March 14, 2023

U.S. Department of Transportation
Docket Management Facility
1200 New Jersey Avenue, SE
West Building, Ground Floor, Room W12-140
Washington, DC 20590-0001

RE: Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles [Docket No. FMCSA-2018-0037]

AAMVA thanks FMCSA for the opportunity to provide additional comment on the issue of Safe Integration of Automated Driving Systems (ADS)-Equipped Commercial Motor Vehicles (CMVs). While AAMVA provides comment specific to the supplemental questions associated with this docket, we also provide our comments submitted in July of 2019 as additional reference for FMCSA.

AAMVA recognizes that this docket is directed solely toward vehicles that are determined to be Level 4 and 5 ADS-equipped CMVs because it is only those levels that an ADS can control all aspects of the dynamic driving task without any expectation of an intervention from a human driver. AAMVA notes two areas where this assumption may complicate the ability to provide comment. The first applies to the ability to make true safety determinations on the operational level of the ADS equipment. It is important that the operational level of the vehicle match its operational expectations before the vehicle is deemed road-ready. It is also important that the operational level of the vehicle accurately apply to the vehicle's operational expectation throughout that vehicle's lifecycle. This is especially important in instances where there may be a degradation or interruption of the designed operational performance level of the vehicle. Changes through damage or over the air updates may exclude certain vehicles from any regulatory differentiation or exception than those of levels 0-3 depending on the application of the vehicle's operational ("level") designation. It is also important that designation accompany the vehicle as it makes changes to operational performance towards more advanced levels so that there can be transparency into the vehicle's ODD and capabilities. For all vehicles, regardless of assigned level, AAMVA continues to encourage the development and integration of law enforcement and first responder interaction plans for ADS-equipped vehicles. See section 6.6 of AAMVA's "Safe Testing and Deployment of Vehicles Equipped with Automated Driving Systems Guidelines" at https://www.aamva.org/getmedia/66190412-ce9d-4a3d-8b6e-28c1b80e3c10/Safe-Testing-and-Deployment-of-Vehicles-Equipped-with-ADS-Guidelines-Ed-3_Final.pdf.

Secondly, AAMVA refers FMCSA to its previous comments on how oversight and monitoring of fleets may continue to play an important role in even the higher-level ADS-equipped vehicles. AAMVA encourages the continued experience level of a qualified CDL driver for those that are tasked with oversight and monitoring of fleets of higher level ADS-equipped CMVs even if the driving task is being performed by ADS systems.

A. Notification by Motor Carriers Operating Level 4 or 5 ADS Equipped CMVs

1.1 – Should FMCSA require motor carriers operating Level 4 or 5 ADS-equipped CMVs to notify FMCSA before operating those vehicles in interstate commerce without a human driver behind the wheel? If so, what potential methods or procedures should be established to notify FMCSA of those operations?

AAMVA encourages FMCSA to require the reporting of motor carriers to not only notify FMCSA that they will operate CMVs in interstate commerce without a human driver, but to identify the specific vehicle and correlate their submitted level of expected ADS performance in that submission with an authoritative, independent determination of that vehicle's operational functionality and a description of its ODD and any limiting factors. This information should also be made available to the public and to state and local agencies that are required to enforce against traffic safety violations (and public safety offices generally).

AAMVA defers on the method of communication with safety stakeholders, but encourages FMCSA to consider the most universal and transparent accessibility option available for granted motor carrier submissions. The ability for safety stakeholders and enforcement arms to verify that the submission has been appropriately conveyed to FMCSA, alongside the recommended motor carrier affirmation of ADS-equipped operational level and ODD will be important factors for consideration in any post-crash environment, safety review, or safety oversight task.

1.2 – Before operating in interstate commerce, should motor carriers be required to submit information, data, documentation, or other evidence that demonstrates to FMCSA that motor carriers seeking to operate Level 4 or 5 ADS-equipped CMVs have appropriate safety management controls in place to operate the vehicle in accordance with the manufacturer's specification and with Federal requirements? If so, please describe any recommended approaches including the information to be provided and appropriate techniques for reviewing that information. If available, provide cost estimates for proposed approaches.

As AAMVA has previously recommended, the more data supplied that can affirm a positive, comprehensive review of substantiating that the CMV is indeed operational at a level 4 or 5 designation is important. AAMVA recommends that there be a method for both confirming its operational level before granting its interstate commerce capabilities, and an attestation by the carrier or operator that they affirm its level of operation. The CMV should be individually tied to a specific carrier through FMCSA. AAMVA further recommends that the applicant provide detailed information on its expected ODD and any limiting factors to the vehicle's operation. The variations on technology are complex and layered to the point that the carrier must shoulder the weight of liability in detecting, mitigating, and repairing ADS-dependent vehicles at all stages of operation. AAMVA further recommends the carrier provide a law enforcement and first responder interaction plan alongside a description of how the carrier plans to intervene in instances where the vehicle must be commanded to cease operations under emergency circumstances and in the event of a crash. FMCSA may also want to consider providing either violation or citation data on specific vehicles so that there is a clear record of its operational performance and safety record. This information should be made available to all state and local jurisdictions responsible for road safety oversight.

