July 29, 2019

Office of the Secretary of Transportation
ATTN: Desk Officer
1200 New Jersey Avenue, SW
Washington, D.C. 20590

Re: Docket Number FMCSA-2018-0037

Dear Docket Officer:

Thank you for allowing the National Safety Council (NSC) the opportunity to provide comments on potential changes to Federal Motor Carrier Safety Administration (FMCSA) regulations.

NSC is a 100-year-old nonprofit committed to eliminating preventable deaths in our lifetime by focusing on injuries in workplaces, in homes and communities, and on the road. Our 15,000 member companies represent more than 50,000 U.S. worksites.

For three straight years, the U.S. has experienced at least 40,000 roadway deaths.[1] Not only are fatalities from motor vehicle crashes devastating to families and loved ones, injuries from crashes are both a personal and public health burden. Crashes also contribute to the high cost of repairing and maintaining roadways.

NSC believes new and evolving vehicle safety technologies will help mitigate errors and prevent fatalities, and broad implementation of this technology may have an oversized positive impact on crashes. However, there are several questions to answer before we reach fully automated vehicles. Below are responses to specific questions posed in this document.

Questions 1.1 How should FMCSA ensure that an ADS-equipped CMV only operates consistent with the ODD for the ADS equipped on the vehicle?

1.3 Should FMCSA consider amending or augmenting the definition of "driver" and/or "operator" in 49 CFR 390.5 or define a term such as "ADS driver" to reduce the potential for misinterpretation of the requirements?

Given that commercial motor vehicle operations impact the CMV driver and all vehicles in their vicinity, FMCSA should clearly define and widely publicize areas where CMVs will operate with automated systems that will allow drivers to divert complete attention from the driving task. Initially, this should be limited to low impact areas with less exposure to other vehicles.[2]

One vehicle technology widely available today is mapping technology. Largely GPS based, mapping provides real-time location information for vehicles, and is capable of providing commercial motor vehicle fleet owners with driver locations. This technology could also be used to determine if a

[1] https://injuryfacts.nsc.org/motor-vehicle/overview/preliminary-estimates/
[2] Level 2 systems require full attention of drivers to the driving task and are being deployed currently with wide usage that can improve safety results.

vehicle is operating outside its operational design domain (ODD), alerting the human driver to take over. This operation should be carefully planned so that vehicles can come to a full stop in a safe location while a human resumes control of the driving task.

To eliminate confusion about who or what is driving the vehicle, FMCSA should consider augmenting the definition of driver to define whether the driver is either (a) a human driver or (b) an ADS driver. Further, the question of who has the primary task of monitoring the performance of the driving task can also be defined. It can be (a) a human driver, (b) a human remotely monitoring the ADS driving the vehicle, or (c) the ADS itself with no human oversight.

Additionally, collecting and sharing data on ADS equipment—how it operates or does not operate effectively—is critical to safer operations of these technologies. Each and every mile of data received can help improve operation.

Your sister agency, the National Highway Traffic Safety Administration (NHTSA), issued a letter of guidance in 2016 stating that in some cases the automated system can be regarded as the "driver" for the purposes of compliance. This may be a course of action for FMCSA to consider. However, it is imperative that human drivers understand how to use these safety systems correctly. New crash avoidance technologies are made available in cars with each model year and individual systems continue to be updated through software after installation, so it can be difficult for drivers to understand which systems their car has and how to interface with them correctly.

NSC leads an initiative called *MyCarDoesWhat*, a national campaign to help educate drivers on new vehicle safety technologies designed to help prevent crashes. These technologies and a driver's relationship to their vehicle are changing quickly. NHTSA predicts this relationship will evolve more in the next 10 to 20 years than it has in the previous 100 years.[3] Keeping consumers informed is imperative to reaching the goal of zero roadway fatalities.

According to the Insurance Institute for Highway Safety (IIHS), one million car crashes could have been prevented in 2014 if vehicles were equipped with just two technologies—automatic emergency braking (AEB) and forward collision warning.[4] Commercial motor vehicles account for four percent of all vehicles on the roadways, but are involved in 11 percent of fatal crashes. The majority of these are rear-end crashes that could have been prevented or mitigated with widespread use of technology like AEB. The House Appropriations Committee also reported that, "AEBs on vehicles can reduce front-to-rear traffic incidents by more than 50 percent."[5]

NSC prefers mandatory inclusion of new automotive safety technologies, but recognizes voluntary cooperation and integration promotes the proliferation of these technologies into the U.S. fleet. According to a 2012 study done by the Insurance Institute for Highway Safety's Highway Loss Data Institute (HLDI), it can take approximately three decades for some vehicle safety technologies to fully integrate into fleets.[6] By the time these technologies are fully integrated, they may be replaced by newer, more advanced vehicle safety technologies.

