planned projects” and to “(a) assist FMCSA in refining its research methodologies; (b) assist in identifying and utilizing current research in the transportation and related communities; and (c) promote transparency of the FMCSA R&T activities.<sup>1</sup>” Although the committee, titled Motor Carrier Safety Research Analysis Committee (MCSRAC), is not well known, it might have profound implications for the trucking industry.

Most in the industry are aware that the highway reauthorization bill, Fixing America’s Surface Transportation (FAST) Act of 2015, directed FMCSA to re-evaluate many of its programs in light of continuing criticism and challenges to the Agency’s methodology and resulting enforcement actions through the Compliance, Safety, and Accountability (CSA) program and the Safety Management System (SMS). For example, FMCSA was directed in Section 5221 of the FAST Act to address these concerns by using the National Academies of Science (NAS) to review the Agency’s scientific methodology and to subsequently submit a corrective action plan to Congress in order to address any shortcomings. While the NAS Panel failed to examine the outcome of the CSA and SMS, it did highlight the lack of quality data within the Motor Carrier Management Information System (MCMIS), the utilization of invalid subject matter experts, the flawed weighted score methodology, and the lack of transparency associated with CSA and SMS.

Several organizations within the trucking industry, including the Owner-Operator Independent Drivers Association (OOIDA) Foundation (OOFI), have questioned the accuracy and reliability of FMCSA’s research and data. The NAS recently issued a report on *Fostering Integrity in Research* stating that research today often lacks the integrity needed within the research community. The report noted that “in industry-performed or industry-sponsored research, pressures associated with regulatory approvals or commercial release may create disincentives for full data transparency or biases that favor conclusions of safety and efficacy.<sup>2</sup>”

OOFI has long held that studies conducted through FMCSA’s R&T division have largely lost their credibility because the Agency has lost the confidence of the industry that it purports to manage and serve. OOFI in particular has discovered a pattern of manipulation and falsification

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<sup>1</sup> Motor Carrier Safety Research Analysis Committee Letter Report: March 13, 2017, [https://www.nap.edu/login.php?action=guest&record\\_id=24713](https://www.nap.edu/login.php?action=guest&record_id=24713)

<sup>2</sup> The National Academies of Sciences, Engineering, and Medicine, *Fostering Integrity in Research*, the National Academies Press (2017), <https://doi.org/10.17226/21896>

of data in FMCSA’s research.<sup>3</sup> It is important to note that when science is called upon to inform decision making, as it often is for FMCSA, there is an elevated risk that the research will be invoked in controversies, misrepresented, or shaped to advance a desired political outcome, contributing to poor decision making and loss of public trust.<sup>4</sup> The NAS has previously stated that “[t]he public will support science only if it can trust the scientists and institutions that conduct research.”<sup>5</sup> Currently, the trust between FMCSA and the trucking industry is broken.

## Research Integrity

According to the NAS, the integrity of research is based on adherence to core values – objectivity, honesty, openness, fairness, accountability, and stewardship. However the first of these is objectivity, meaning that a researcher should not be influenced by certain kinds of motivation but instead should be able to design experiments in which the hypothesis can be disconfirmed. OOFI has found that FMCSA’s research often lacks objectivity which is clearly demonstrated in the Agency’s model to measure the effectiveness of the CSA SMS and its interventions as the model was developed in conjunction with the very same entity which created the CSA SMS and currently administers the system, the John A. Volpe National Transportation Systems Center (Volpe). With such a conflict of interest, OOFI finds it difficult to believe that Volpe can objectively measure the ability of its own system to issue interventions and reduce crashes. It is critical that research be void of any potential bias, especially confirmation bias whereby a study is designed in such a way as to support a preconceived outcome. This is the foundation of scientific reliability.

However, OOFI has discovered numerous counts of confirmation bias within R&T’s research as their studies seldom pose a refutable hypothesis which is the inherent possibility that a statement can be proven false and the first key to objectivity. According to Karl Popper, objectivity consists of the freedom and responsibility of the researcher to (1) pose refutable hypothesis, (2) test the hypothesis with the relevant evidence, and (3) state the results clearly and unambiguously to any interested person. The goal of objectivity is that any other researcher can use the same information to replicate the work and reach the same conclusion. This is often referred to as reliability.

