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**WHITE PAPER**  
**Review of FMCSA's Regulatory Evaluation of  
Electronic Logging Devices**

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## Introduction

On December 16, 2015, the Federal Motor Carrier Safety Administration (FMCSA) published a Final Rule entitled *Electronic Logging Devices and Hours of Service Supporting Documents (MAP-21)* to establish (1) minimum performance and design standards for hours-of-service (HOS) electronic logging devices (ELDs); (2) requirements for the mandatory use of ELDs by drivers who are required to prepare HOS records of duty status (RODS); (3) requirements concerning HOS supporting documents; and (4) address concerns about harassment resulting from the mandatory use of ELDs.<sup>1</sup>

Considering the substantial cost that the Final Rule will impose upon the trucking industry, FMCSA determined that the rule is economically significant; thereby the Agency was required to conduct a regulatory impact analysis (RIA) in order to calculate the benefits and costs associated with an ELD mandate. However, in attempting to understand FMCSA's *Regulatory Evaluation of Electronic Logging Devices and Hours of Service Supporting Documents Final Rule*, the industry must accept the *assumptions* under which the cost and benefits are founded.

The Owner-Operator Independent Drivers Association Foundation (OOFI), the research and educational arm of OOIDA, which is the largest non-profit national trade association representing small business owners and professional truck drivers, took exception with many of these assumptions and found that most of them are not based on sound science as FMCSA would like to have the industry to believe. It is difficult for OOFI to accept a mandate which will affect hundreds of thousands of carriers and millions of drivers that is based upon mere assumptions, which are of themselves founded upon *beliefs* rather than facts and scientific validity.

OOFI recognizes the difficulty behind any rulemaking that FMCSA might impose upon the trucking industry, as it is highly diversified and no one mandate will possibly fit all the various motor carriers and truck drivers. Nevertheless, OOFI and the industry expect FMCSA, as well as all Federal agencies, to follow acceptable and scientific methodology based on empirical evidence that is both reliable and valid. Reliability and validity are the cornerstones of any scientific research, especially for rulemakings that will impact the livelihood of millions and cost the industry billions of dollars.<sup>2</sup>

## Assumptions versus Facts

The following section is a partial synopsis of the assumptions that must be accepted by the reader in order to justify FMCSA's conclusions. Each assumption is followed with facts that seemingly contraindicate those beliefs. It is important to note that perhaps OOFI's greatest apprehension concerning the Agency's RIA is the fact that FMCSA frequently admits that their assumptions are not

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<sup>1</sup> *Electronic Logging Devices and Hours of Service Supporting Documents (MAP-21)*, FMCSA (2015).

<sup>2</sup> OOFI has offered other instances where FMCSA has used questionable scientific methodology in order to justify their regulations, referred to by OOFI as "we believe science" and "assumption science". OOFI feels that this particular mandate is the most egregious abuse of data and manipulation of statistics that FMCSA has to date offered.

based on fact. Nonetheless, FMCSA continued to utilize their questionable formulas in order to justify the ELD mandate.

Section 32301(b) of the Commercial Motor Vehicle Safety Enhancement Act, as enacted by the Moving Ahead for Progress in the 21<sup>st</sup> Century Act (MAP-21), mandated that the Secretary of Transportation adopt regulations requiring commercial motor vehicles (CMVs) involved in interstate commerce, which are operated by drivers required to keep RODS, to be equipped with ELDs. In particular, MAP-21 prescribed that an ELD must:

- Accurately record commercial driver hours of service;
- record the location of a commercial motor vehicle;
- be tamper resistant;
- be synchronized to the operation of the vehicle engine or be capable of recognizing when the vehicle is being operated; and
- be able to record a driver's hours of service and duty status accurately and automatically.<sup>3</sup>

**Assumption and Belief:** The Agency has recognized that although MAP-21 requires that an ELD "accurately record commercial driver [HOS]," there is no current technology that can automatically record on-duty not driving (ODND), off-duty, or sleep-berth times without manual input from the driver.<sup>4</sup> FMCSA however *believes* that they have fulfilled the "intent" of the MAP-21 mandate.

**Fact:** ELDs, as proposed, can only record when the truck is in operation, all other duty statuses have to be inputted manually.

**Assumption and Belief:** "Use of ELD technology is intended to significantly reduce or eliminate false or erroneous driving time records, and reduce false and erroneous on-duty, off-duty, and sleeper-berth entries. The ELD final rule is intended to improve CMV safety and reduce the paperwork burden by increasing the use of ELDs within the motor carrier industry, which FMCSA *believes* will improve HOS compliance, and thereby reduce the number of crashes related to CMV driver fatigue associated with violations of the HOS rules (*emphasis added*).<sup>5</sup>"

**Fact:** FMCSA recognized that only one of the four duty statuses can truly be recorded automatically as required by MAP-21 without input from the driver.

**Assumption and Belief:** Perhaps the most egregious assumption that FMCSA presents in the RIA is their utilization of "driver wages" as a cost benefit for the Final Rule. FMCSA is well aware that a vast majority of drivers affected by the ELD mandate are not paid hourly wages, nor do they receive or qualify for fringe benefits. Instead, a large percentage of the trucking industry is compensated on a per

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<sup>3</sup> MAP-21 Section 32301

<sup>4</sup> *Electronic Logging Devices and Hours of Service Supporting Documents Supplemental Notice of Proposed Rulemaking*, FMCSA (2014), pg. 38.

<sup>5</sup> Brian Preslopsky et al., *Regulatory Evaluation of Electronic Logging Devices and Hours of Service Supporting Documents Final Rule*, FMCSA (2015), pg. 3-4.

mile basis. The Agency has primarily justified the cost of the rulemaking by inflating the cost benefits that motor carriers will supposedly receive by not having to pay drivers for filling out a paper logbook.

The RIA also included fringe benefits, which consists of health insurance, Medicare, unemployment insurance, overtime pay, worker compensation, etc., as part of the drivers' hourly wages. The final savings was therefore valued at \$31 per hour for every driver. While FMCSA does admit that a majority of drivers are not paid for time spent filling out or forwarding paper RODS, they *believe* that the driver's time is valuable and that they *should* receive compensation for their time.

**Fact:** FMCSA's assumption is laudable, but it does not alter the fact that in the real-world, drivers are not paid for completing paper logs. Nonetheless, because the Agency *believes* a driver *should* be paid they included this labor cost savings in the RIA, resulting in \$2,438 million per year (annualized using a 7% discount rate) that drivers should be paid, thus saving motor carriers' from expenses that they do not actually incur.

It is important to understand again that most carriers do not pay hourly wages, so the savings that they will receive is \$0.00. Additionally, fringe benefits are not offered for approximately 96 percent of the trucking industry as most companies have fewer than 50 employees and will not pay for medical insurance. Owner-operators in particular will not receive fringe benefits because they do not fall under overtime pay, workers compensation, etc., therefore affecting the supposed labor cost savings. Ultimately, the cost benefit for time saved spent filling out a paper log is zero and fails the cost-benefit analysis. The Agency was only able to "justify" the Final Rule by exaggerating the benefits and including higher than average hourly wages.

**Assumption and Belief:** FMCSA estimated that 26 fatalities, 562 injuries, and 1,844 crashes will be prevented each year with the installation of ELDs. According to Table 8 of the RIA, these preventions generated savings of \$11 million per fatality, \$453,000 per injury, and \$72,000 per crash, for an average cost per crash of \$272,000. The Agency attempted to justify these figures by utilizing extremely convoluted formulas and assumptions that were not based on empirical evidence. From these costs, FMCSA estimated that ELDs would produce a total benefit savings of \$572 million for "safety."

**Fact:** In order to project the crash costs, FMCSA followed guidance from the USDOT Office of the Secretary of Transportation, which utilizes the newest value of statistical life (VSL) of \$9.2 million to evaluate fatalities and the Abbreviated Injury Scale (AIS) to assess injuries. Since police accident reports do not record AIS, FMCSA used three different sources, FMCSA's Large Truck Crash Causation Study, the General Estimates System, and the Fatality Analysis Reporting System, none of which actually relates to the police accident reports, to fill in the data gaps and estimate the cost of injuries.