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[3] http://www.nhtsa.gov/staticfiles/rulemaking/pdf/Automated_Vehicles_Policy.pdf
[4] Cicchino, Jessica B. 2016. Effectiveness of forward collision warning and autonomous emergency braking systems in reducing front-to-rear crash rates. Arlington, VA: Insurance Institute for Highway Safety
[5] https://appropriations.house.gov/sites/democrats.appropriations.house.gov/files/FY2020 THUD Draft Report.pdf
[6] http://www.iihs.org/media/db4aeba1-6209-4382-9ef2-275443fcccea/536403661/HLDI%20Research/Bulletins/hldi_bulletin_28.26.pdf

NSC supports the inclusion of new safety technologies in vehicles to help reduce crashes, injuries and fatalities resulting from the use of commercial motor vehicles. Additionally, NSC strongly supports education as a powerful tactic to reduce injuries and save lives. NSC will seek to expand national driver education campaigns and the education of vehicle safety technologies.

When crashes occur during automated driving operations, any data collected should be available in a downloadable and standardized format for investigators, law enforcement, state highway safety offices, insurers and other relevant stakeholders. Following a crash, we must be able to answer simple questions such as: Did the vehicle systems or the human driver have control of the car? Was the vehicle was communicating with the driver or remote operators? If so, how was it communicating with the driver? Were all systems working as designed?

Understanding the circumstances and causes surrounding malfunctions, including those at lower levels of automation, will help make this technology safer, and ensure failures are less likely to occur as technology evolves. This will be especially important in assuring consumers of the reliability of ADAS and ADS systems. NSC believes that minimum parameters should be set for data preservation, standardization of formats, ease of access for post-crash evaluation and privacy protections early in the process. Reliable data-sharing programs require greater maturity and a strong safety culture committed to continuous improvement.

Question 1.2. What are manufacturers' and motor carriers' plans for when and how Levels 4 and 5 ADS-equipped CMVs will become commercially available?

As ADS levels 3, 4 and 5 come onto the public roadway system, we can look to the national experience introducing the public to level 2 systems. Notably, we find confusion about capabilities, domains and a general lack of knowledge. Particular problems will remain as consumers encounter ADS levels. For example, level 2 and level 3 will require drivers to take over the system anytime an operational boundary is breached and level 4 systems will not be able to operate in all Operational Design Domains. Communicating the appropriate operation of these systems may prove difficult without consistent education. Marketing is not education. With greater system complexity, we need greater knowledge and understanding of the systems. We strongly recommend a robust and widely-accessible consumer education and training effort as we introduce level 2, 3 and 4 vehicles into the fleet.

NSC agrees with DOT that there is a driver understanding gap as new technologies are deployed, and older technologies are updated or retired. It is our belief that education and training are required to speed adoption and proper use of these features. It is also our belief that education needs to continue throughout the life of the vehicle, as software and hardware updates modify the operational parameters for vehicle systems. As previously mentioned, NSC created the nation's premier research-based vehicle automation education program – *MyCarDoesWhat* and is a founding member and manager of *PAVE* – Partners for Automated Vehicle Education.

We appreciate the difficult task of ensuring a safe roadway system as technology advances. For the foreseeable future, tens of millions of vehicles will be sold to the American public that are not levels 3, 4 or 5. How the public experiences the introduction and safe operation of higher levels of automation in vehicles will directly impact the rate of adoption of these technologies and how rapidly the vehicle fleet turns over to more advanced levels of automation. A strong federal presence in preserving safety protections will go a long way to help speed adoption.

Questions 2.1 Should a CDL endorsement be required of individuals operating an ADS-equipped CMV?

2.2 If so, what should be covered in the knowledge and/or skills test associated with an ADS endorsement?

2.3. What would be the impacts on SDLAs?

2.4. Should a driver be required to have specialized training for ADS-equipped CMVs?

2.5. In an operational model that has an individual remotely monitoring multiple CMVs, should the Agency impose limitations on the number of vehicles a remote driver monitors?

2.6. Is there any reason why a dedicated or stand-by remote operator should not be subject to existing driver qualifications?