OOFI has found that the research conducted by the R&T division lacks any such reliability as evidenced in FMCSA’s study *Research on the Safety Impacts of Speed Limiter Device Installations on Commercial Motor Vehicles: Phase II Draft Final Report* (Speed Limiter Study). The study was published in 2012 as a “second” final draft; the first final draft was

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<sup>3</sup> *Review of FMCSA Studies*, OOFI (2015), <http://www.ooida.com/OOIDA%20Foundation/RecentResearch/Request/Download.aspx?type=White+Paper&document=Review-of-FMCSA-Studies.pdf>

<sup>4</sup> *Fostering Integrity in Research*

<sup>5</sup> National Research Council and Institute of Medicine, *Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct*, the National Academies Press (2002)

released in 2010. It is important to note that there was no new data collected, nor was there any new research conducted in the intervening time span and yet the Agency somehow reached a different conclusion. While the first final draft found that “because of data limitations and data quality, the research team could not definitely attribute the effect [of safety] to the presence of an active [speed limiter],<sup>6</sup>” the “second” final draft stated that “the findings showed strong positive benefits for [speed limiters].<sup>7</sup>” If FMCSA cannot even reproduce their own findings, how can the public be expected to do so?

Again, scientific objectivity is intended to ensure scientists’ personal beliefs and qualities—motivations, positions, material interests, field of specialty, prominence, or other factors—do not introduce biases into their work. Objectivity can be compromised when institutional expectations, laboratory culture, the regulatory environment, or funding needs put pressure on the scientist to produce positive results or to produce them under pressure.<sup>8</sup> Such was the case in 2012 when FMCSA published a Statement of Work (SOW) entitled *Research to Support Revisions to the Agency’s Electronic Onboard Recorder (EOBR) Rule*. Rather than take an objective and scientific approach to the concerns submitted by OOIDA and the U.S. Court of Appeals Seventh Circuit for the Agency’s 2010 EOBR Final Rule, FMCSA stated that “[t]he purpose of this task order is to obtain research support services in support of the Federal Motor Carrier Administration’s Electronic On-board Recorder (EOBR) rule.” Clearly the Agency was applying pressure on anyone who would accept funds for the research project to support the preconceived revisions that the Agency desired. This is a classic example of confirmation bias and is in direct violation of the integrity needed in research today as defined by NAS.

OOFI has not been the only organization or entity to criticize the Agency’s R&T division and their research methodology. As part of a larger appropriations bill in 2012, the Government Accountability Office (GAO) was directed in a Senate Appropriations Committee report to monitor FMCSA’s implementation of the CSA program and report its findings to Congress. To examine the effectiveness of CSA and to review the SMS methodology, GAO collected data from the MCMIS database, the backbone of the CSA SMS, in order to replicate the Agency’s method of calculating and determining a motor carrier’s safety performance. GAO concluded that “FMCSA’s methodology is limited because of insufficient information, which reduces the precision of SMS scores.<sup>9</sup>” Thus affecting the reliability of thousands of carriers’ SMS generated scores and thereby directly impacting their ability to operate a successful business. FMCSA has still not addressed this long-standing issue.

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<sup>6</sup> Gene Bergoffen et al., *Research on the Safety Impacts of Speed Limiter Device Installations on Commercial Motor Vehicles: Phase Two Draft Final Report*, FMCSA (December 2010)

<sup>7</sup> Richard J. Hanowski et al., *Research on the Safety Impacts of Speed Limiter Device Installations on Commercial Motor Vehicles: Phase II Draft Final Report*, FMCSA (March 2012)

<sup>8</sup> *Fostering Integrity in Research*, pg. 35

<sup>9</sup> GAO, *Federal Motor Carrier Safety: Modifying the Compliance, Safety, Accountability Program would Improve the Ability to Identify High Risk Carriers*, GAO (Feb 2014)

The Senate report also tasked GAO to continually and periodically assess FMCSA's CSA program. In October 2016, GAO released a report in which they examined the extent that FMCSA had (1) implemented CSA interventions, (2) evaluated the effectiveness and efficiency of CSA interventions, and (3) monitored progress toward achieving outcomes. Utilizing data from MCMIS between 2010 and 2015, the GAO found, "After evaluating the reliability of these data for our analytical and reporting purposes, we conclude that the data were of undetermined reliability, because data limitations prevented an adequate and comprehensive assessment."<sup>10</sup> Although GAO offered several recommendations to improve the CSA SMS, FMCSA has largely rejected them. Undoubtedly it is because of this rejection, as well as the Agency's continual dismissal of the unified objections posed by various industry stakeholders, that Congress was prompted to mandate the evaluation of the CSA SMS as part of the FAST Act.

