Commercial Vehicle Safety Alliance
Improving uniformity in commercial motor vehicle safety and enforcement

May 3, 2018

Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Ave., SE
West Building, Ground Floor
Room W12-140
Washington, DC 20590

RE: Docket Comments: Docket Number FMCSA-2018-0037
Request for Comments Concerning Federal Motor Carrier Safety Regulations (FMCSRs) Which May Be a Barrier to the Safe Testing and Deployment of Automated Driving Systems-Equipped Commercial Motor Vehicles on Public Roads

The Commercial Vehicle Safety Alliance (CVSA) respectfully submits the following comments regarding FMCSA docket no. FMCSA-2018-0037, related to the implementation of automated driving systems (ADS) in commercial motor vehicles (CMVs).

CVSA is a nonprofit association comprised of local, state, provincial, territorial and federal commercial motor vehicle safety officials and industry representatives. The Alliance aims to achieve uniformity, compatibility and reciprocity of commercial motor vehicle inspections and enforcement by certified inspectors dedicated to driver and vehicle safety. Our mission is to improve uniformity in commercial motor vehicle safety and enforcement throughout the United States, Canada and Mexico by providing guidance and education to enforcement, industry and policy makers.

CVSA acknowledges the potential for ADS to enhance human driver safety performance or, at a crossroads in the future, to replace the human driver altogether while also exceeding the best level of safety performance of the human driver. We have not yet reached that point and CVSA urges the Federal Motor Carrier Safety Administration (FMCSA) and the National Highway Traffic Safety Administration (NHTSA) to proceed with caution and not to remove or relax *necessary* safety regulations to enable testing unproven automated driving systems on public roads. Motor vehicle regulations generally were established to address a safety need. Empirical evaluation of durability, reliability and performance of ADS and their components cannot be assumed. CVSA members, including law enforcement agencies responsible for commercial motor vehicle safety, are being asked basic safety questions regarding ADS about which they have limited operational information. As these technologies advance, it is critical that safety protocols be shared with safety regulators.

CVSA further encourages FMCSA to work with NHTSA and establish requirements for commercial motor vehicles to communicate upon request information essential to enforcing traffic laws and conducting inspections, at least including the following: electronic vehicle identification, time stamp and automation operational status (verifiable level of automation and whether a human operator is in the vehicle, operating or monitoring it remotely, or if it is in a fully autonomous mode). NHTSA's proposed vehicle to vehicle (V2V) communications platform with basic safety message for light vehicles, once applied to commercial motor vehicles as NHTSA has

planned, would be a logical platform for integrating and communicating ADS status parameters from commercial motor vehicles.

CVSA also has already petitioned FMCSA to establish an electronic vehicle identification system. In July 2010, CVSA petitioned FMCSA to establish new requirements for the electronic identification of all commercial motor vehicles by amending § 390.21 to require commercial motor vehicles be equipped with an electronic device capable of communicating a unique identification number when queried by roadside. In May 2013, FMCSA denied CVSA's petition due to lack of information necessary to estimate costs and benefits. The current developments in ADS should offer added information about potential benefits. Meanwhile, in February 2015, CVSA submitted supplemental information in support of our petition, and in November 2015, FMCSA reconsidered its denial and reported it would initiate a rulemaking. CVSA maintains that this still-pending rulemaking is needed and may provide the platform for identifying and monitoring of ADS-equipped vehicles and their communication with law enforcement.

FMCSA, for the purposes of this notice, focused on SAE Levels 3-5. One major challenge in providing comments here is that there are few federal rules that a technology or vehicle manufacturing company must follow to establish whether their ADS is a Level 1-2 technology or a Level 3-5 technology. We make these comments assuming the providers of ADS are achieving their claimed automation level. The appearance that a system can be demonstrated to automate the basic driving task in one operational design domain (ODD) does not mean the system is safer than the best or even the average human driver in the same domain as the demonstration or in numerous other ODDs found on our roadways.

Safety is not the sole motivation for implementing ADS. FMCSA describes ADS in the notice as *advanced safety systems*. Despite the aforementioned potential for safety improvements as a result of ADS, there are other potentially competing motivations that could conflict with safety goals. For example, logistical efficiency, driver convenience and employee retention, or resolving the shortage of qualified truck drivers all are possible market pressures for ADS that may conflict with some safety goals. We understand the voluntary approach taken with ADS 2.0 document—we don't yet know enough about ADS to effectively regulate—but we also feel FMCSA, NHTSA and states need to proceed with caution. Testing of any system capable of inflicting injury is inherently risky, and completely safe operation cannot be ensured. There will be crashes and there will be fatalities as these systems are researched, designed, developed and deployed. All technologies can be fallible, and ADS experimentation on public roadways must be done carefully.