Yes, an endorsement should be required before operating an ADS-equipped CMV for the following reasons:

- Many of today's drivers did not learn to drive on vehicles equipped with ADAS features (automation levels 1, 2 or 3) and thus have no background in how to interface with or properly operate them.
- ADAS safety features have different generic names and brand names that vary among manufacturers. These names may contain phrases that give the impression that systems have more capabilities than they truly do, potentially resulting in driver over-reliance. NHTSA should consider standardizing generic nomenclature and/or taxonomy. For instance, depending on the manufacturer, Automatic Emergency Braking is also referred to as forward collision mitigation, front crash protection or auto-braking, among others.
- Warning and icon standardization issues persist, resulting in confusion for the driver.
- Not all systems clearly indicate if safety features have been disabled.
- Safety features have different operational parameters and limitations across manufacturers, potentially even within the same manufacturer's varying models or trim levels.
- Safety features may change over time – as software is updated, for example – and drivers need to be properly educated on how these changes affect the operation of their vehicle.
- Safety feature operational parameters and limitations may not be intuitive or obvious, particularly if drivers use different vehicles.
- Operational Design Domain or Object Detection and Response Characteristics are not explicitly and succinctly communicated to the driver, so they can be aware of limitations, shortcomings or differences in systems.

Human-machine interface problems should be given strong safety consideration by FMCSA for any vehicle that is being operated remotely. Without having to remain regularly involved with a task, it is challenging for humans to re-engage quickly if an emergency arises. This must be considered.

Questions 3.1. Should HOS rule changes be considered if ADS technology performs all the driving tasks while a human is on-duty, not driving; off-duty or in the sleeper berth; or physically remote from the CMV?

3.2. Should the HOS requirements apply to both onboard and remote operators?

3.3. If so, how should HOS be recorded when an individual is not physically in control of the vehicle?

Yes, hours of service rules should be considered. NSC knows that adults should receive 7-9 consecutive hours of sleep in order to be fully rested. It is preferable for that sleep to occur at night when the body has its circadian low. If a CMV driver, whether in cab or remote, is fatigued, it impacts the driver and all those operating on the roadways around them. The longer a person is on duty, the more hours they are awake. More time without rest results in a higher likelihood for safety-critical mistakes, and this accumulates and compounds over time.[7] Drivers with less than 7 hours of sleep can face crash risks similar to alcohol-impaired driving. These effects can be exacerbated if they occur during circadian lows.[8, 9]

Human ability to remain focused on tasks, such as long distance driving, is limited. Time on task fatigue describes the gradual increase in the amount of effort needed to maintain the same level of performance on a task over time. The longer people are required to perform a task, the more attention, speed, and accuracy decline. Research shows the optimal duration for safe highway driving is under 90 minutes before sleepiness and time-on-task-related degradations in performance occur.[10] Consecutive driving time and the resulting decreases in performance are exacerbated if a person has had extended wakefulness[11] or night work.[12]

Question 5.1. How should the prohibition against distracted driving (*i.e.,* texting, hand-held cell phone) apply to onboard operators responsible for taking control of the CMV under certain situations, and to remote operators with similar responsibilities?

Distraction is distraction, no matter where a person operates. In safe driving, an operator must keep his or her mind on the primary task at hand. A study performed by David Strayer of the University of Utah, concluded driver distraction from secondary in-vehicle activities is increasingly recognized as a significant source of injuries and fatalities on our roadways.[13] NSC believes people who are operating a vehicle should not use an electronic device that is not primary to the driving task. This is no different for humans monitoring the operation of ADS drivers whether on-board or remotely.

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[7] Williamson, Lombardi, Folkard, Stutts, Courtney and Connor (2011). The link between fatigue and safety.
[8] Tefft, B.C. (2016). Acute Sleep Deprivation and Risk of Motor Vehicle Crash Involvement.
[9] Akerstedt, T., & Kecklund, G. (2001). Age, gender and early morning highway accidents. Journal of Sleep Research, 10(2), 105-110.
[10] Ting, Hwang, Doong and Jeng (2008). Driver fatigue and highway driving: a simulator study.
[11] Wickens, C. D., Hutchins, S. D., Laux, L., & Sebok, A. (2015). The impact of sleep disruption on complex cognitive tasks: a meta-analysis. Human factors, 57(6), 930-946.
[12] Lerman, S. E., Eskin, E., Flower, D. J., George, E. C., Gerson, B., Hartenbaum, N., Moore-Ede, M. (2012). Fatigue Risk Management in the Workplace. Journal of Occupational and Environmental Medicine / American College of Occupational and Environmental Medicine, 54(2), 231–58.
[13] Strayer, D. L., Turrill, J., Cooper, J. M., Coleman, J. R., Medeiros-Ward, N., & Biondi, F. (2015). Assessing Cognitive Distraction in the Automobile. Human Factors, 57(8), 1300–1324. https://doi.org/10.1177/0018720815575149

Questions 8.1. Should motor carriers be required to notify FMCSA that they are operating Level 4 or 5 ADS-equipped CMVs?