### **Motor Carrier Safety Research Analysis Committee Letter Report**

In 2016, an ad hoc committee was established through the Transportation Research Board of the NAS with the project title, "Strengthening the Federal Motor Carrier Safety Administration Research & Technology Program." As described previously the MCSRAC was established to assist FMCSA strengthen its R&T program to better meet the needs of the Agency's safety mission as well as to inform commercial motor vehicle carrier enforcement, the research community, safety advocates, and industry of active and planned projects. While this committee may not draw the attention of the trucking industry as the FAST Act has done, it could become the most important with repercussions that could be possibly affect FMCSA's mandates, past, present, and future.

In March 2017, the MCSRAC sent a letter report to the Associate Administrator of the Office of Research and Information Technology at FMCSA conveying the results of the committee's first meeting. The first meeting served to introduce the MCSRAC to the FMCSA R&T staff and program of activities by providing a broad overview on the data and methodological challenges that the R&T program faces. The first report focused on (1) whether FMCSA is doing the right things in the right areas and (2) the recommendations concerning the data set for the 2016 report of the NAS on motor carrier operator fatigue and health (NAS 2016).

To determine whether FMCSA is doing the right things in the right areas, the committee asked for clarification on the Agency's goals and objectives for the R&T program. The Committee noticed at least two safety goals, first to strengthen FMCSA's R&T with regard to the Agency's policies and regulatory authorities, such as by addressing fatigue through research on hours of service (HOS) regulation, and second to conduct research and assist in technology development to reduce the frequency and severity of large truck and bus crashes. From the letter report, it appears that the R&T staff questions their current directives and would prefer to focus on the

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<sup>10</sup> GAO, *Motor Carriers: Better Information Needed to Assess Effectiveness and Efficiency of Safety Interventions*, pg. 45

actual cause of crashes in order to inform strategic planning and subsequent research which could then produce better safety countermeasures.

During the meeting, the MCSRAC heard from Dr. Martin Walker of FMCSA that the R&T program has focused on serving internal FMCSA R&T customers, such as program managers in rulemaking and enforcement, and responding to congressional mandates for specific projects over the last decade. OOFI has continually stated that FMCSA is more interested in activities, compliance, and rulemakings that justify its programs rather than conducting any meaningful research on actual crash reduction. The letter report verified OOFI's statement by concluding, "The committee questions whether the present approach of the R&T program is missing an opportunity to ascertain more broadly the factors contributing to large truck and bus crashes and to identify, evaluate, and implement suitable countermeasures...The resulting projects include important safety concerns but appear to lack an integrating principle."

The committee also recommended that FMCSA "should not preclude modest investments in data gathering and analysis to understand risks of large truck and bus crashes more broadly." During the initial meeting, R&T staff expressed a desire with the MCSRAC to conduct research that could assist the Agency in obtaining a better understanding of the "cause of crashes" and thereby produce better safety countermeasures. The R&T staff asked the committee to consider alternatives to the Large Truck Crash Causation Study (LTCCS) which FMCSA did in collaboration with the National Highway Traffic Safety Administration (NHTSA).

Although the LTCCS is frequently referenced by the Agency as a definitive study on crashes, OOFI has taken a strong stance against its utilization as it is a prime example of data manipulation. The LTCCS is founded upon assumptions based on merely anecdotal information, and includes "creative" terms which have no real meaning and may in fact obscure the process of finding the cause of crashes. The committee, while not as direct in their criticism, stated that the LTCCS had limited value because of the small sample size and the lack of exposure estimates. The MCSRAC also stated that the process for assigning the "critical reason" in the LTCCS is not well defined, since crashes can have multiple contributing factors, none of which may be primary. In addition, the focus of the "critical reason" on the few seconds preceding the crash can obscure effective countermeasures, which are less proximate.