In the request for comments, CVSA appreciates the agency's recognition of the need to work with states, from an operations standpoint. We commit to helping our members work with the U.S. Department of Transportation (USDOT) as well.

Additionally, FMCSA discusses the regulatory context for whether a driver is required in a commercial motor vehicle. CVSA discourages allowing testing of vehicles on public roads with no human onboard where other vehicles and human drivers are also operating unless and until the fully automated technologies have proven their performance, reliability, maintainability and durability, and shown to be safer than the best human drivers (rather than the average human driver). Once proven, it may be appropriate to pilot programs where the driver is removed altogether while in mixed traffic. Unequivocally establishing reliability, maintainability and durability of ADS, is necessary prior to deployment on public roadways.

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FMCSA also asks for comments on specific aspects as outlined below.

Inspection, Repair, and Maintenance

> *Question: How should motor carriers ensure the proper functioning of ADS prior to operating in an automated mode?*

The answer to this question may depend on the level of automation and the various ODDs discussed by the Volpe Center report. In general, ADS functionality will need to be vetted by carriers with technical or financial means to do so (for early adopters) and eventually by regulators for all other cases and going forward. There will need to be regulations requiring self-diagnostics integration and reporting for critical subsystems as well as the ADS itself—much like antilock braking system (ABS) or electronic stability control (ESC) dashboard malfunction indicator lamps serve today. USDOT will need to establish minimum performance or equipment criteria, and test procedures for either type-certification (whereby the ADS would need approval from USDOT) or self-certification (confirmed by the technology provider, vehicle manufacturer or third party). And, a self-diagnostic test would then need to be part of a pre-trip inspection before automated mode operation. Penalties for inappropriate use of ADS should be severe.

> *Question: Should the Agency consider minimum requirements for motor carrier personnel responsible for maintaining the equipment used to achieve certain levels of automated operations (for example, a requirement that technicians be trained by the ADS developers, etc.)?*

Yes. It is unclear what the ADS will look like in several years, but some certification or minimum requirements or qualification would be justified in rulemaking for maintenance personnel. Regulations will need to account for the eventuality of replacement parts being available for critical components (such as a radar, lidar or cameras, etc.) that may not be fully compatible and compliant with standards of the ADS. It is critical that the correct part and function be attached. The self-diagnostic checks we mentioned in the question above will also help ensure maintenance requirements are met. ABS serves as an example of a technology that needs a qualified technician to service it. CVSA consistently observes 11 percent of trucks and 14 percent of trailers equipped with ABS have ABS violations indicated. This level of maintenance would be totally unacceptable for an ADS that operates on public roadways. The mediocre level of maintenance seen on ABS is an indication of how well ADS components may be maintained, especially as vehicles age and miles add up.

Motor carriers will also need to help ensure basic system security of ADS. FMCSA and other federal agencies should consider rules to require the ADS industry, carriers and customers to position, maintain and monitor the system to ensure it cannot be operated remotely by an illicit outside source

> *Question: What Information Technology (IT) security/safety assurances can be provided by maintenance personnel and CMV drivers/operators that the ADS systems are functioning properly?*

Whatever the minimum qualifications for maintenance personnel are established, as in the questions above, they would need to incorporate overall minimum levels of preventative maintenance and diagnostic checks. There may also need to be ADS specific recordkeeping.

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Question: For State representatives with experience inspecting traditional CMVs, what types of malfunctions or damage on an ADS-equipped CMV should be considered an imminent hazard? Do you have any additional comments regarding inspection, repair, and maintenance?

The North American Standard Out-of-Service (OOS) Criteria for vehicles did not envision equipment that can operate the vehicle instead of the human driver. Inspectors only check for required equipment and conditions. If ADS systems are not required, then the current inspection procedures and OOS criteria do not apply. Unless and until there is a requirement for ADS components or systems, there would be nothing for inspectors to check. If requirements are set, there should be minimum parameters established that could be retrieved as a data packet (using an inspection tool/laptop) that inspectors could download from the vehicle or that could be communicated through telematics to an inspector. The Insurance Institute for Highway Safety has published already a minimum list for suggestion (submitted to NHTSA's ADS 2.0 docket). And there could be FMCSR requirements for maintenance of components (particularly sensors) as well. As noted in the Volpe report and in our introductory comments above, some manner of communicating the status of a vehicle to enforcement is needed in regulations.