1.3 – What data should FMCSA collect and maintain regarding Level 4 or 5 ADS-equipped CMVs engaged in interstate transportation? How would such information be used and how would it improve FMCSA's ability to oversee the safe operation of Level 4 or 5 ADS-equipped CMVs?

See the above response. FMCSA must retain its role as the safety oversight agency for motor carrier operations. AAMVA assumes that FMCSA would both use and share this data to ensure the submitted information from motor carriers affirms their commitment to safety. Where there are outliers or violators in the submission and commitment to obey traffic law, the ability for a carrier to operate (both generally, and specifically for unmanned fleets) should be reviewed and corrected with a responsible and safe operational record being of paramount importance to continued operation.

AAMVA recommends that FMCSA partner with NHTSA to collaborate on the standing requirements for crash reporting so that both agencies receive information relative to crashes pertaining to their particular authorities and operational oversight. As FMCSA has direct oversight over motor carrier operations, they also may need access to crash and ADS-equipped CMV safety data from NHTSA.

1.4 – What is the current size of the Level 4 or 5 ADS-equipped CMVs engaged in interstate transportation? How would such information be used and how would it improve FMCSA's ability to oversee the safe operation of Level 4 or 5 ADS-equipped CMVs?

AAMVA does not have insight into the current size of the Level 4 or 5 ADS-equipped CMV fleet. The question does pose whether the requirement to have a fleet tracking system in place that carries the appropriate level of operation and ODD associated with each individual vehicle is a reasonable expectation for oversight of fleet operations. Much as CDLIS is the current repository of commercial drivers that allows for tracking the safety record of an individual driver associated with a specific safety record, it may be incumbent on the safety community to translate that same individualized safety record as associated with a vehicle to the appropriate safety oversight community. It also begs the question of how a vehicle may be marked and identified. Not only from a physical identification perspective, but how the ADS-equipped CMV fleet will be associated with its data record. Vehicle identification strategies should be considered to improve safety and facilitate motor vehicle administration practices and law enforcement efforts. The VIN conveys significant information regarding the characteristics of the motor vehicle to which it is issued. A new VIN system should be considered that would include information relative to ADS onboard the vehicle. Additionally, and AAMVA defers to CVSA comment, the transportation community is developing a universal electronic vehicle identifier that could be integrated with a new VIN system. Both VIN modernization and the unique identifier number are reasonable solutions to capture individualized vehicle capabilities. These two concepts could combine to facilitate identification and safety assessment of ADS-equipped CMVs.

AAMVA notes that the VIN would only serve as an applicable identifier for those produced as originally ADS-capable vehicles off the assembly line. Many of the CMVs that will become ADS-capable will be retrofitted in the aftermarket process, so the VIN as an identifier would not apply. With that said, FMCSA should be responsible for sharing the data on reported ADS-equipped vehicles (as reported from motor carriers) with the appropriate state authorities so that they can convey that information with state vehicle registration records, or at least that information will be known for traffic safety oversight, law enforcement and ODD enforcement purposes.

As to how the information on the size of the fleet should be used, AAMVA defers to FMCSA in its role as federal safety regulator of CMVs and its ability to oversee and regulate motor carrier operations. Again, AAMVA encourages FMCSA share information on violations with state and local enforcement entities so that the appropriate enforcement actions can take place. This communication will become more important in the absence of a driver where interaction with the driver serves as a control over operation. In the absence of a driver, FMCSA's direct role with carriers may become even more important.

1.5 – On average, how many days are Level 4 or 5 ADS-equipped CMVs expected to be operational per year.

AAMVA defers to the manufacturers and engineers to provide estimates on operational continuity and capacity with the caveat that engineered capacity may not equate to optimal safety conditions.

B. Oversight for Remote Assistants

2.1 – To what extent should the Federal requirements otherwise applicable to CMV drivers (such as hours-of-service limitations, drug and alcohol testing, and physical qualifications), also apply to a remote assistant who is not expected to take control of the dynamic driving task of an ADS-equipped CMV operating at Level 4?

AAMVA would largely defer to FMCSA on the application of the hours-of-service requirements. Fatigue should still be a major consideration of the operator, no matter whether they are remote or in cab. However, the difference in applying the operational hours of service between monitoring and engagement in the driving task is a complex association.

However, the remainder of the regulations that would be applicable to any operator of a CMV should still apply. Anyone that is required to take control of a commercial vehicle should be medically fit to do so, should be unimpaired, and should have the capability and capacity to operate the vehicle as proficiently as a currently tested and credentialed CDL driver. FMCSA makes the discrepancy between remote assistance and operation of the vehicle. AAMVA sees their task as very related. Even if the "assistant" is handling the emergency shutdown, or unanticipated safety situation, they should be capable of managing the safety of the vehicle as would any fully trained driver. This is especially true in emergency situations. The person must be trained and capable to understand the safety implications of the vehicle, the safe and proper management of its operational function, and how the vehicle relates to traffic safety, surrounding vehicles, and traffic law.