As noted by the committee, the R&T division primarily focuses their countermeasures on drivers, vehicles, and carriers, but excludes the interacting effects of the environment and roadway. This same criticism was also noted by GAO during their evaluation of FMCSA's annual review concerning the effectiveness of CSA interventions. In particular, GAO stated that the Agency did not sufficiently account for external factors, such as weather and economic conditions, which could affect crash rates.<sup>11</sup>

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<sup>11</sup> Ibid



## Crash Data

The collection and utilization of crash data in regards to FMCSA is critical to the Agency's research integrity. FMCSA, NTSB, and other safety groups are quick to highlight "fatigue" as a major issue and a leading cause of crashes within the trucking industry. While not downplaying the effect of fatigue, the committee stated that this single minded approach to a complex problem is misdirected and believed that it is important to focus on the factors that contribute to fatigue rather than the role of fatigue itself in crashes. While FMCSA has initiated several programs and regulations, such as CSA, electronic logging devices, and revisions to the HOS, in an attempt to mitigate fatigued driving, these countermeasures have obviously been ineffective in reducing crash rates involving large trucks as they ignore the broader risks and safety strategies that influence crashes.

Although OOFI has repeatedly asked FMCSA to examine other potential problems that cause fatigue, such as detention time and hourly compensation, the Agency has not made a concerted effort to address these concerns. It appears instead that FMCSA is more concerned with meeting the needs of program managers and enforcement to promulgate more mandates with no proven safety benefits. In fact, a review of the CSA program demonstrates that while fatal, injury, and property-damage-only (PDO) crashes decreased by 34%, 33%, and 26% respectively between 2004 and 2009 prior to the implementation of CSA 2010, these same crashes have increased by 17%, 59%, and 40% following the introduction of CSA, thereby reversing safety improvements.<sup>12</sup>

Rather than continue on an ineffective course, the MCSRAC suggested that the R&T assemble relevant information concerning motor coach and truck crashes from existing data sets. For example, FMCSA's own data shows that most truck enforcement activity occurs on Interstate highways even though the non-Interstate fatal crash rate per truck mile traveled is two and one-half times greater. It is important that R&T broaden its perspective of crash risk more holistically, such as crash location, rather than focus primarily on the aspects of drivers, vehicle maintenance, and carrier performance.

Prior to the implementation of CSA in 2010, OOFI questioned whether demographics would be considered in the safety ranking of motor carriers as a carrier that operates regularly between Kansas City, Missouri and Denver, Colorado along the I-70 corridor should not be compared against a carrier operating in the northeast along the I-95 corridor. The risk factors are vastly different for these two corridors. Though FMCSA does not currently take demographics into account, the committee strongly recommended that "FMCSA consider a program of study that includes consideration of the effect of environmental factors, traffic levels, vehicle technologies,

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<sup>12</sup> *A Performance Review of CSA indicates that CSA should be placed Out-of-Service and its authority revoked*, OOIDA Foundation (Sept 2016).

and roadway design on large truck and bus crashes in addition to their current set of contributing factors.<sup>13</sup>”

The MCSRAC recommended that R&T collect data on crash location (latitude and longitude), time of day and date, citation, and that contributing factors be integrated into the MCMIS crash files. Linking this information with Police Accident Reports (PARs) will allow the Agency to look at traffic data for exposure-based analysis. The committee also recommended linking carrier-involved fatal crashes found in the Fatality Analysis Reporting dataset with carrier attributes such as size, business address, and type of carrier across multiple states. The MCSRAC ultimately recommended that FMCSA collaborate with other federal agencies such as NHTSA and the Federal Highway Administration (FHWA) to gather data which would provide additional insights into the “cause of crashes.”

However, in order to appropriately collect and analyze the various crash datasets it is crucial that individual states adhere to the Model Minimum Uniform Crash Criteria (MMUCC) which seeks to develop a uniform reporting form for all states to use. In a notice published in the *Federal Register*, NHTSA, FHWA, FMCSA, and the Governors Highway Safety Association acknowledged “that the lack of uniformity reporting make the sharing and comparison of State crash difficult because different elements and definitions result in incomplete and misleading results.<sup>14</sup>” Through the grant program entitled the “Motor Carrier Safety Assistance Program,” FMCSA has the resources to make states utilize the MMUCC which would address some of the NAS recommendations and help to make crash data uniform and valid.