Manufacturers and installers of ADS systems should be required to place a permanent label/s on the motor vehicle and ADS specific devices which identify key safety sensitive requirements. CVSA safety inspectors could thereby be trained and identify maintenance defects to include possible violations and out-of-service violations. These violations would need to refer to new regulations, which could utilize manufacturer specified safety certifications. An example: A label would identify the proper placement and angles of installation for all ADS safety sensitive operational components. The components would then be clearly marked with installation requirements such as angle alignments. This would ensure a vehicle is not operated outside of the manufacturer expectations. Thus, when an ADS-equipped CMV collides with a deer thereby rotating the radar, the misalignment (within teachable parameters) could be visible to inspectors. Lastly, normal wear and tear (loss of a fastener on a sensor component) could also cause this movement and misalignment.

<u>Roadside and Annual Inspections</u>

Question: How could an enforcement official identify CMVs capable of various levels of automated operation? For example, should CMVs with ADS be visibly marked to indicate the level of automated operation they are designed to achieve, or would making these vehicles so easily identifiable cause other road users to interact unfavorably with CMVs with ADS?

Yes, ADS-equipped vehicles should be marked and identified with some visible means of communication. Additionally, CVSA strongly suggests, per our comments above, an ADS-equipped vehicle also equipped with a universal electronic vehicle identification system would be capable of communicating to enforcement, and possibly other road users, the ADS capability and status. This is very important, especially for first responders, but also others driving around ADS-equipped trucks, critically so for CMVs with no human onboard. For example, when an ADS-equipped, autonomous truck with no human onboard has a brake failure on a grade, other nearby drivers would be able to better respond with this information.

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Question: Do you have any additional comments regarding roadside and annual inspections?

Safety and uniformity is a principal goal that CVSA strives to achieve as a formula for saving lives on all North American highways, but we must emphasize the safety of CMV safety inspectors cannot be overlooked through this process. As we look toward completing roadside inspections on autonomous and autonomous capable commercial motor vehicles, we must ensure the vehicles are capable of safely being inspected and have over-ride systems in place that would allow a safety inspector the capability of having reasonable safety control over the system and vehicle (similar to placing tire chocks and having the driver turn the vehicle off during today's inspection).

<u>Distracted Driving (Prohibition Against Texting and Using Handheld Wireless Phones) and Driver Monitoring</u>

Question: What changes, if any, should be made to the distracted driving regulations for human drivers of CMVs with ADS while in automated mode?

This would apparently depend on the Automated CMV Operating Concepts discussed by Volpe. If a vehicle is operated under concepts D, E, F or G, CVSA does not foresee changes to the distracted driving rules would be necessary. If a vehicle is operated under concepts A, A1 or B, the distracted driving rules should apply. Alternatively, if the vehicle is operated under concept C or C1, perhaps distracted driving rules could be adjusted.

Question: For example, should a human driver in a CMV with ADS be allowed to use a hand-held wireless phone while the ADS is in complete control of the vehicle?

Yes.

Question: Should driver fatigue monitoring be required, and if so, what method(s) should be used to conduct such monitoring?

In any of the Automated CMV Operating Concept cases where a human driver is responsible for actively monitoring or intermittently monitoring the ADS operation of the vehicle, yes, fatigue monitoring should be used. Some providers of ADS are using machine learning to advance and refine the capabilities of their ADS to drive the vehicle and also to monitor the fatigue and attention of the human in the driver seat. If systems are established to be very effective at measuring fatigue, they should also be used in non-ADS equipped vehicles, rather than relying solely on hours of service and traffic enforcement to prevent fatigue.

Question: Additionally, should these systems be required to provide "alertness assistance" to human drivers? For example, should these systems be required to periodically request input from human drivers, or should they be required to request input from human drivers only when the driver appears to be losing focus or when the ADS in control of the vehicle is confronted with situations outside its parameters?

Yes, these systems should utilize the best alertness assistance available, in accordance with established research and experience.