2.2 What, if any, aspects of the remote assistant job function may require FMCSA oversight including minimum training standards and/or auditing, e.g., training, physical qualifications, and other job-performance related measures? Please provide rationale and evidence for the recommended manner of oversight.

See the above. AAMVA recommends that as an oversight entity over the operation of the commercial vehicle, the assistant be trained in a sufficient manner that they can communicate as knowledgeably about the condition of the vehicle and the circumstances of operation in mixed traffic as ably and proficiently as any fully credentialed CDL holder.

2.3 Are there any qualification requirements that FMCSA should consider for remote assistants, such as related experience, e.g. as a CDL holder?

Yes, see AAMVA's previous comments regarding this. Also see AAMVA's comments in the ANPRM in question 2.5 and 2.6 below.

2.4 – Are there any specific limitations that should be imposed on the working conditions of remote assistants, such as limitation on the number of ADS-equipped CMVs that a remote assistant is simultaneously responsible for or the number of hours that a remote assistant may work?

AAMVA provides the following excerpt from its previously submitted comments regarding this (question 2.5 from the ANPRM):

> "The agency should seriously consider the ability of a remote operator to safely monitor any more than one vehicle at a time. Given that the term "remote operator" has been used under different scenarios, it may require further refinement of just what that function entails. If a single monitor may be required to intervene in multiple safety issues, it would seem prudent to start at a relatively low threshold to avoid any inability to respond. FMCSA would also need to clarify the role between any human occupants who are assigned to deal with vehicle performance issues and the role of the remote monitor. If the two are working in tandem, that may require a different oversight scenario than one in which the remote monitor is expected to intercede in any vehicle operations."

AAMVA also notes that remote assistance and remote operators may be physically located in a different jurisdiction than the jurisdiction in which the vehicle is being operated. If there is any operational control being exercised by any individual, having knowledge of the specific laws within the area of vehicle operation is extremely important. This also impacts and obscures the ability of the law enforcement to duly enforce the law against an "operator" that is not physically present in the jurisdiction of operation. AAMVA encourages FMCSA to require remote assistants and remote operators to provide details for where the operators or assistants are for law enforcement contact. This may prove doubly important if assistants or operators are physically located in other countries, and FMCSA may consider requirements for their presence to be captured under U.S. jurisdiction (as well as in the area of vehicle operation). AAMVA recommends that any person that has the ability to become a remote operator under any circumstance be required to be physically located within the jurisdiction of vehicle operation.

See AAMVA's previous comment regarding hours-of-service limitations.

2.5 – Are there any other considerations that FMCSA should be aware of relating to individuals who may function as remote assistants?

The concept of substituting a "remote assistant" for someone who may otherwise be engaged in a more active role of monitoring or taking control of a remotely operated fleet is an important consideration. This is one of the reasons AAMVA continues to recommend that an "assistant" carry the same qualifications as a fully credentialed CDL driver.

AAMVA strenuously encourages FMCSA to clarify and define the difference between these roles. The difference between operation and "guiding" a vehicle can very easily be obscured when input is being provided to the functionality of a vehicle – especially when combining data input as a means for directing the operations of a vehicle with new technology. AAMVA has concerns that "assisting" and "operating" are too closely related in concept, and asks that FMCSA be very clear in both describing them as terms, and more importantly, by ensuring that there is no overlap between vehicle assistance and vehicle operation. These terms must not be interchangeable, and if a person has the ability to take control or influence any aspect of the dynamic driving task, they should be considered an operator even if their duties are mostly to "monitor" or "assist" in other ways short of assuming driving control.

If a remote assistant is to function only under certain circumstances with respect to CMV operations, but a different individual is responsible for a more "hands-on" management position of CMV operations (up to and including taking control of the vehicle in more complex situations) it will be important for there to be clear insight into who was operating or managing the vehicle at any time. Crossover between monitoring the vehicle and taking control of the vehicle could be incredibly important both in crash investigation and in general motor carrier safety oversight. It is

important that FMCSA consider the differentiation between assisting in one capacity and operation of the vehicle in any manner. If the jobs are not differentiated, it will be equally important to understand where an assistant intervened in operations and when a more engaged qualified driver took control of the vehicle – especially during emergency situations. If the assistant is not a fully credentialed CDL driver, it will be essential for there to be records of who, when, where and for how long an assistant (or more qualified driver/operator) took control of the vehicle.

C. Vehicle Inspection and Maintenance

3.1 – Should Level 4 or 5 ADS-equipped CMVs be subject to pre-trip inspection requirements for their mechanical and ADS components in addition to those specified in 49 CFR 392.7, including those which might necessitate new inspection equipment before such CMVs are dispatched and offer a specified period of operation? If so, what methods should be used to conduct these additional inspection items, what equipment components should be inspected, what documentation should be required, who should be responsible for conducting those inspections and what qualifications or specialized training should be required, and how frequently should the additional inspections be conducted?