**Assumption and Belief:** In order to attempt to gain a comprehension of the RIA, one must first make the basic assumption that compliance is equal to safety. In other words, an individual must accept the premise that motor carriers who violate the HOS rules are more likely to be involved in crashes than those who do not. FMCSA has admitted that crashes seldom have a single cause but *assume* that compliance with the HOS regulations will decrease crashes and therefore show a benefit that outweighs

the costs associated with purchasing and installing ELDs. FMCSA attempted to validate these benefits through a convoluted mathematical analysis which was founded upon assumptions, while also utilizing an extremely small and outdated data set.

**Fact:** When reading the RIA, there are two facts that are crucial to remember. One, at no time was fault considered in any crash, and two, at no time does FMCSA directly relate the crashes to any violation. Rather than attempt to associate a specific violation with an accident, FMCSA simply assumes that all HOS violations have a nexus to crashes, including form and manner violations, which the Agency readily admits has little or no correlation to crashes. Table 11 of the RIA, entitled "Estimated Crash Reductions for HOS Violations," indicated that form and manner violations pose a higher crash risk than for violating either the 11<sup>th</sup> hour or the 14-hour rules.

Further, the Agency contradicted itself by stating that multiple violations in any one category do not have a compounding effect on crash probability. However, if each violation truly has a relationship with crashes, then multiple violations should compound the probability of a crash regardless of the category.

**Assumption and Belief:** Rather than using a representative sampling of motor carriers who currently use ELDs in order to assess the effectiveness of the devices, FMCSA constructed their effectiveness measure by using data from two carriers that had voluntarily installed AOBRDs because of their poor HOS ratings and three carriers that agreed through settlement agreements to install AOBRDs in lieu of paying civil penalties for their habitual HOS compliance violations. FMCSA formulated their baseline on the effectiveness of ELDs for the entire trucking industry based upon data from just three of these five carriers.

**Fact:** The Agency recognized that these carriers were not representative of the industry, as they all have higher than average HOS violation rates, but nonetheless, FMCSA still utilized their data as being reflective of the overall effectiveness of ELDs. There is no mention of any changes that occurred in the actual crash rate of these carriers. In fact, FMCSA notes that crashes are rare events, which sets up their assumption of statistical probability. "The Agency was not able to construct statistically significant measures of safety improvement for carriers that installed ELDs by directly examining the crash data of these carriers because crash is a rare occurrence for an average CMV."

According to the basic concept of scientific inquiry, FMCSA is required to have a sample size that is representative of the trucking industry and yet only five carriers were selected for the basis of the Final Rule. Moreover, the Agency excluded all information concerning these motor carriers, including demographics, the number of power units, and the number of drivers, from the RIA. The only information that FMCSA provided was the fact that these carriers were required to have AOBRDs because of habitual HOS violations.

**Assumption and Belief:** FMCSA utilized obsolete data from the pre-2003 HOS regulations for reference when more meaningful and current data was readily available under the newest HOS regulations. The Agency admitted that did not conduct any new studies utilizing current data for the RIA.

**Fact:** Comparing data which was used prior to the current HOS regulations and applying to the industry today is unscientific and seriously calls into question the validity of the findings used by FMCSA as the baseline for the effectiveness of ELDs.

**Assumption and Belief:** It is critical to note that actual crashes were not presented as part of the RIA, instead the reader must make the assumption that HOS violations can be utilized to predict future crashes. Thus, rather than utilizing crash rates, FMCSA developed what they call “crash risk probability,” which expresses the likelihood of a crash with a violation by using the ratio of the number of crashes with a recorded violation to the number of days that drivers drove with that violation. The risk probability prior to an intervention (i.e. roadside inspection, intervention letter, etc.) is the ratio of the number of times that a crash occurred when drivers were in violation to the total number of times that drivers were in violation. FMCSA stated that this provided the relationship in the data between violations and crashes.<sup>6</sup>

**Fact:** The Agency did not adequately explain mathematically nor statistically how they were able to “accurately” predict crashes based solely upon HOS violations, out-of-service (OOS) violations, and the duration of the violation. OOFI found FMCSA's explanation to be severely lacking and convoluted. For example, FMCSA never referenced at-fault crashes, related a crash to a specific HOS violation, nor did they explain why HOS violations which affect fatigue only have a positive effect on a driver for 30 days following the violation. Instead, the reader is forced to *assume* that the cause of the crash is somehow directly related to the HOS regulation which was violated no matter what might have actually occurred. Equally as puzzling was FMCSA's inclusion of violations for load securement and unsafe driving in their formula for crash risk probability, as neither of these violations would be affected by an ELD. OOFI found that the only reasonable conclusion behind the incorporation of these two violations was to inflate the crash risk probability and thereby the safety benefits associated with ELDs.

For the reader to comprehend the Agency's formula, it is first critical to suspend all logic and accept FMCSA's assumptions as fact. In so doing, the reader can begin to comprehend the definition of risk probability, which stated in simple terms means that if a driver has a violation and is subsequently involved in a crash, the statistical probability of a future crash is dependent upon the number of days that he or she drove with that violation prior to the accident occurring. Regardless of who was at fault in the crash or even if the violation had any relative factor in the crash taking place, FMCSA's crash risk probability appears to imply that just because a driver received a violation makes him or her more likely to have an accident, especially if the violation occurred within 30 days of the violation date.

OOFI had great difficulty in understanding the rationality behind both the formula and the concept of crash risk probability as a whole, as it seems that all logic and true statistical and scientific methodology must be suspended in order to justify its application in the cost-benefit analysis. For a deeper inquiry into this formula and how it is applied across a number of violations, see the section later on in this work entitled “Analysis of Appendix E.”

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<sup>6</sup> *Ibid.*, pg. 39

**Assumption and Belief:** FMCSA gathered information from fleet management system (FMS) vendors in order to project the costs of ELDs. While the Agency recognized to some degree that vendors do not always disclose the costs of extra required hardware to the customer, FMCSA opted to accept the vendors' annualized pricing, which was \$419 for an ELD with telematics, \$93 to upgrade an FMS, and \$128 to replace an automatic on-board recording device (AOBRD).

**Fact:** Motor carriers who already had ELDs installed on their trucks offered far differing cost and maintenance concerns than what the vendors provided.

**Assumption and Belief:** In an attempt to address the problem statement, FMCSA determined that there are HOS violations which can lead to CMV driver fatigue. Thereby the Agency stated, "Using technology to improve recording of CMV driver activity can reduce fatigue by helping carriers to prevent drivers from exceeding driving time and related on-duty time limits as well as preserving off-duty time for drivers to recover."<sup>7</sup>

**Fact:** It is already in the best business interest of the motor carriers to know the time that they will take to deliver a load and the distance that must be traveled so that they can properly prepare their revenues and costs. Hence it is doubtful that ELDs will be utilized to prevent drivers from improperly using on-duty time, of which there is no limit (only driving time and how many hours a driver must be off before driving is limited), and which status must be manually inputted.

Moreover, OOFI questions how an ELD will preserve off-duty time for drivers to recover as this too has to be inputted manually. It appears that FMCSA's perception of fatigue is restricted to only driving time and as long as the driver does not exceed 11 hours in a 14-hour window, or driving after working 70 hours in 8 days, he or she will not be fatigued.

It is important to understand that while MAP-21 mandated that FMCSA address driver harassment, the RIA does not include any real valid research involving the harassment of drivers through the use of ELDs. Instead, the Agency pointed to a survey that they commissioned entitled *Attitude of Truck Drivers and Carriers on the Use of Electronic Logging Devices and Driver Harassment*, which concluded that harassment does not occur due to being in a situation where HOS are logged using ELDs.<sup>8</sup> However, FMCSA failed to mention that the data from the survey actually demonstrated that thousands, and even hundreds of thousands of drivers in some cases, are requested to violate the regulations by their carriers. If FMCSA does not view these figures as statistically significant, then they should at least recognize that the percentage of all violations that are related to the HOS cannot be held as a significant cause in a crash.