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Question: What level of human driver inattentiveness (or how long a period of inattentiveness) should be allowed in a vehicle controlled by an ADS before the vehicle is required to enter its minimal risk condition? How long after entering the minimal risk condition must a human driver wait to re-engage an ADS (e.g., a minimum 30-minute break may provide the driver an opportunity to rest)? What should the requirements be for re-engaging the CMV with ADS in an automated mode in this scenario?

These are good questions for additional research.

Medical Qualification

Question: What medical conditions currently precluding issuance of a medical card could become inapplicable as ADS technology develops?

The answer to this question may depend on many variables, including which automated CMV operating concepts are in play, or whether the human driver inputs needed to operate the vehicle can be fully activated. For example, loss of a limb (arm or leg) might logically preclude a human driver from operating a vehicle with a manual transmission. These considerations may be numerous given the developments of ADS.

Question: What medical conditions currently precluding issuance of a medical card should NOT be considered disqualifying for a human driver who is simply monitoring a CMV with ADS?

All human driver medical qualifications would need to be reconsidered if a vehicle can be operated in C, D, E, F, G operating concepts defined by Volpe.

Hours of Service for Drivers

Question: [In the hours of service context] …Current regulations require that all time spent at the operating controls of the CMV be recorded as on-duty, driving time. Given the SAE levels of automation discussed above, FMCSA seeks public comments on how drivers' hours of service should be recorded if the ADS is relied upon to perform some or all of the driving tasks.

In the near term, CVSA does not see significant changes needed to the hours of service regulations. Advanced driver assistance systems (ADAS) that perform some of the driving tasks (e.g., adaptive cruise control, lane keeping assist, ABS) are already in use today. And as far as CVSA is aware, regulators have not opted to amend hours-of-service regulations as a result, even though those systems may alleviate stresses causing fatigue. In the longer term, for periods of time during which the human driver effectively could tune out from the driving task (or safely fall asleep while wearing his safety belt in the driver seat) studies will be needed to better understand the impacts of these types of operations.

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Commercial Driver's License (CDL) Endorsements

Question: Should an endorsement be considered for human drivers and operators of CMVs with ADS to ensure they (1) understand the capabilities and limitations of the advanced technologies, and (2) know when it is appropriate to rely on automatic rather than manual operation?

An endorsement could be necessary if new skills are expected of the human operator of vehicles with certain advanced technologies. Advanced driver assistance systems available today (automatic transmissions, adaptive cruise control, automatic emergency braking, lane departure warning or lane keeping assist) generally reduce the skills needed by a human driver, and an endorsement does not seem needed for those. A new endorsement may be of interest if the human operator of an ADS-equipped vehicle now needs to monitor the driving task or to be prepared to make decisions on when and when not to rely on the ADS. The news media and social media have highlighted incidents, including some fatal crashes, where the human operator may not have understood the ADS capabilities or their own responsibilities to monitor the driving operation. Nevertheless, there are few regulations or standards that define what is expected of a human operator or observer (for lack of a standard terminology) who was sitting in the driver seat and may have been able to prevent a crash that occurred while under ADS operation.

Question: If so, what types of tests—knowledge, skills, or both—should be required to obtain such an endorsement; and should there be separate endorsements for different types of ADS?

The necessary skills would be entirely dependent upon the technology.

Question: If an ADS-equipped CMV is to be deployed without a human driver onboard, should the computer system be required to demonstrate autonomous capabilities for the same maneuvers included on the CDL skills test?

No. The capabilities of the ADS should exceed those of the human it is replacing. While the ADS-equipped CMV must be able to achieve the same maneuvers included in the CDL skills test, there should be more stringent performance tests for ADS systems. For example, the ADS should be able to perceive its surroundings better (have better vision) and to respond more quickly to sensory input cues (and brake or steer sooner) than the human driver. There should be an autonomous vehicle (ADS) required testing element that is specific to the type and activity of the ADS. There are too many scenarios that are possible under this category but it is reasonable that an owner operator of an ADS-equipped CMV declare in advance the specific use of the vehicle and thus the vehicle must demonstrate the "use." Once categorized, standard testing could be developed to help maximize safety. In all situations, ADS-equipped CMVs must be able to react in a reasonable and safe way to emergency responders who are in emergent operations, including making a traffic stop on the ADS vehicle or for the ADS vehicle to move over for first responder who may be on the shoulder of the roadway.