AAMVA fully supports the work and inspection program recommendations of the CVSA and defers to their expertise in matters related to vehicle inspection and maintenance programs associated with ADS-equipped CMVs. With that said, AAMVA recommends that all commercial vehicles still be subject to a pre-trip inspection. AAMVA defers to FMCSA and CVSA on how this is best conducted, but for ADS-equipped vehicles where a driver is not present to perform the inspection, AAMVA recommends that the carrier log and affirm that the vehicle is fit for duty and has been appropriately inspected before trip initiation. If the requirements need to be appropriately adjusted by FMCSA, AAMVA encourages the process to include at a minimum, the logging of the appropriate pre-trip mechanical functions, or an affirmation that all pre-trip inspection requirements have been satisfied. AAMVA defers to the motor carriers, CVSA and FMCSA to make the right determination on inspection methodologies and the appropriate inspection equipment for ADS-equipped CMVs. AAMVA further defers to CVSA to name the appropriate inspection certification requirements for conducting the inspections and the associated specialized training and frequency of the inspection. Finally, AAMVA notes that the absence of a human driver should not relieve the vehicle from any state inspection requirements unless given special consideration by the appropriate authorities.

3.2 – If additional inspections, inspection equipment, or additional qualifications for inspectors are proposed, provide an estimate of the costs associated with such additional requirements including the approximate time to complete the additional inspection requirements, costs of any proposed training if additional inspector requirements are proposed and the paperwork burden associated with such training.

AAMVA defers to CVSA and FMCSA on any additional inspections, associated equipment and qualifications for inspectors.

3.3 – What technical barriers exist to conducting conventional roadside inspections (which require interactions with the human driver) of Level 4 or 5 ADS-equipped CMVs and what approaches currently exist or might be developed to remove those barriers.

AAMVA again defers to CVSA and FMCSA on how to best conduct roadside inspections for driverless CMVs. The work being conducted on a CMV universal electronic vehicle identifier and the ability to broadcast essential safety

data to the appropriate authorities should assist in the option of conducting rolling inspections at designated (or impromptu) spaces along the CMV's route. The key will be in ensuring the right data is broadcast to the right authorities and ensuring that safety defects and malfunctions are duly reported in a timely fashion and not masked. Again, AAMVA defers to CVSA expertise in this area.

3.4 – What, if any, pre-trip inspection requirements, documentation, and communications capability (for making the results of such inspections available to law enforcement personnel), should be imposed on motor carriers operating Level 4 and 5 ADS-equipped CMVs as a condition for bypassing conventional roadside inspection stations?

At a minimum, and if the pre-trip inspection is carried out by the motor carrier, there should be documentation stating the CMVs motor carrier affiliation, the date and time of the inspection, the result(s) of the inspection, and the individual that conducted the inspection and affirmed the results. AAMVA again defers to CVSA on any additional requirements or details that are appropriate. This information should be readily available in a central repository and made available to law enforcement through FMCSA and searchable by VIN/unique universal electronic vehicle identifier. Upon request by law enforcement of FMCSA, motor carrier data on these inspections should also be made available upon request. If rolling inspections are a consideration, FMCSA should consider how to designate safety critical inspection criteria as a requirement that causes the vehicle remove itself from operation on any roadway until the issue is corrected. FMCSA should also consider requiring that the carrier document the issue as a part of the vehicle's operational history so long-term safety evaluation of recurring problems can be evaluated.

3.5 – If Level 4 or 5 ADS-equipped CMVs are not required by the States to undergo roadside inspections during operation, what information should be communicated by the motor carrier and CMV to the State inspectors (e.g. the results of potential alternative pre-trip inspections, and/or the real-time operational status and condition of safety critical systems such as brakes, tires, lighting systems, steering ,and ADS components)? Are there other data and performance information that would need to be made available to ensure adequate vehicle maintenance and safe operations?

If Level 4 or 5 ADS-equipped CMVs are not required to undergo roadside inspections during operation, the CMV should be able to continuously broadcast the status of safety critical systems to law enforcement and inspection personnel once the capability to receive, register, and retain that broadcast information has been achieved. AAMVA defers to CVSA and its work to manage the technology capabilities associated with rolling inspections for comment on how this is best achieved. As noted previously, the information associated with the VIN/unique identifier, the affiliation of the vehicle to its carrier, mileage, origin/destination, limiting factors on ODD, and the information on last conducted pre-trip inspection may be essential data points for law enforcement.

3.6 – What communication systems currently exist that would allow roadside inspection officers to receive information regarding Level 4 or 5 ADS-equipped CMVs and what information could be transmitted via these systems regarding the mechanical condition of the CMV and other operational documentation (e.g., shipping documents and origin/destination), while in route?

AAMVA refers FMCSA to its previous comments and again defers to CVSA on additional documentation that may be helpful to roadside inspectors. CVSA is also better positioned to provide feedback on the appropriate technology solutions and currently available options for receipt of Level 4 and Level 5 driverless vehicles.

3.7 – Under what safety situations should State inspectors and/or FMCSA receive immediate notification of an unsafe maintenance or operational issue, if any? What data and information would need to be provided in instances such as tow-away crashes or those that disable key operational features of a CMV? Under such safety situations, what return to service process would ensure any maintenance and operation issues have been addressed?