**Assumption and Belief:** Finally, FMCSA assumed that the majority of carriers would periodically and systematically equip ELDs onto their trucks through the succeeding years regardless of the mandate as

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<sup>7</sup> *Regulatory Evaluation*, pg. 7.

<sup>8</sup> Frank Lynch et al., *Attitudes of Truck Drivers and Carriers on the Use of Electronic Logging Devices and Driver Harassment*, FMCSA (Nov 2014), pg. 3.

the return on investment became more and more apparent. The Agency utilized a Sigmoid Curve in order to forecast a timeline of voluntary acceptance.

**Fact:** However, the accuracy of this timeline is strongly dependent on if there are true returns on investments and if the cost of the technology were to decrease. FMCSA apparently does not appreciate or recognize that a Sigmoidal Curve used in economic predictions functions on the principle that there are specific instances within the curve where changes are required in order for the trend to continue. In fact, one of the primary purposes of the Sigmoid Curve is to continually remind the business person of the need to reexamine their economic position and determine when a change may be required.

## Review of the Regulatory Impact Analysis

Again, because the Final Rule is determined to be an economically significant regulatory action, FMCSA was required under Executive Order (EO) 12866, as supplemented by EO 13563 to conduct a proper RIA. As part of the RIA, the Agency was charged with (1) identifying the target problem and including a statement for a need for action; (2) discussing alternative approaches; (3) defining the scope and parameters of the analysis; (4) defining a baseline; (5) defining and evaluating the benefits and costs of the rule and the alternatives; (6) comparing the benefits and costs; and (7) interpreting the benefits and costs results. The following is a summarization of the Agency's RIA and subsequent assumptions.

### Background

According to FMCSA, the goal of the HOS regulations is to promote the safe operation of CMVs by limiting the on-duty driving time of a driver. For enforcement purposes, the Agency conducts regular roadside inspections and compliance reviews to ensure that drivers and carriers are operating within the HOS limits. Utilizing data from the Motor Carrier Management Information System, FMCSA cited that 5.5% of inspections in 2012 that examined HOS resulted in at least one OOS violation of the HOS rules and that 3.8% of all inspections that included HOS violations were issued OOS citations for missing, incomplete, improper or fraudulent records of duty status. FMCSA failed to mention however that many of the HOS violations have no nexus to crashes, as indicated by their own data. Rather instead, the Agency allows the reader to *assume* that these violations have a direct correlation to safety.

Moreover, the RIA stated that according to an online survey, which included biases that precluded it from being utilized in FMCSA's numerical analysis, 78 percent of CMV drivers believe that the most common and deliberate HOS violation is logging off-duty when actually on duty. The Agency seemingly ignored the fact that this type of violation is just as possible with an ELD as it is with a paper logbook, as off-duty time will still have to be manually recorded by the driver.

In response to the Agency's 2014 supplemental notice of proposed rulemaking (SNPRM), OOIDA commented that violations for driving beyond the 11<sup>th</sup> hour, which FMCSA cited in previous rulemakings as being one of the primary causes for the need of a mandate, accounted for merely 0.9 percent of HOS violations in 2009. FMCSA corrected the Association in the Final Rule by clarifying that violations of driving beyond the 11<sup>th</sup> hour represented 0.9 percent of total driver inspections. While FMCSA stated

that “the rate of [OOS] violations...related to HOS was about 5.8 percent in 2009, which implies that the 11<sup>th</sup> hour violations were present in 16 percent of inspections in which there was an [OOS] order due HOS,<sup>9</sup>” the Agency missed the point that 99.1 percent of all inspections do not include the 11<sup>th</sup> hour violation and 94.2 percent of all inspections do not include an HOS related OOS violation. In addition, they did not present any empirical evidence which demonstrated that these OOS violations lead to a real-world crash, but instead they referred to them simply as compliance.

### **Description of the Final rule**

The purpose of the RIA was to provide an assessment of the costs and benefits of requiring carriers to install ELDs in their trucks. The premise behind the entire analysis is that the “use of ELD technology is *intended* to significantly reduce or eliminate false or erroneous driving time records, and reduce false and erroneous on-duty, off-duty and sleep-berth entries.<sup>10</sup>” According to FMCSA, “The ELDs record some but not all aspects of CMV use automatically, which is why false entries would be reduced but not eliminated.” However, three of the four duty statuses still require at least some, if not complete, input from the driver and driving time can be adjusted. OOFI severely questions how many HOS violations will truly be reduced and their relation to safety.

Although FMCSA *believes* that ELDs will improve HOS compliance and thereby reduce the number of crashes related to CMV driver fatigue associated with violations of the HOS rules, their own study, entitled *Evaluating the Potential Safety Benefits of Electronic Hours-of-Service Recorders Final Report*, found a different result. The study separated eleven motor carriers into two different cohorts, one that equipped their trucks with electronic hours-of-service recorders (EHSRs), or in other words ELDs, and one that did not. According to the study, “No differences were found between the EHSR cohort and the non-EHSR cohort for USDOT-recordable and fatigue related crash rates.<sup>11</sup>”

Notwithstanding the Agency's assumption that ELDs improve compliance, it is important to remember that the problem statement only included 5.5 percent of HOS inspections in 2012 that resulted in an OOS order and 0.9 percent of all inspections in 2009 that had an 11<sup>th</sup> hour violation. If the reader were to remove the 3.8 percent of violations that were related to form and manner, as well as several other HOS violations that do not have any relationship to fatigue, the number of violations that an ELD effectively could eliminate in order to improve fatigue grows smaller and smaller.

### **Cost of ELDs**

Among the changes that occurred between the SNPRM and the Final Rule, the Agency's estimate concerning the cost of purchasing an ELD decreased. Rather than contacting motor carriers who utilized ELDs, FMCSA relied solely on marketing materials and FMS vendors for pricing information even though the Agency admitted that vendors do not disclose all the costs associated with ELDs. “The Agency has found that many manufacturers do not disclose costs of extra required hardware in their promotional

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<sup>9</sup> Final Rule, pg. 224.

<sup>10</sup> *Regulatory Evaluation*, pg. 3-4.

<sup>11</sup> Jeffrey S. Hickman et al., *Evaluating the Potential Safety Benefits of Electronic Hours-of-Service Recorders Final Report*, FMCSA (April 2014), pg. 39.

material, such as smartphone (usually running the Android operating system) as a user interface or the hardware needed to connect to a CMV on-board diagnostic port such as a J1939 port.<sup>12</sup> OOFI has demonstrated in the past that FMCSA and other agencies, such as the Environmental Protection Agency, have frequently underpriced technologies while also exaggerating the useful life of the equipment.

For example, the 2011 electronic on-board recorder (EOBR) notice of proposed rulemaking priced the EOBR devices between \$1,500 and \$2,000 per unit, while vendors claimed that the cost of such a device was between \$600 and \$800. A study published by the American Transportation Research Institute called *Electronic On-Board Recorder Adopting in the Trucking Industry: Issues and Opportunities* found that drivers and motor carriers who used EOBRs had a different viewpoint on costs than did safety managers and vendors. The study concluded that a majority of motor carriers paid \$1,000 or more per unit, with 37 percent indicating that they paid more than \$2,000. Whereas 33 percent of vendors stated EOBRs cost less than \$500.<sup>13</sup>

Regardless of the purchase price of an ELD unit, there are other costs associated with the device such as a monthly subscription fee, which can easily exceed the cost of a paper logbook, maintenance fees, purchasing a computer or multipurpose device (i.e. smartphone, tablet, etc.), and monthly data plans. In the RIA, FMCSA assumed that all motor carriers own or have access to computer technology, such as personal computers, tablet devices, or smartphones, thus the Agency “did not consider an estimate of the cost of purchasing these types of new equipment.”<sup>14</sup> While technology has grown more and more prevalent within the trucking industry, it certainly should not be assumed that every motor carrier has the equipment necessary for an ELD.