FMCSA often complains of being underfunded but does not use the funding they do have to achieve the data validity and reliability to pursue effective enforcement activities. While OOIDA and OOFI have some concerns with certain parts of the MMUCC, overall they agree that the need for uniform data would provide a more solid basis for rulemaking and enforcement that does support the mission statement of FMCSA.

### **Safety Research Methods**

The letter report also identified that FMCSA relies heavily upon naturalistic driving studies (NDS) to evaluate the behavior of drivers while they are on the road. However, NDS are incredibly limited due to the fact that crashes are rare events. Thereby the Agency created safety critical events (SCEs) to stand as a proxy, which include events such as hard braking or lane changes. The committee nevertheless asked “[w]hat is the standard of proof for a proxy measure as an indicator of crash risk?”

Dr. Ronald Knipling, a well-respected safety analyst, has challenged the entire utilization of NDS as a proxy for crashes as they are based entirely on different driver behaviors. All crashes are a tangible external consequence, whereas SCEs are defined by driver maneuvers where there

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<sup>13</sup> Motor Carrier Safety Research Analysis Committee Letter Report

<sup>14</sup> Model Minimum Uniform Crash Criteria; Docket number: NHTSA-2016-0089

is no crash. In a 2015 report, Dr. Knipling referenced an oft cited FMCSA study, the *100-car Naturalistic Driving Study*, in which there were 9,125 SCEs reported as near crashes but in reality only 69 had any impact. Of these, five caused injuries and another seven were police reported property-damage only crashes, making the total police-reported percentage 0.1%. “If crashes themselves vary greatly in regard to when, where, how and why they happen, what is the likely representativeness of events that are not even crashes?”<sup>15</sup> Nevertheless, FMCSA frequently utilizes these non-crash events as a proxy for actual crashes in order to derive the number of lives that they believe will be saved by promulgating various regulations and programs.

Finally, the MCSRAC identified another frequent concern of OOFI, namely the common practice of FMCSA to select Volpe or other favored transportation research groups that are likely to support the Agency’s preconceived conclusions. Again, there can be no research integrity if FMCSA does not allow for a refutable hypothesis. The committee recommended that FMCSA use funded researchers to publish their results in peer-reviewed journals. OOFI has previously suggested that FMCSA create an ombudsman or utilize an unaffiliated third-party to select the best applicants to receive project funding based on their application and expertise in the study area.

## Conclusion

An ad hoc committee of the National Academy of Sciences, the Motor Carrier Safety Research Analysis Committee, was formed under the direction of the FAST Act to review the research and technology program within FMCSA. A preliminary letter report identifying concerns of the first meeting between the committee and the R&T program personnel verified a number of sanctions lodged against FMCSA’s methodology and research by several outside sources. During the initial meeting, the R&T staff acknowledged that much of their research was conducted to support internal managers, rule-makers, and enforcement. While this is important, the staff recognized that they were not focusing enough on improved data collection and analysis in order to better understand the risks and the causes of large truck crashes. The committee ultimately found that the R&T program failed to gather complete information on various factors, such as location, weather, economic conditions, etc., that could contribute or lead to a crash.

OOFI believes that the Agency’s concentration on meeting internal needs has contributed to a confirmation bias within their research, meaning that a conclusion is already assumed and a study is therefore designed to support said conclusion. Thus it is important that FMCSA allow for a refutable hypothesis in their research designs and utilize data sources already available to them, such as FARS, to enhance insights in crash factors. However, any rulemaking or

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<sup>15</sup> Knipling, Ronald R., Diving Assessment 2015 Conference, Snowbird Utah, June 22-25, 2015; *Naturalistic Driving Events, No Harm, No Foul, No Validity*.

enforcement activities based upon these data sources should be limited while the Agency should allow for peer reviews of their research by sources outside of their domain.

The committee also questioned the use of naturalistic driving studies in determining the causes of crashes or in formulating rules as NDS are limited due to infrequent crash occurrences. The MCSRAC challenged the assumption that safety critical events are a suitable proxy for actual crashes, and yet, as OOFI has demonstrated, FMCSA frequently utilizes SCEs in their self-evaluation of the effectiveness of the CSA program and SMS, which affects the livelihood of over 500,000 motor carriers and 6 million drivers.

In conclusion, OOFI looks forward to further reports submitted by the MCSRAC as the committee continues its work for several more months.