8.2. If so, how should the carrier notify FMCSA?

8.3. Should FMCSA require markings identifying the ADS Level of a vehicle?

8.4. Should the Agency require motor carriers to utilize ADS-equipped CMVs that have a malfunction indicator?

8.5. Should the Agency require that motor carriers deploying ADS-equipped CMVs ensure the vehicle can pull over in response to Federal and State officials or move out of the way of first-responders?

8.6. How might that be achieved, and at what cost?

8.7. How would roadside enforcement personnel know that a vehicle can no longer operate safely?

8.8. Absent an FMVSS, how could standard indications be provided to enforcement personnel?

Transparency is key to gaining full acceptance of AVs, especially when it comes to vehicles that can weigh 80,000 pounds or more or carry more than 50 individuals. ADS-equipped CMVs should alert vehicles operating around them of their operation status for the safety of the CMV driver and the safety of the other operators around the CMV. For example, non-CMV operators may not understand a "connected" platoon when they see one and therefore, may not understand how to operate around it. Clear, consistent communication about CMVs operating in some automated mode is necessary.

According to a survey commissioned by NSC and the Emergency Responder Safety Institute, 71% of drivers take photos or videos when they see an emergency vehicle responding to a fire or crash while behind the wheel. On top of that, 24% answered that they do not realize there are currently legal requirements directing what drivers must do when they encounter an emergency vehicle on the side of the road.[14] FMCSA should require this feature on ADS-equipped CMVs. Emergency responders are particularly vulnerable because they're responding to crashes on active roadways. The general public lacks the understanding of the role of emergency service personnel engaged in traffic control. ADS technologies such as automated signal changers, remote cameras, highway advisory message boards, and radio advisory warnings and messages should be implemented and used to maximum advantage.

Question 9.2. What types of rules should FMCSA consider to ensure that motor carriers safety management practices adequately address cybersecurity?

FMCSA should consider cyber and data protections for the electronic infrastructure in a vehicle and maintained externally in the cloud. As vehicles become more dependent on artificial intelligence for

[14]https://www.nsc.org/Portals/0/Documents/NewsDocuments/2019/First%20Responder%20Public%20Opinion%20Poll%20Summary%20-%20March%202019.pdf?ver=2019-03-27-142452-923

safety and critical operational elements, including over-the-air updates to operating systems, such protections should be required and enhanced.

AI: As vehicle manufacturers and suppliers start deploying artificial intelligence in ADS, critical software assumptions, validation techniques and verification procedures should be made explicit to ensure safety and help the public understand and thus begin to trust AI deployments.

Cybersecurity: FMCSA should require that each automaker and software supplier have a coordinated hacking/electronic infrastructure recovery plan in place to mitigate damage to individual, fleet-wide, and system-wide breaches.

Recall and update compliance: U.S. compliance with recalls is woefully low; the latest numbers indicate there are approximately 52 million open vehicle recalls equating to 1 in 4 vehicles on the road. FMCSA should consider how to address vehicles that do not comply with latest patches and/or software and hardware updates. If safety critical updates are not installed, FMCSA should allow a manufacturer to take actions up to and including automatically shutting down the technology or vehicle until the update is complete.

Latency minimum requirements: Vehicle sensor fusion tasks and communication with the cloud has to occur with minimum latency to ensure that ADS vehicles have the information they need at the right time to make the right decision(s). Additionally, some systems contemplated may require remote human or AI monitors. The effective control parameters in such a deployment need to be defined. FMCSA should evaluate minimum requirements with significant input from manufacturers and the industry, to enable onboard and remote ADS to make the best decisions at the right time.

NSC applauds both FMCSA and the DOT for your continued efforts to promote safe and appropriate use of increasing levels of driving automation, while at the same time, encouraging innovation and continuous improvement among automakers and suppliers. We support research and development to achieve fully automated vehicles and investment in the infrastructure needed to support such a mobility option.

Thank you for your leadership role in safely integrating these vehicles in our fleet. I appreciate your ongoing consideration of NSC input.

Sincerely,

Lorraine Martin
President and CEO