FMCSA also acknowledged that it has no information on how this Final Rule would affect small carriers economically but stated that they have “some concern” regarding this matter. In particular, the Agency believed that some of these carriers would not be able to purchase an ELD, thus FMCSA assumed that they will be able to finance an ELD with low an interest rate between 3 and 7 percent. FMCSA also stated that there is one vendor that provides free hardware and recoups the cost of the device over time in the form of higher monthly operating fees. However, the Agency did not include these higher fees in their analysis. When considering a multi-billion dollar mandate it is imperative that FMCSA, or any government agency, research the economic impact that a rulemaking will have upon small business owners, especially since the trucking industry is dominated by small carriers.

In determining the costs of the sample devices, FMCSA utilized the Omnitrac's MCP50 FMS because the company currently holds 48 percent of the United States market share for ELDs. However, OOFI found a number of issues related to the Agency's cost estimate. For example, FMCSA assumed that 50 percent of long-haul trucking operations today have an FMS or an ELD installed, yet the Agency did not cite their source in order to justify such a high market penetration rate which would greatly affect the overall cost of the ELD mandate. The Agency also *assumed* “that carriers own or have access to computer

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<sup>12</sup> Ibid. pg. 79.

<sup>13</sup> Sandra Shackelford and Daniel C. Murray, *Electronic On-Board Recorder Adopting in the Trucking Industry: Issues and Opportunities*, American Transportation Research Institute (2006).

<sup>14</sup> *Regulatory Evaluation*, pg. 26.

technology, such as personal computers, tablet devices, or smartphones...Therefore, the analysis *did not consider* an estimate of the cost of purchasing these types of new equipment.<sup>15</sup> The OOFI's Member Profile Surveys indicate that there are still a percentage of owner-operators and professional employee drivers who do not have the necessary technologies to comply with the Final Rule.

To confound the benefit-cost further, "FMCSA tried to make *reasonable assumptions* about...other [ELD] costs,<sup>16</sup>" including the expense that would be incurred by drivers who would not have a compatible phone. The Agency determined from ComScore, a technology analytics company, that 48.5 percent of drivers would need to purchase an Android device in order to be compatible with the MCP50 FMS. However, FMCSA figured the cost by taking the median price for an Android smartphone (\$495) and a data plan (\$50) and cutting them almost in half for all carriers, thus the cost was \$240 (\$495 x 48.5%) and \$24 (\$50 x 48.5%), respectively. According to FMCSA, these costs represented an industry average expense since about half would have a compatible phone, and about half would have to buy a new phone to use with their ELD. This was an incorrect assumption however, as FMCSA cut the price in half for all carriers, not drivers, and reduced the overall cost of the data plan for the whole industry when all drivers would still need to pay \$50 for a continual data plan charge.

### **Driver and Carrier Office Staff Training**

Although the Agency recognized that "small business may need additional information and guidance in order to comply with the regulation,<sup>17</sup>" FMCSA still assumed that by the effective date of the Final Rule most truck drivers would already have interacted with an ELD, FMS, or a user interface similar to those utilized by ELDs. Thus FMCSA determined that drivers would need only 30-minutes of training with an ELD, for a cost of \$15.50 per driver and \$8 per driver for the trainer. As noted previously however, FMCSA came to this conclusion by assuming a 50 percent market penetration rate for ELDs, for which they have no justification. In an attempt to minimize the adverse economic impacts on small businesses, which the Agency did not study, they have proposed to offer "webinars and other presentations *upon request* as needed and at no charge to the participants.<sup>18</sup>"

FMCSA also assumed that "the cost of training carrier office staff is estimated to be minimal...FMCSA *assumes* that carrier supervisors and office staff would require little to no formal training to learn how to interact with a new web site.<sup>19</sup>" FMCSA clearly does not understand that the trucking industry is composed of small carriers who will require training far beyond the 30-minute estimate, and whose "office staff" is often the family member at home who may or may not have the technological skills needed to operate an ELD or provide training for the driver.

### **Identification of the problem and the need for the rule**

Without empirical evidence, FMCSA determined that there are HOS violations that can lead to increased CMV driver fatigue and pose an unacceptable risk to the motoring public. FMCSA assumed that "using

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<sup>15</sup> Ibid, pg. 26

<sup>16</sup> Ibid, pg. 79.

<sup>17</sup> Ibid, pg. 61.

<sup>18</sup> Ibid.

<sup>19</sup> Ibid, pg. 32.

technology to improve recording of CMV driver activity can reduce fatigue by helping carriers to prevent drivers from exceeding driving time and related on-duty time limits as well as by preserving off-duty time for drivers to recover.<sup>20</sup> It is important to clarify that there is no limit to ODND time, rather the only limitation is that a driver cannot *drive* until he or she has taken at least ten consecutive hours off-duty. Again, fatigue is not restricted to only driving time and thereby the effectiveness of ELDs to prevent driver fatigue is somewhat limited.

In 2014, FMCSA contracted MainWay Services to survey drivers and motor carriers in order to investigate potential driver harassment concerns. According to MainWay, the research study uncovered rare instances of harassment (as reported by the drivers) but did not reveal a pattern where drivers who use ELDs are subject to greater harassment than those who use paper.<sup>21</sup> Nevertheless, the data from the study demonstrated that the instances of harassment were far from rare, as noted in Table 2, when the study's results were projected for the approximately 2.3 million CMV drivers.

**Table 1: The Number of Driver Effected by Harassment and the Number of Carriers that Practice Harassment**

Specific Interactions That Drivers Experience on a Monthly Basis	1+ Times Per Month Among Those Who Use ELDs	Number of Drivers Effected by Harassment	1+ Times Per Month Among Those Who Use ELDs	Number of Carriers that Practice Harassment
<b>Paid and Unpaid Time</b>				
Require you to wait between loads for more than 2 hours without pay.	41%	943,000	35%	181,300
Require you to wait for customer delays for more than 2 hours without pay.	39%	897,000	28%	145,040
<b>Fatigue</b>				
Ask you to operate when you judged you were fatigued.	12%	276,000	5%	25,900
<b>Logging and Breaks</b>				

<sup>20</sup> Ibid, pg. 7

<sup>21</sup> *Attitudes of Truck Drivers*, pg. 3

Ask you to log your hours inaccurately to get more work time or delay a break.	9%	207,000	3%	15,540
Change your log record after it was made to give you more work time or delay a break.	10%	230,000	5%	25,900
<b>Communications</b>				
Interrupt your off-duty time with a message at an inappropriate time.	37%	851,000	29%	150,220
<b>Schedules</b>				
Ask you to meet a customer load schedule you viewed as unrealistic	40%	920,000	18%	93,240

According to the study, drivers were asked a series of questions in order to gauge their reactions to company requests for them to work more than permitted by the regulations or when they felt ill or fatigued. However, the research stated, “Based on driver responses, this *is not a very common* occurrence: only 4 percent of paper-logging drivers and 3 percent of ELD-logging drivers said this had happened to them, which was an insignificant difference according to HOS logging method (*emphasis added*).<sup>22</sup>”

Despite the *insignificant* difference between HOS logging methods, the statement above demonstrated that practice of asking a driver to break the HOS regulations or to operate when they felt ill or fatigued is far from just a rare occurrence. Regardless of HOS logging method, this practice overall would affect 161,000 drivers, including 69,000 drivers that use ELDs. More than perhaps anything, MaineWay’s study demonstrated that thousands of drivers are experiencing harassment that might contribute to fatigue, and a part of that harassment is instituted by carriers that utilize ELDs. Thus, FMCSA’s own research has validated that ELDs do not increase HOS compliance, and in fact, contribute to the overall problem of fatigue. The study also validated that ELDs can be cheated, and do not always record HOS as accurately as the Agency has suggested.<sup>23</sup>

<sup>22</sup> Ibid.

<sup>23</sup> OOFI, *Review of FMCSA’s Attitude of Truck Drivers and Carriers on the Use of Electronic Logging Devices and Driver Harassment*, OOIDA Foundation (2014), pg. 7.