For a Level 4 or 5 CMV operating outside the parameters of its designated ODD. For any safety critical defect or malfunction. For any issues where the vehicle is unable to communicate safety critical information. For any issue or combination of issues that should place the vehicle out of service. For any disruption or failure to the vehicle's emergency shutdown or failsafe operational suite. For any issue that disrupts its ability to be remotely monitored or handled.

The CMV should be able to log and communicate any system failure issue recognized and the moment the issue was detected in the event of a tow-away crash. Minimal crash data fields that could assist in the investigation of a crash should also be evaluated as potential key data pieces, including speed, weight, bearing, incline, timestamps, GPS location, or other features as FMCSA and law enforcement deem appropriate. This could include the essential safety details included in the MMUCC as potential designations. This should include the status of whether the ADS system or any remote operator had functional control of the driverless vehicle at the time of the crash or also, whether there was input being delivered to the vehicle providing "breadcrumbing" directives to the vehicle at the time of incident that may have influenced where the vehicle could travel.

The return to service process should be handled by the motor carrier, with an in-depth inspection of any contributing operational system failures being rectified and recorded, as well as an inspection of all mechanical and operational safety systems. The carrier should affirm that the repairs were completed to satisfaction, and submit the vehicle for independent vehicle fitness evaluation. The crash and return to service inspection should be retained as a part of the vehicle's safety record and available if requested for long-term safety evaluation and serve as record for identifying any recurring problem with an individual CMV.

AAMVA thanks FMCSA for the opportunity to comment and refers the agency to our previously filed comments provided below. We also refer FMCSA to our previously cited "Safe Testing and Deployment of Vehicles Equipped with Automated Driving Systems Guidelines" (Edition 3) - https://www.aamva.org/getmedia/66190412-ce9d-4a3d-8b6e-28c1b80e3c10/Safe-Testing-and-Deployment-of-Vehicles-Equipped-with-ADS-Guidelines-Ed-3_Final.pdf. This document includes additional considerations for topics such as connected vehicles, low-speed shuttles, data collection, platooning, and automated delivery vehicles and personal delivery vehicles.

July 19, 2019

U.S. Department of Transportation
Docket Management Facility
1200 New Jersey Avenue, SE
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Washington, DC 20590-0001

RE: Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles [Docket No. FMCSA-2018-0037]

The American Association of Motor Vehicle Administrators (AAMVA) welcomes the opportunity to provide comments on the Federal Motor Carrier Safety Administration's (FMCSA) request for comments on existing Federal Motor Carrier Safety Regulations (FMCSRs) that my need to be updated, modified, or eliminated to facilitate the safe introduction of commercial automated driving systems (ADS) on our nation's roadways. Commercial motor vehicles (CMVs) carry the potential to lead global deployment of advanced ADS technologies. AAMVA looks forward to continued federal-state collaboration as the modern commercial motor vehicle fleet takes shape.

AAMVA emphasizes that the retention of regulations regarding the operational performance of any vehicle are essential, and encourages FMCSA to use discretion in the consideration of the removal or modification of a Federal Motor Carrier Safety Regulation that may have secondary or tertiary impacts on the crashworthiness, operational safety, or performance standards of the vehicle when considered in its entirety.

AAMVA recognizes the essential role that ADS technologies will serve in saving lives and applauds its integration into vehicle fleets. As these technologies are deployed to vehicles, it is essential for each ADS contribution towards vehicle performance to be readily available. AAMVA notes that the integration of FMCSRs and Federal Motor Vehicle Safety Standards (FMVSS) exists to standardize performance aspects of the vehicle. Removal of standardized performance or application of regulations may complicate universally applied regulations that apply important safety benchmarks to all vehicles (ADS equipped or not). While AAMVA understands that no responsible manufacturer would use regulatory removal as a platform for testing questionable vehicle performance technologies, the advent of autonomous features will attract a much larger swath of technology from developers that may or may not be acclimated to the standard protocol for compliance with FMCSRs. It is the uniform application of a federal regulatory model that the states rely on for making determinations regarding vehicle safety.

Intersection with State Policies and Law

Careful consideration must be given to how the removal or modification of FMCSRs will affect underlying state law and administrative policies. Given that some state vehicle and licensing code is directly related to the ability of a state to meet applicable FMCSRs, the potential to disrupt state law and standing administrative policies is significant and widespread. AAMVA recommends that FMCSA consider the continued inclusion of state governments in the FMCSR modification process, so that avoidance of unnecessary legal complications can be avoided and so that disruption to current administrative practice is minimized.

AAMVA refers FMCSA to its previous comments in this docket to address the broader impacts associated with modification of the FMCSRs to accommodate automated vehicle technologies.

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?