Safety protocols should be established and codified for automated vehicles to identify and address unusual conditions. In addition, safety considerations surrounding CMV safety inspectors, size and weight officers, law enforcement officers and all first responders in general must be addressed. Examples include:

- Ability to recognize and avoid first responders, regulators, construction personnel, wrecker drivers and other employees who work on the highway, right-of-way or in construction zones.

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- Ability to recognize and avoid highway hazards, including disabled or crashed vehicles, etc.
- Ability to recognize and stop for emergency responders and regulators, when appropriate.
- Ability to provide communications between the motor vehicle and enforcement.

Testing and Interstate Operations of CMVs With ADS on Public Roadways

Question: What type of ADS-equipped CMVs are currently being tested? Are they Level 4 ADS-equipped vehicles that can only operate on certain roadways, Level 4 vehicles with more extensive ODDs, or full Level 5 vehicles?

CVSA is fairly certain that testing of ADS-equipped vehicles is happening in U.S. jurisdictions without our knowledge. There are several major players who have brought their technology to the attention of state officials, but operating ADS-equipped CMVs is not necessarily in violation of state or federal laws and regulations. This is concerning and worth noting here. We don't know what types of vehicles are being tested.

Question: In moving forward what actions, if any, should FMCSA consider to ensure the safe operation of ADS-equipped CMV's in various ODDs?

FMCSA should work with NHTSA to verify the ADS technology providers have records and safety practices that FMCSA would expect of a motor carrier in a pre-ADS world. If they do not, then FMCSA and NHTSA have the authority to take them off the road.

Question: How can FMCSA assess whether a CMV with ADS operating within its ODD can perform on certain maneuvers, such as emergency brake performance, crash avoidance maneuvers, etc.?

FMCSA and NHTSA should establish test procedures and pass/fail performance criteria.

Question: Should FMCSA consider approaching CMVs that carry persons or hazardous materials differently than other CMVs?

Yes. While full driving automation may one day be the safer option, they are not yet that today. ADS should be first designed, developed and established to be safer than human drivers on CMVs with one human on board and limited hazardous materials, before expanding the technology to certain passenger carrying vehicle operations or hazardous materials shipments, especially in high speed (therefore high potential energy crash) operational environments.

Beyond Compliance Program

Question: To what extent, if any, should the various levels of automation be considered as part of the Beyond Compliance Program?

ADS are not necessarily synonymous with safety systems. While most would agree that safety is a likely benefit, the level of safety benefit and the state of the status quo of technologies remains in flux. ADS should not be part of the Beyond Compliance Program until they have empirically established a benefit to safety.

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Regulation of Manufacturing Versus Operation

Question: The regulation of CMVs is a function shared by the National Highway Traffic Safety Administration (NHTSA) and FMCSA, with manufacturing regulated by NHTSA and operation regulated by FMCSA (and its State partners). Does this separation of functions create unique problems, or perhaps offer unique solutions, for operators of ADS-equipped CMVs?

It is essential that FMCSA work with NHTSA and state partners and agencies in the new area of regulatory applicability. Establishment of a universal CMV electronic identification system would need to be done in conjunction with all these partners. And this may be the best way to be able to begin to verify and enforce traffic laws with the mixed traffic of ADS operation and human operated vehicles.

Confidentiality of Shared Information

Question: What measures would original equipment manufacturers and developers expect of FMCSA before sharing confidential business information?

FMCSA may need to establish standards/regulations for non-proprietary safety information regarding certain components (e.g., radar, lidar, video and GPS systems) that directly relate to safety sensitive functions. Additionally, NHTSA, FMCSA and other USDOT agencies should work with the industry to obtain critical public safety related information that may be proprietary and seek confidential agreements which would provide critical safety sensitive functions. If statutory authority is a limitation, Congress should be informed of such limitations.

Other Considerations

While not specifically identified in the request for comments, another important issue that will require FMCSA's consideration is how to account for vehicle and driver violations within the agency's Compliance, Safety, Accountability (CSA), Safety Measurement System (SMS). For example, a vehicle system that fails to operate the CMV as intended will need to be characterized and documented differently from issuing a traffic enforcement violation to a driver. Further, consideration should be given to how these ADS-related violations will impact a motor carrier's safety rating. CVSA encourages the agency to address these issues before moving ahead with regulatory action.

If you have further questions or comments, please do not hesitate to contact me by phone at 301-830-6149 or by email at collinm@cvsa.org.

Respectfully,

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