Additionally, two-thirds, or 67 percent, of the carriers that requested their drivers to exceed the HOS limits stated that their drivers sometimes reject those requests. In response, 5 percent of the carriers admitted to threatening the drivers afterwards.<sup>24</sup>

**Table 2: Other events experienced by drivers at their current employer**

Other Events That Surveyed Drivers Experienced While Employed at Their Current Company	Among Those Who Use ELDs	Number of Drivers Effected by Harassment
Any in list (net)	39%	897,000
Contacted by your carrier, to find out why your truck wasn't moving	23%	206,310
Told to record your loading/unloading hours as off duty	12%	107,640
Told to log your duty status as fixed number of minutes on duty, and the rest of the time as off duty while loading or unloading	11%	98,670
Your carrier changed your duty status in your logs	11%	98,670
None of these	61%	1,403,000

## Labor Costs

In order to calculate labor costs, FMCSA utilized the following:

1. Wages (very few drivers subject to the ELD mandate are paid wages, most instead are compensated per mile)
2. Fringe benefits (other than those drivers who are employed by large motor carriers, few actually receive fringe benefits). These benefits include:
  - Paid leave
  - Bonuses
  - And overtime pay (truck drivers are exempt from the overtime rule)
3. Health insurance (only the largest carriers offer health insurance and typically the premiums are taken out of the drivers' settlement, thus at least part of the cost is passed onto the drivers)
4. Other insurance (not named)
5. Retirement plans (again, these plans are usually paid for by the driver from their settlement)
6. Legally required benefits that include:

<sup>24</sup> Ibid.

- Social security (not applicable to the thousands of owner-operators)
- Medicare (may or may not be applicable to thousands of owner-operators)
- Unemployment insurance (not applicable to owner-operators)
- Workers compensation (not applicable to most owner-operators)

It is evident throughout FMCSA's analysis that the Agency did not consider that owner-operators, who represent approximately 50 percent of the carrier industry, are not covered under many of the benefits included in the labor costs. FMCSA also should have considered that very few of the millions of drivers affected by the ELD mandate receive hourly wages. The most common method of compensation is mileage based pay, followed by a percentage of the line haul pay. Although FMCSA is well aware of how CMV drivers are primarily compensated, they did not include these facts in their benefit-cost analysis. While MAP-21 does not mandate that FMCSA include small carriers in their analysis, Executive Order 12866<sup>25</sup> and the most recent highway reauthorization bill, Fixing America's Surface Transportation Act (FAST Act), requires the Agency to consider the effects of a final major rule on different segments of the industry, to formulate estimates and findings on the best available science, to use data that is representative of the industry, and to consider effects on various types and sizes of carriers. Wherefore, FMCSA should be required to reassess its cost analysis estimates based upon the realities of the trucking industry.

In the RIA, FMCSA recognized that "many CMV are not paid for time spent filling out or forwarding their RODs to carriers. This is especially true for drivers who are paid by the mile.<sup>26</sup>" However, in order to justify their cost and benefits, "The Agency *assumes* drivers value their leisure time at the same amount that they accept in exchange for it, that is their base wage plus fringe benefits.<sup>27</sup>" Thus while the Agency acknowledged that the vast majority of drivers are paid by the mile, in the same breath they also discuss driver compensation as base wages plus benefits which FMCSA admitted that most drivers do not receive. It is critical to note that without the cost savings estimated by FMCSA through the inclusion of base wages and fringe benefits, the entire benefit-cost analysis of the ELD Final Rule falls flat.

Not to be detoured by facts however, FMCSA estimated total driver compensation (base wage plus fringe benefits) based on the Bureau of Labor Statistics (BLS) Occupational Employment Statistics, which stated that Heavy and Tractor-Trailer Truck Drivers (occupational code 53-3032) received a mean hourly wage of \$19.68. Though the BLS does not publish data on fringe benefits for specific occupations, FMCSA utilized the average hourly wage and average hourly benefits for private industry workers in transportation and warehousing from the BLS's Employer Costs for Employee Compensation to estimate a fringe benefit of 57 percent of hourly wages. The final driver cost was calculated at \$31 per hour ( $\$19.68 \times 57\% + \$19.68 = \$31$ ) for a mean annual wage of \$64,480. As stated previously, regardless of compensation method, most drivers do not receive fringe benefits. Therefore if the Agency eliminated this figure from their calculations and rounded the mean hourly wage to \$20, drivers would receive a mean annual wage of \$40,934, an almost \$23,000 decrease.

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<sup>25</sup> Exc. Order No. 12866, Fed. Reg. 58, No. 190 (September 30, 1993): 51735-51744.

<sup>26</sup> *Regulatory Evaluation*, pg. 9.

<sup>27</sup> *Ibid.*

Interestingly, FMCSA decided to switch gears from an hourly wage to a mileage fee when figuring for the cost savings related to overhead for motor carriers. Utilizing a study from 2003, the Agency estimated an overhead rate of 27 percent by dividing the average cost per mile of CMV operation for management and overhead (\$0.107) from the per mile cost for labor (\$0.39). None of this of course applies to the thousands of small carriers and owner-operators that dominate the industry.

What FMCSA either failed to understand or chose to ignore was that BLS wages are based on a 40-hour work week. If the annual wage figures were accurate, the average annual wage for truckers would be \$40,934 in wages and \$22,880 in fringe benefits. The vast majority of drivers under the mandate however work 70 hours in 8 day cycles, which equates to approximately 3,194 hours per year. This would reduce the hourly income to \$12.82 an hour and lower the fringe benefits, if there are any, to \$7.16 an hour, thus resulting in a driver wage of \$19.98 rather than the Agency's current \$31.

The reality of course is that both the average hourly wage and the average fringe benefits for drivers is \$0.00. Hence the cost savings are zero. Instead, the Agency's exaggerated benefits and higher-than-average wage estimates artificially inflated the benefits of the ELD mandate.

## Crash Costs

In the RIA, FMCSA followed guidance from the USDOT Office of the Secretary of Transportation, which used the newest VSL of \$9.2 million and the AIS, to estimate the crash cost benefits. While OOFI acknowledges that this is standard procedure, FMCSA's crash incident data relies primarily on police accidents reports which do not utilize the AIS. In order to transition the information from the police accident reports into AIS, the Agency used the Large Truck Crash Causation Study, the GES, and the FARS to weight average costs for non-injury, injury, fatal, and all crashes. They also relied on a report conducted in 2006 by Zaloshnja and Miller for raw crash costs. Thus, rather than comparing the different sources with their own source, namely the police accident reports, to verify if the data is parallel in order to confirm the crash correlation, FMCSA just *assumed* that they would be similar.

## Methodology for ELD Effectiveness

The Agency constructed their estimate for the effectiveness of ELDs based on data from just five motor carriers out of a possible 539,000, or in other words, FMCSA formulated the baseline for a multi-billion dollar rule from just 0.00093 percent of the industry. Moreover, the Agency provided no demographic information, such as the number of power units or drivers, concerning these five motor carriers. However, FMCSA did explain that three of the five were mandated through settlement agreements to equip AOBDRs because of prior habitual compliance violations of the HOS, while the remaining two, who also had HOS compliance issues, voluntarily placed AOBDRs on their trucks.

Although the Agency recognized the bias in their dataset by stating that these motor carriers might have a larger than average impact to their violations from ELD use because all were attempting to reduce HOS violations beforehand, they endeavored to justify the small sample size by claiming that the carriers had enough inspections to allow for statistically significant estimates of changes in HOS violations. Regardless of the number of inspections that were included in the analysis, the data was limited to a

very small sampling of carriers who had habitual HOS issues.

It is also important to note that FMCSA did not mention any crashes that occurred before or after the installation of the AOBDRs. This is critical as FMCSA continues to incorrectly interchange compliance with actual and measurable crash reduction. According to the RIA, "The Agency was *not* able to construct statistically significant measures of safety improvements for carriers that installed ELDs by directly examining the crash data of these carriers because a crash is a rare occurrence for an average CMV.<sup>28</sup>" In response, FMCSA switched to "crash risk" as a surrogate for real-world crashes because the Agency believed, "ELDs, by reducing HOS violations, reduce the crash risk for the entire CMV population; *only* by evaluating this reduction in crash risk against the total population of CMVs *can FMCSA derive meaningful results (emphasis added).*"<sup>29</sup>"

As there was no method to formulate an actual direct estimate, FMCSA constructed an *indirect estimate* of the safety benefits of ELD use by combining data from two different sources, both of which were based on indirect "crash risk" projections as there was no evidence of true crashes to relate them too. Therefore, the safety benefits were derived from the data on reductions in HOS OOS violations from the five motor carriers and data on crash risks associated with certain HOS OOS violations from FMCSA's Roadside Intervention Model.