In order for FMCSA to be able to enforce the ODD of a specific vehicle that may carry numerous permutations of ADS capabilities, it will be important for FMCSA to first require the submission of clearly described ODD from the vehicle manufacturer. Only those with design oversight of the vehicles are equipped to properly analyze and describe the sufficient areas of safe operation. Once that ODD has been described and documented with appropriate federal authorities, FMCSA must develop a capability to classify and assign the ODD of the vehicle by individual vehicle identifier (most likely a VIN). Because FMCSA enforcement is limited, the ability to communicate the described ODD with state and local authorities will also play an important factor. Given that ODD may evolve alongside the vehicle through over-the-air updates and other contributing factors, the ability to locate and utilize real-time data on the described ODD will play an important role in ensuring intended ODD aligns with actual vehicle operation.

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

AAMVA defers to the expertise of the manufacturer and motor carrier community.

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.

Yes. A holistic look at how the term "driver" penetrates existing FMVSS and associated statutory provisions will be an important consideration. Equally important is consideration of how the term will be utilized and cross-referenced across the entire transportation safety spectrum. In its early stages, it will be important that FMCSA collaborate with all safety stakeholders on the meaning of the term as ascribed to commercial vehicle safety and ensure that the exact same definition be applicable to non-commercial applications. AAMVA believes FMCSA should consider vehicle safety in the most general terms possible. Given that we are seeing exemption applications that very lightly touch on one of the most serious aspects of operational performance - the ADS as "driver" - it is important to understand that the majority of FMVSS were comprehensively developed for vehicles transporting a human driver. Those human drivers have been evaluated based on competency at the state level in order to legally operate the vehicle, it will be important for FMCSA to clearly document who or what is responsible for the operational functions of the vehicle. AAMVA recommends FMCSA collaboration with all AV stakeholders, many of which are outlined in AAMVA's "Guidelines for the Safe Testing and Deployment of Highly Automated Vehicles."

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

AAMVA is currently in the process of formally exploring the application of an endorsement for an ADS-reliant CDL endorsement. Without knowing whether there is an absolute need for a specific endorsement, AAMVA believes

that all drivers should be required to understand the capabilities and limitations of the advanced technologies equipped on their motor vehicles. AAMVA recognizes that the suite of technologies contributing to the driving task may be too extensive for anyone to know or be aware of on an individual component level. However, it is extremely important that all drivers be able to masterfully prove their ability to safely operate their vehicle under any conditions. With this in mind, while it may not be feasible to test a driver on the names, applications and design components of a singular ADS, what should be expected of all drivers is their unerring ability to translate what the ADS is communicating to them and contributing to the driving task by ensuring a sustained and controlled demonstration of safe driving behavior. This means intervening in the driving task to ensure adherence to all applicable safety laws, attentive oversight of the driving task, and demonstrated proficiency in controlling the vehicle. While AAMVA continues to explore the potential for endorsing ADS proficient drivers, it is nevertheless more important that FMCSA focus on how best to partner with states on the safe testing of CDL applicants who arrive in ADS equipped vehicles.

Under the assumption that ADS systems truly contribute to assisting the driver in avoidance of dangerous driving situations, ADS systems should be viewed *only* in terms of assistance. Drivers should still be required to demonstrate the safe operation of any vehicle they are in control of. With this in mind, the existence of an endorsement may only serve as relevant in the post-citation, post-crash environment. At this point, it may be too late for an endorsement to be considered a safety precaution, but the endorsement may serve a purpose in terms of liability, enforcement and predictive data on drivers. Certainly the driver licensing community has used restrictive endorsements in the past (such as the air brake endorsement), but in this instance, FMCSA is requesting comment on use of the endorsement to ensure the driver understands the capabilities and limitations of the advanced technologies. AAMVA offers that there are certain to be numerous technologies the states and other oversight agencies are not even aware of as part of the vehicle. Because the ADS system components perform a driving function, and may be less "mechanically visible" than previous restrictive endorsements, it may prove too difficult for examiners and roadside enforcement agents to realize the presence of every driver-dependent ADS technology. Further, the states may be unable to classify and integrate every individual or layered ADS technology into a uniformly recognized telltale. In terms of demonstrated ADS proficiency, the application of an endorsement for every permutation of ADS technologies seems expansive. However, the ultimate goal of safely demonstrating the ability to operate a commercial motor vehicle commensurate with federal standards seems a more achievable, outcome-based, litmus test.

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

As mentioned above, the ultimate determining factor will be the assurance that the operator can safely ensure the safe operation of the vehicle. What that takes in terms of demonstrating proficiency by each unique ADS component will take close collaboration between the documentation requirements prescribed by FMCSA, those responsible for testing in the states, and the evolution of a modern testing methodology. AAMVA stands ready to partner with FMCSA in ensuring the continued safe operation of commercial vehicles.

2.3 – What would be the impacts on SDLAs?

SDLAs would at a minimum be required to work closely with FMCSA on any modifications to the testing methodology and training their examiners accordingly. AAMVA anticipates that there would be additional training costs for any changes made to current testing. Depending on the determination made by FMCSA with respect to endorsement, there could be additional system modification costs to accommodate a new endorsement so that the changes would be accurately captured by the Commercial Driver's License Information System (CDLIS) and the

shared functionality of Commercial Skills Test Information Management System (CSTIMS). Additional testing requirements could complicate an already crowded skills testing environment and complicate the ability for states to exchange data. There are also considerations for how to incorporate additional training and testing requirements into the Entry-Level Driver Training Rule (ELDT).