The Roadside Intervention Model, which is explained further in the review of Appendix E, utilizes a risk-based approach to estimate the crash risk for every Federal Motor Carrier Safety Regulation. Thereby following FMCSA's assumption that ELDs prevent HOS violations from occurring, a crash risk reduction estimate was applied to the percentage of HOS violations deemed to be eliminated by ELDs. To clarify the crash risk reduction estimate, FMCSA utilized the 11<sup>th</sup> hour violation as an example. In their indirect estimate, this violation, which represented 0.9 percent of all inspections and 16 percent of all inspections in which a driver was placed OOS for an HOS violation, was associated with a crash for every 40, 11<sup>th</sup> hour rule violations.

**Table 3: Estimated Crash Reductions for HOS Violations**

Violation	Description	Crash Reduction	# of Violations Associated with a Crash
395.13(d), 395.13(d)(1), 395.13(d)(2)	Driving after being declared out-of-service	1.37784	1.4
395.15(b), 395.15(b)(5), 395.15(c), 395.15(d)(1), 395.15(f), 395.15(g), 395.15(h)(3), 395.15(i)(5)	On-board recording device information requirements not met	0.02952	34
395.3(a)(1)	Requiring or permitting driver to drive more than 11 hours	0.02496	40
395.3(a)(2)	Requiring or permitting driver to drive after 14 hours on duty	0.02496	40

<sup>28</sup> Ibid, pg. 16.

<sup>29</sup> Ibid.

395.8(a)	No driver's record of duty status	0.02952	34
395.8(a)(1)	Other Log/Form and Manner	0.00521	
395.8(a)(2)	Incomplete/Wrong Log	0.02952	34
395.8(c)	Other Log/Form and Manner	0.00521	192
395.8(d)(1)	Other Log/Form and Manner	0.00521	192
395.8(d)(2), 395.8(d)(4), 395.8(d)(5), 395.8(d)(6), 395.8(d)(7), 395.8(d)(8), 395.8(d)(9), 395.8(d)(10), 395.8(d)(11)	Other Log/Form and Manner	0.02952	34
395.8(e)	False report of driver's record of duty status	0.05088	20
395.8(f)(1), 395.8(f)(2), 395.8(f)(3), 395.8(f)(4), 395.8(f)(5), 395.8(f)(6), 395.8(f)(7), 395.8(f)(9), 395.8(f)(9), 395.8(f)(10), 395.8(f)(11), 395.8(f)(12)	Driver's record of duty status not current	0.02952	34
395.8(g)	Other Log/Form and Manner	0.02952	34
395.8(h)(1), 395.8(h)(2), 395.8(h)(4), 395.8(h)(5)	Other Log/Form and Manner	0.02952	34
395.8(i)	Incomplete/Wrong Log	0.02952	34
395.8(j)(2)	Other Log/Form and Manner	0.02952	34
395.8(k)(1), 395.8(k)(2)	Incomplete/Wrong Log	0.02952	34

Source: *FMCSA Safety Program Effectiveness Measurement: Intervention Model Fiscal Year 2009*. Crash reduction figures adjusted from 30 to 240 driver working days.

Interestingly, according to the RIA, a driver is more likely to have an accident for a violation of “on-board recording device information requirements not met” than for driving more than 11 hours or 14 hours on-duty. Other violations that were supposedly more dangerous than going beyond the 11<sup>th</sup> hour rule were “incomplete/wrong log,” “other log/form and manner,” and “driver's record of duty status not current.” Nevertheless, if it were true that a crash occurred for every 34<sup>th</sup> violation of “on-board recording device information requirements not met,” it would not seem logical to assume that mandating ELDs will decrease this particular violation, instead it would be more reasonable to estimate that such violations would increase, thus purportedly increasing the likelihood of a crash and negating possible benefits from the Final Rule.

## Sensitivity Analysis

It is extremely difficult to arrive at any precise value of statistical life (VSL) however the USDOT Office of the Secretary of Transportation has consistently based VSL not just on the value of life itself but also on medical costs, emergency services, property damage, and costs for delays through the years. When the original electronic on-board recorder rulemaking was initiated in 2004, a VSL of \$3 million was used in the RIA, which precluded any mandate due to the fact that the costs far outweighed the benefits. Nonetheless, the VSL has continued to increase over the years, ranging from \$6 million in 2008 to \$9.2 million today. Naturally, this ever increasing value has further assisted FMCSA in justifying multi-billion

dollar cost of the Final Rule.

## Review of Appendix A: Impact of ELDs on Roadside Violations for Five Companies

As previously mentioned, the foundation of FMCSA's RIA and the effectiveness of ELDs were solely based upon data from five motor carriers. During its review of Appendix A, OOFI found a number of limitations associated with this dataset including a strong potential bias. Other substantial problems included:

- Small sample size (five carriers were selected out of 539,000)
- Three carriers were required to have ELDs installed due to HOS violations in a settlement agreement and two carriers voluntarily installed ELDs. (It is difficult to believe that FMCSA could not find a larger random sample of carriers to use as the basis for their research. Random samples are the standard for researching in order to avoid confirmation bias and sampling bias.)
- The sizes of the carriers were not given, nor was there any indication of where these carriers operated. The analysis simply stated that they were long-haul carriers.
- FMCSA recognized that the carriers were not representative of the average carriers. (This is in direct opposition to the FAST Act which requires FMCSA to have a representative sample of the industry in their research leading to major rulemakings.)<sup>30</sup>
- FMCSA did not clarify what HOS violation issues the selected carriers had or the crashes that the carriers were involved in.
- FMCSA wanted data that went back 12 months for a pre-installation vs. post-installation data from roadside inspection safety performance, however, for the 3 carriers that were mandated there was a "small gap" of several months of data which was not accounted for in the results.
- One of the two voluntary carriers had different installation dates for their fleet of trucks.
- As crashes are rare events, actual crashes were not accounted for. (Thus the reader is forced to accept FMCSA's belief that OOS violations are actually preventing a crash.
- Appendix A discusses OOS violations as if they are the same as crashes.

In order to construct a more *conservative* estimate of ELD effectiveness, FMCSA examined OOS violations for four HOS violations, one of which was the "60 hours/7 days or 70 hours/8 days" violation that refers to how long a driver can be on duty during a seven or eight day period before being required to have a 34-hour break. It is apparent from the RIA that FMCSA still does not recognize that the HOS regulations do not limit how long a driver may be ODND as there is no rule on how many hours a driver may be on-duty as long as he or she does not drive. Additionally, there is no requirement that a driver must take a 34-hour break, they simply cannot operate more than 60/70 hours in 7/8 consecutive days.

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<sup>30</sup> FAST Act (2015) § 5202.

Reliability and validity are the cornerstones for any scientific research, thus in order for any study, assessment, or methodology to be considered sound, it must be free of bias and distortion. Appropriate scientific methodology requires that there are controls in place to assure that groups or participants are as comparable in all aspects as possible, these are the variables or confounds that allow for comparison. FMCSA failed however to control the variables that might have influenced both the data and the study's conclusions.

The Agency admitted, concerning both the voluntary and non-voluntary carriers, that “neither type of carrier is typical of a randomly selected carrier from the population,”<sup>31</sup> thereby rendering the study invalid as it was not comparable to the trucking industry. Utilizing *assumptions*, FMCSA “constructed a 95 percent confidence interval around the average reductions in HOS OOS violations and *assumed*, in order not to overestimate the effectiveness of ELDs, that typical carriers would reduce their violations at the lower bounds of those confidence intervals.<sup>32</sup>” Confidence levels are meaningless however if they do not control for the confounds that are inherent within the dataset, as admitted to in this analysis.

For example, it can be demonstrated that there is a strong correlation between people carrying umbrellas and the occurrence of precipitation. While it would be easy to achieve a 95 percent or greater confidence level demonstrating that this statement is true, we cannot reasonably state that people cause it to rain because they are carrying umbrellas. Essentially, this is what the Agency has done with the data from their base analysis. The same faulty statistical analysis is utilized again in FMCSA's crash and violation reduction estimates discussed later in this white paper. These two analyses are the primary foundations for the RIA, and both are severely lacking scientific and factual validation.

## Review of Appendix D: Compliance Costs of the HOS Rules

In Appendix D of the RIA, the Agency provided detailed information regarding their methodology for the benefit-cost estimate of the ELD mandate. In their explanation, FMCSA disclosed that (1) they had not undertaken a comprehensive survey of drivers to measure the level of noncompliance with the HOS rules since 2003, thus the Agency utilized data based on obsolete HOS regulations; (2) they did not attempt to directly measure the costs and benefits of the increased HOS compliance that is expected with the adoption of ELDs, which is especially problematic as this is the purpose of the RIA; and (3) they instead started with the level of noncompliance that was found when drivers were surveyed prior to 2003 in order to measure the benefits and costs.

As a supposed caveat however, the Agency stated that all sources and citations were accurate when the original 2003 RIA was conducted and published, and that they could not guarantee the current availability of data and publications from outside sources. It is important to note that FMCSA offered no explanation as to why they did not utilize the most current data available from their own MCMIS database. To further confound the issue associated with outdated information, the Agency relied on a two phase driver survey concerning HOS compliance which was conducted between 1997 and 1999 by

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<sup>31</sup> *Regulatory Evaluation*, pg. 66.

<sup>32</sup> *Ibid*, pg. 67.

the University of Michigan Trucking Industry Program (UMTIP). FMCSA also utilized a survey conducted by the Walter-Reed Army Institute of Research in 2000 which gathered sleep patterns via wrist actigraphy and self-reported sleep logs from just 50 truck drivers over a two to three week period. Again, these studies were based on HOS regulations prior to 2003.

From both the UMTIP study and the Walter-Reed study, the Agency gathered the schedules of the participants, which were based on a 24-hour period, and modeled a 25-day schedule in order to represent the real-world as the study provided insufficient raw data to completely enumerate driver schedules over time. In order to accomplish this task, FMCSA took the average number of hours worked per 24-hour period and simulated it to the number of hours worked per 8-day period under the pre-2003 HOS rules. Nevertheless, drivers today do not operate under the pre-2003 HOS regulations, but instead are subject to the HOS rules as enforced under the Consolidated and Further Continuing Appropriations Act of 2015, which suspended the 2013 34-hour restart provision. In other words, FMCSA's methodology consisted of outdated and insufficient information coupled with a small sampling of drivers from the Walter-Reed survey.

**Table 4: HOS Rule Changes Comparison**

Provision	Pre-2003	Current
Maximum consecutive driving hours per shift	10 hours	11 hours
Sleeper berth exception	Split into 2 segments of at least 2 hours each	Drivers must take at least 8 consecutive hours in the sleeper berth, plus a separate 2 consecutive hours either in the sleeper berth, off-duty, or any combination of the two
Maximum Shift/Day On-duty hours	15 hours; extended for off-duty breaks	14 hours; no extension
Minimum off-duty hours between on-duty shifts	8 hours	10 hours
Daily work/rest cycle hours	18 hours (10/8)	24 hours (14/10)
Total allowed driving hours in a 24-hour period	16 hours	11 hours
Maximum weekly driver hours	60/7 days 70/8 days	60/7 days 70/8 days

The Agency spent a considerable amount of their time with simulated, or made-up, driver work schedules in order to then create a "driver schedule proportion matrix" based on pre-2003 HOS regulations. Thereby FMCSA made several *assumptions* without basis or merit and then applied those beliefs to present day HOS rules. As if this was not enough to muddle the Agency's benefit-cost analysis, FMCSA utilized annual data from non-union truck drivers between 1995 and 2000 to formulate an estimate of driver wage function.

In order to determine the driver wage function, the Agency utilized a regression analysis by including dummy variables that they believed or assumed would affect the wages of the drivers. FMCSA used this regression model based on data from approximately 20 years ago to estimate a standard deviation for each variable and their effect on wages as if the distribution curve would be the same for today. FMCSA also hypothesized that the wage earned by truck drivers was dependent upon hours worked. However, as discussed previously, the Agency has admitted that most long-haul drivers are not compensated by an hourly wage, but on a per mile basis. Nonetheless, by utilizing wages they can justify the costs savings for carriers in the RIA.

In conclusion, the methodology behind FMCSA's benefit and cost analysis was based on (1) data from obsolete HOS regulations which were in effect over 13 years ago; (2) driver surveys conducted prior to the 2003 HOS rules; (3) driver surveys which had inadequate raw data and a small sample size; (4) simulated driver work schedules which were formulated and transposed to current HOS regulations; (5) 20 year old wage information; and (6) knowledge that long-haul truckers are paid by the mile not by the hour. From this data, FMCSA determined the compliance costs of the HOS rules.

### Review of Appendix E: Roadside Intervention Model

In order to determine the safety benefits of the Final Rule, FMCSA utilized the Roadside Intervention Model, which measures the effectiveness of roadside inspections and traffic enforcements, to estimate the reduction in crashes from decreased HOS violations due to ELD use. The Agency admitted however that because actual crashes are rare events, they cannot be used for predictive purposes nor can they be directly tied to violations, which should end both the conversation and the research. Nevertheless, according to the RIA, "The model is based on the *premise* that interventions resulting in the correction of vehicle and driver violations, specifically roadside inspections and traffic enforcements, contribute to a reduction in crashes (*emphasis added*).<sup>33</sup>"

The question arises however if a violation, particularly an HOS violation, is the direct cause of a crash. For example, if a driver was operating with a form and manner violation and subsequently is involved in a crash, did that form and manner violation cause the accident to occur? FMCSA has not established a true and direct relationship with HOS violations and crashes. Instead, the Agency utilized "crash risk probability" to assign a numerical value concerning the possibility of an accident occurring because of a given violation and thereby they predicted the supposed benefits of ELDs.

FMCSA defined an intervention as when a roadside inspection or a traffic enforcement action was taken against a driver. FMCSA stated, "Since the occurrence of a single violation implies a certain degree of crash risk, each inspection that uncovers and corrects at least one violation can be interpreted as reducing crash risk...By summing the crash risk probabilities for all violations corrected over all inspections, the model estimates the number of crashes avoided."<sup>34</sup> If this were true, then it would seem logical that for multiple violations in any one grouping, or multiple interventions, that the crash

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<sup>33</sup> Ibid, pg. 117.

<sup>34</sup> Ibid, pg. 118.

risk would increase, however, the Agency's research indicated that is not the case. This statement seems to contradict FMCSA's earlier comment that a single occurrence of a violation implies a certain degree of crash risk.

The following was a key statement of the RIA, "The model *assumes* that observed violations discovered at the time of an intervention can be converted into crash risk probabilities. This assumption is based on the premise that detected violations represent varying degrees of mechanical or judgmental faults and, further, that some are more likely than others to play a contributory role in motor carrier crashes (*emphasis added*).<sup>35</sup>" In other words, the Agency utilized an assumption based on another assumption rather than on empirical evidence.

Additionally, the Roadside Intervention Model relied upon the same methodology that is used in the Compliance, Safety, and Accountability Program. FMCSA claimed that this methodology was based on "sound safety data and statistical approaches, as well as input from *subject matter experts* when empirical data are not available.<sup>36</sup>" It is important to note that several notable researchers and organizations, including the Government Accountability Office, have been extremely critical of the CSA methodology. In December 2015, FMCSA was forced to remove the CSA percentile rankings from public view by the FAST Act until the Agency can improve the methodology. As for the mythical "subject matter experts," FMCSA has used this term in other rulemakings but has yet to reveal who these experts are. Evidently, these experts can produce sound safety data without empirical evidence.