As mentioned above, FMCSA would have to work very closely with its state administrators to ensure a uniform standard of proficiency in varying ADS circumstances is utilized in a consistent manner.

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

Yes. See our response in previous questions regarding the need for appropriate training to accompany all CDL applicants. At a minimum, drivers should be able to identify which functions of the vehicle are assisted or performed by ADS technologies. Drivers should be able to not only identify, but be trained on how to seamlessly accommodate any ADS "hand-offs" if that is described as a safety redundancy in the event of ADS failure. Drivers should be proficient in recognizing what telltales and indicators mean with respect to their associated ADS functions, should be able to detect anomalies, and should be able to proficiently intervene if they notice functional issues with the ADS. If the ADS is not capable of performing the entire dynamic driving task, the drivers should be able to perform any functions that the ADS cannot perform <u>at all times.</u>

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?

The agency should seriously consider the ability of a remote operator to safely monitor any more than one vehicle at a time. Given that the term "remote operator" has been used under different scenarios, it may require further refinement of just what that function entails. If a single monitor may be required to intervene in multiple safety issues, it would seem prudent to start at a relatively low threshold to avoid any inability to respond. FMCSA would also need to clarify the role between any human occupants who are assigned to deal with vehicle performance issues and the role of the remote monitor. If the two are working in tandem, that may require a different oversight scenario than one in which the remote monitor is expected to intercede in any vehicle operations.

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

No.

Section 3 – Hours of Service

AAMVA defers comment on hours of service requirements to the motor carrier industry, FMCSA and its enforcement partners.

4.1 – Should some of the physical qualification rules be eliminated or made less stringent for humans remotely monitoring or potentially controlling ADS-equipped CMVs?

Again, FMCSA must carefully consider the differentiation of remote monitoring from remote control of a commercial vehicle. AAMVA defers on medical fitness to the experts at FMCSA, but if a remote operator is expected to take physical control of any commercial vehicle, it would seem applicable that the remote operator have the same medical fitness qualifications as a driver physically present in the vehicle.

4.2 – If so, which of the requirements should be less restrictive for human operators who would take control of an ADS-equipped CMV remotely?

AAMVA defers to FMCSA expertise on medical fitness for remote monitors.

4.3 – Should the Agency consider less restrictive rules for humans who have the benefit of ADS technology to assist them in controlling the vehicle (e.g. technologies that would enable individuals with limb impairments to operate at a level comparable to individuals without such impairment?

AAMVA defers to FMCSA on medical fitness and safety equivalency evaluation and determination.

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?

This question, like others, will largely depend on the SAE-level designation of the vehicle, the operational capabilities of the vehicle, and the role of the driver. As the technologies progress, the role of the "driver" may change. If the role of the driver becomes one of monitoring without the expectation that they take direct control of the vehicle, then there may be latitude on safety expectations. For the time being, any human given the designation of "driver" should be responsible for safe oversight of the vehicle without engaging in any form of distracted driving.

FMCSA further requests comments on whether fatigue monitoring and alertness assistance be provided to human drivers. Where applicable, these features have the potential to increase safety. As mentioned above, if the expectation is that the "driver" is responsible for oversight of the driving task, and that task is routinely being performed by ADS systems which may need to hand off control of the vehicle at any point, then those types of monitors and alerts would provide a much needed additional layer of safety.

6.1 – Should FMCSA consider revising its rules to ensure that (1) any human exercising control of an ADS-equipped vehicle must continue to comply with all the rules under Part 392, and (2) a CMV under the control of a Level 4 or Level 5 ADS must satisfy the operational rules?

AAMVA supports the continued mandatory compliance of Part 392 for any human exercising control of a commercial vehicle.

6.2 – For example, should FMCSA require that the ADS be capable of identifying highway-rail grade crossings and stopping the CMV prior to crossing railroad tracks to avoid collisions with trains, or going onto a highway-rail grade crossing without having sufficient space to travel completely through the crossing without stopping?

Yes.

6.3 For scenarios in which the control of the ADS-equipped CMV alternates, or may alternate, between a human and the technology, should FMCSA require that both the human operator and ADS comply with the applicable operational rules?

Yes.

7.1 – What qualifications should be required of the individual performing the pre-trip inspection?

The individual should be able to satisfy the existing pre-trip requirements and ensure the mechanical components of the vehicle are in order and prepared for safe operation of the vehicle. The individual performing the pre-trip inspection should also be able to describe the functions of any system contributing to the dynamic driving task. The individual should be able to identify and describe any telltales or indicators that illustrate any issues preventing optimal commercial motor vehicle safety operations or any condition that may present an impediment to safety.

7.2 – What kind of routine or scheduled inspections should be performed and what types of ADS-related maintenance records should be required?