### Assignment of Crash Risk Probabilities

It is imperative to understand how FMCSA derived their estimation for crash risk probability as the entire benefit-cost analysis is based on this surrogate for crashes. Essentially, the Roadside Intervention Model introduced the concept of grouping violations that are similar in nature and have equal crash risks. "The model *assumes* that correcting a violation associated with a particular violation group during an intervention reduces the risk of a subsequent crash by a finite amount.<sup>37</sup>" The model employed three estimates in developing the crash risk reduction probability for a violation groups:

1. The crash risk for violations in the group is defined as the likelihood that the unsafe behavior associated with the violation contributes to a crash during one day of driving.
2. The duration of the reduction in crash risk when a violation in the group is identified at the roadside and corrected, which varied according to the violation group.
3. The correction rate for violations in the group that are corrected as a result of the intervention.

FMCSA introduced a new factor into the equation, the duration of the reduction for the violation group. FMCSA determined in some mystical way, that interventions only last for a finite number of days; hence all HOS violations and the subsequent interventions are only effective for a certain period of time.

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<sup>35</sup> Ibid.

<sup>36</sup> Ibid.

<sup>37</sup> Ibid, pg. 119.

Again, FMCSA defined a violation group as one that consists of similar violations thought to have equal crash risk. For the ELD benefit-cost analysis, the violation group consisted of (1) unsafe driving, (2) fatigued driving, and (3) improper loading, and the intervention was effective for 30 days.

Next, FMCSA assumed that “Non-crash daytrips intercepted in roadside inspections and traffic enforcements and their violations are considered to be a representative sample of all non-crash daytrips, and crashes undergoing post-crash inspections and their violations are considered to be a representative sample of all crash daytrips.<sup>38</sup>” The problem with this assumption is that the violations discovered in a post-crash inspection may not have been the actual cause of the crash. For example, if a truck driver was rear-ended at a stoplight and yet the post-crash investigation found that the driver was in violation of the 11<sup>th</sup> hour rule, did the crash occur because the trucker was run into or because they violated the HOS?

FMCSA determined the crash risk probability by dividing the number of crashes with a violation by the total trips with the violation. As indicated below, the numerator is determined by information in the MCMIS database and only uses post-crash inspection information. However, there still is no consideration as to the cause of the crash only that there was a violation of the specific grouping.

$$\frac{\text{\# Crashes With Violation (j)}}{\text{Total Trips With Violation (j)}} = \text{Likelihood of Crash With Violation (j) = CRP}$$

The denominator however is more difficult to determine as that data was not collected by FMCSA, thus the Agency relied on the Annual Vehicle Distance in Miles and Related data provided by the Federal Highway Administration (FHWA). Nevertheless, there is no specificity on which roadway configuration was used to figure the annual mileage, nor was there any attempt to determine from log book information how many actual trips the driver made without a crash.

The figure below depicts how FMCSA derived the total number of non-crash trips with a violation, but the difficulty with this ratio is the fact that not all inspections are recorded. Under CSA, if either a driver or a carrier has not incurred a violation, any clean inspection will not be recorded.

$$\frac{\text{\# Non-Crash Inspections With Violation (j)}}{\text{\# Non-Crash Inspections Without Violation (j)}} \times \frac{\text{Total \# Non-Crash Trips}}{\text{Total \# Non-Crash Trips}} = \frac{\text{Total Non-Crash Trips With Violation (j)}}{\text{Total \# Non-Crash Trips}}$$

Finally, FMCSA took the crash risk probability for the violation and multiplied it by the duration of the correction, which for HOS violations was 30 days, in order to arrive at the risk reduction for a given violation.

<sup>38</sup> Ibid, pg. 140-141

## Conclusion

Upon reviewing and analyzing the Agency's Regulatory Impact Analysis, performed in support of the ELD mandate, OOFI is seriously concerned that the RIA lacks scientific validity and reliability. While FMCSA was required to adopt regulations through MAP-21 mandating operators of commercial motor vehicles who keep paper RODS to install ELDs, the overall congressional objective that the device record a driver's hours of service accurately and automatically was not met. In fact, only one of the four duty statuses can truly be recorded automatically.

As the ELD Final Rule is projected to cost over \$1 billion, the RIA was required to demonstrate that there would not be an undue financial burden forced on the trucking industry, especially for small business operators. The Agency acknowledged however that it had no information on how this rule would economically affect small carriers. In order to justify the benefit-cost analysis, FMCSA manufactured a cost savings based on an hourly wage metric which does not exist as well as "fringe benefits" that most drivers are not entitled too.

In attempt to further justify the ELD mandate, FMCSA assumed that compliance with the HOS regulations was equal to safety since DOT-reportable crashes are rare events. In fact, FMCSA assumed that every out-of-service violation prevented a crash from occurring. Although there is no evidence to support this assumption, the Agency utilized it for the basis of the final analysis. If the reader were to accept this assumption, then it would naturally follow that every violation has the potential to save a crash.

Utilizing very creative and convoluted statistical formulas and algorithms, with little or no validation, FMCSA arrived at a weighted percentage for each HOS violation that an ELD will prevent. The Agency recognized that these formulas still did not meet the required standard, therefore they hedged their formula by stating that an intervention will only be effective for 30 days following a violation. It is important to note that no supporting evidence was ever presented to validate this assumption. Additionally, because both because crashes are such rare events and because of limited data, FMCSA "binned" HOS violations with other violations with similar weighted scores. The "binned" violations included "Unsafe Driving," "Fatigued Driving," and "Improper Loading." Once again, there was no explanation given as to why "Unsafe Driving" and "Improper Loading" would be improved by ELDs, nevertheless FMCSA used the data as if they all belonged to the same "bin."

In contrast to the inflated benefits of the ELDs, FMCSA reduced the cost of the ELDs from the previous proposed rulemakings. Instead of using a cost that had been incurred by those carriers who presently utilize ELDs, they received information from vendors whose costs they admitted might not have reflected all the costs involved.

OOFI believes that the inflated benefits and reduced costs that FMCSA used in its RIA to justify the ELD mandate was scientifically invalid and without merit. As stated above, OOFI believes that FMCSA did not meet the requirements of Section 32301(b) of MAP-21 by not proposing an ELD that records a driver's hours of service and duty status accurately and automatically. Furthermore, OOFI believes that the

Agency is in violation of Section 5202 of the FAST Act. This subsection required that when performing a “regulatory impact analysis,” FMCSA must consider the impact of such a rule on “different segments” of the motor carrier industry, and on carriers of “various sizes.” In addition, the analysis must be based on “representative” data for those carriers. FMCSA based their analysis on five motor carriers, three of which had repeated hours-of-service violations and were required to install ELDs as a part of their settlement agreements, while the remaining two voluntarily installed ELDs because of poor HOS compliance. FMCSA again admitted that these carriers were not “representative of the industry.”

Moreover, FMCSA's RIA also violated Section 5221 of the FAST Act. In this subsection, any rulemaking that includes the CSA program must consider the results of a comprehensive and necessarily time-consuming review process. Nonetheless, FMCSA admitted to using the same formulas and methodology in determining crash risk probability as the Agency used in the CSA program under the Safety Management System. According to Section 5221, the Agency is required to submit a corrective action plan to update the SMS and to consider the plan in any rulemaking that utilizes CSA.

According to FMCSA, “The objective [of the Final Rule] is to reduce the number of crashes caused by driver fatigue that could have been avoided had the driver complied with the HOS rules.” The key to the whole mandate is that ELDs will help the physical condition of CMV drivers, enabling them to operate their vehicles safely. Unfortunately, FMCSA have failed to understand the misuse of ELDs and have underestimated the pressure that carriers push upon drivers to operate even when they are tired in order to maximize their driving time. Additionally, FMCSA has failed to recognize that their own research found no differences between fleets with ELDs and those without them for USDOT-recordable and fatigue related crashes, thus negating the premise behind the Final Rule.

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