FMCSA should consider required inspections when vehicle functionality has been significantly altered. AAMVA defers to FMCSA and the manufacturers on the ability to safely evaluate ADS components throughout their lifecycle, but encourages documentation of inspections and maintenance so that safety trends or hazards might be mitigated based on the ADS components associated with each vehicle.

7.3 – Should the inspection period be more or less frequent than annual for an ADS-equipped CMV?

AAMVA defers to manufacturers, CVSA and FMCSA in making determinations on inspection periods for ADS-equipped vehicles. However, if the vehicle undergoes a significant change through over-the-air updates or experiences a change in its automated capabilities, FMCSA may want to consider tying significant functional changes to the vehicle inspection process.

7.4 – Should inspections be mileage based or time based?

AAMVA defers to industry and FMCSA expertise in developing appropriate safety evaluation criteria. The inspections should be conducted annually at a minimum.

7.5 – Should FMCSA impose general requirements for motor carrier personnel responsible for ADS-related inspection, repair, and maintenance tasks similar to the Agency's brake inspector qualification requirements?

Motor carrier personnel responsible for ADS-related inspection, repair, and maintenance should have the technical experience and expertise to correct any issues with the CMV. Given that this will become a highly-technical duty, FMCSA may want to ensure they have the ability to satisfy any issues with the ADS functions of the vehicle – including the ability to identify and mitigate safety hazards that may be the result of faulty software or system integration.

7.6 – How could FMCSA ensure that motor carriers apply safety-critical software updates?

One way to ensure all appropriate safety-critical software updates have been installed is to make motor carriers attest to that fact as a part of periodic or roadside inspections. The visibility to ensure different software patches have been installed will not be readily apparent to third parties, so documentation of attestation by manufacturers that the safety-critical updates have been deployed coupled with attestation by the operator/motor carrier that the updates have been installed may assist the agency.

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

Yes.

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

AAMVA defers comment on the best method of communication between motor carriers and FMCSA, however, that communication should be readily documented.

8.3 – Should FMCSA require markings identifying the ADS level of a vehicle?

AAMVA recommends that ADS-equipped vehicles should be marked in a visible manner so that roadside enforcement and first responders can readily identify them. Given that the ADS capability of the vehicle may change, an external identifier of any AV capability may make sense rather than a static external identifier of the level of ADS capability. AAMVA also recommends that the vehicle be able to *communicate safety data* to first responders and roadside enforcement agents (whether manned or unmanned.) Beyond visible exterior markings, it would be helpful to first responders and crash investigators to have access to information on whether the ADS or a human operator was in control of the CMV.

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

FMCSA should consider how malfunctions can be properly and efficiently identified by third parties – especially in the case of safety-critical failures. This is important to all parties interacting with the vehicle if it is operating in an unsafe state.

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?

Yes.

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

Any impediment to first responders' ability to respond to an incident should be met with appropriate enforcement penalties. States have already developed associated laws for mitigating this problem for human drivers. Motor carriers who impede first responders should be subject to the same consequences as any other entity, with the caveat that if FMCSA sees the problem as endemic, the vehicles be removed from service until they can properly identify and respond to emergency services.

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

See previous comments regarding safety-critical telltales and system failure. AAMVA has also commented on attestation, which would only solve part of the issue. The other half of the equation is being able to detect and identify non-visible signs of unsafe operation. AAMVA would defer to CVSA on the best way to ensure 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?

FMCSA must describe what standard information is critical for safe operation of the CMV. Given there are numerous different functions of the ADS-equipped CMV that may impact safe operation, FMCSA should consider what malfunctions or failures are deemed safety-critical and associate a uniform indicator that can be easily identified by third parties. In the absence of a single indicator for multiple functions, FMCSA should consider the ability to transmit available safety data to inspectors and enforcement, and must require that the data be submitted to enforcement personnel if requested.

9. Cybersecurity

AAMVA defers comment on cybersecurity to those most qualified to protect the integrity of ADS systems.

10.1 – As the development of ADS technology continues, the Agency believes there is a need to learn about the performance limitations of these systems. FMCSA draws a distinction between information about performance limitations and details about the system design. To what extend to ADS developers believe performance data should be considered proprietary and withheld from the public?

While AAMVA will not comment on behalf of ADS developers, we do recommend the need for manufacturers to collaborate with FMCSA on how to submit information on ADS systems. All applicable and relevant testing data that applies to exemption from the standard should be documented. Where sensitivity around sharing that data for proprietary reasons may limit the prudence of submission of this data, the manufacturer should attest to having data supporting the relative safety measurement of performance and should attest to its veracity. Petitioners

declining to provide data for proprietary reasons should be prepared to claim ownership of the technologies as their own. Manufacturers should also provide enough of a detailed description to allow for comparison against existent technologies so that it can be differentiated from other models and evaluated for its "innovative" nature.

AAMVA thanks FMCSA for the opportunity to comment on its consideration of integrated ADS technologies in commercial motor vehicles. AAMVA understands the need for FMCSA to be agile in its approach to moving life-saving technologies to consumers and stands willing to work with the agency as we revisit what it means to deemed federally compliant with a robust catalogue of commercial safety regulations.

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