

August 26, 2019

Federal Motor Carrier Safety Administration
1200 New Jersey Avenue SE
Washington, DC 20590

Re: Docket Comments: Federal Motor Carrier Safety Administration
Docket Number FMCSA-2018-0037
Advanced Notice of Proposed Rulemaking (ANPRM)
Safe Integration of Automated Driving Systems (ADS)-Equipped Commercial
Motor Vehicles (CMV's)

The Volvo Group is one of the world's leading manufacturers of trucks, buses, construction equipment and marine and industrial engines. Volvo Group develops, manufactures, and sells heavy-duty trucks, buses and motor coaches and their powertrains in the U.S. under the brand names of Volvo Trucks, Mack Trucks, Volvo Bus, Nova Bus, and Prevost. The Volvo Group has been manufacturing in the U.S. since 1900 and directly employs nearly 15,000 Americans. Our major facilities are in North Carolina, Pennsylvania, Virginia, Maryland, and New York. We have invested nearly \$2 billion in our nine manufacturing facilities since 2002 and spend more than \$250 million in R&D in the U.S. every year. The Volvo Group respectfully submits the following comments to FMCSA's Advanced Notice of Proposed Rulemaking (ANPRM) for the Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles, (hereafter "ADS ANPRM" or "ANPRM").

INTRODUCTION

Volvo Group has long been a leader in developing and implementing safety technologies on motor vehicles. Along with Environmental Care and Quality, Safety is a core value of Volvo. Safety is deeply rooted in our culture and heritage with an approach of "Safety by Design" where we continue to develop and provide safety features to our customers even in advance of regulations.

As a general matter, Volvo Group agrees with FMCSA that ADS-equipped vehicles present a huge potential for improvement in transportation safety and the efficient movement of freight and passengers. ADS vehicles have potential added benefits in congestion mitigation and increased transport efficiency resulting in overall reduction of vehicle-miles-traveled (VMT), criteria pollutant emission reduction and greenhouse gas emission reduction. ADS vehicles also have the promise to enable transportation for those unable to afford or use traditional transportation solutions.

VOLVO RESPONSES TO SELECTED ANPRM QUESTIONS

1. Do the FMCSRs Require a Human Driver?

1.1 Should FMCSA establish a rule that would prohibit an ADS-equipped CMV from operating outside its designated ODD?

An ADS will be programmed to operate when it recognizes that it is within the relevant ODD. If the vehicle is not in a recognized ODD or is in some boundary condition (e.g. work zone, accident, police, heavy snow/rain ...), then AV will fall back to some minimal risk condition (MRC) (e.g. stopping on the side of the road). For this reason Volvo believes a regulation to prohibit an ADS-equipped CMV from operating outside its designated ODD would not add value and would be unnecessary.

1.2. What are manufacturers' and motor carriers' plans for when and in what way Level 4 and 5 ADS-equipped CMVs will become commercially available?

Volvo Group believes that the safe introduction of automated heavy-duty vehicles will begin in limited access areas with no exposure to vulnerable road users. Since 2018 Volvo has successfully tested Level 4 autonomous Volvo trucks at the Brønnøy Kalk mine in Norway, transporting limestone along a five-kilometer stretch of tunnels and mine roadway.¹ This is Volvo Trucks' first autonomous solution in real operation, and the aim is to greatly improve the mine's productivity and safety.

For on-road trucks Volvo sees potential for a safe next step in the evolution of advanced automated driving systems in the use-case of semi-confined L4 operation in ports, manufacturing facilities and similar logistics operations. Volvo is in the process of developing a fully autonomous, driverless L4 solution for this application called Vera. Vera is an electric, autonomous and connected vehicle that can operate safely with significantly less exhaust emissions. It is controlled and monitored via a control tower, and designed for repetitive assignments in logistics centers, factories and ports. Vera is suited to short distances, transporting goods with high precision. Volvo has been collaborating with DFDS Logistics at a port terminal facility in Gothenburg Sweden to implement several Vera vehicles as part of a connected system that is monitored from a control tower. The aim is to establish a seamless flow of goods responsive to demands for greater efficiency and flexibility. Several Vera vehicles are intended to operate on pre-defined public roads in an industrial area.²

As a next step Volvo foresees automated driving evolving into limited operational design domain (ODD) L4 highway operation for goods movement between logistics hubs.

All of these applications lend themselves to certain types of commercial vehicle work, but certainly not all. It is important to note that society will still need human drivers to handle certain elements of commercial vehicle transportation tasks.

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

Irrespective of the interpretation of the current regulations, to avoid ambiguity and the need for constant interpretation, Volvo believes that it would be best to incorporate terms and definitions to

¹ <https://www.volvotrucks.com/en-en/news/press-releases/2018/nov/pressrelease-181120.html>

² <https://www.volvotrucks.com/en-en/about-us/automation/vera.html>

define what entity is in control of a CMV. These terms should include definitions for Driver (human), ADS Driver (the ADS), and Remote Driver (for when a human is controlling a vehicle from a remote location).

2. Commercial Driver's License (CDL) Endorsements

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

Human drivers that control and operate an ADS-CMV should continue to be required to have a CDL. Because the ADS technology is not established at this time, it is not clear what added requirements would constitute an ADS endorsement. As the technology matures, a CDL endorsement for a human ADS operator may be needed. Another CDL endorsement that may eventually be warranted would be an endorsement for a remote operator. In any case, a remote operator should be required to have a CDL to ensure they have the needed background of a CMV's physical capabilities and the CMV driving task.

2.3. What would be the impacts on SDLAs?

If FMCSA enacts requirements for a CDL endorsement for ADS operation, then the individual states would need to update their programs, and train and test accordingly based on FMCSA's requirements.

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

Volvo believes that it would be good to have some agreed upon levels of training for basically all personnel that will be involved with ADS vehicles (e.g. safety drivers, emergency responders, tow truck operators, freight yard dispatchers, etc...). However, it is very early in the development of ADS-CMV applications, so the training needs are not fully understood at this time. As the technology matures, the need for training should be assessed.

2.6. Should a dedicated or stand-by remote operator be subject to existing driver qualifications?

The current driver qualifications are a physical exam for fitness, a driving test, and a written test. A remote driver should have some real-world training and use of the CMV, so a remote or stand-by operator should meet existing qualifications. A remote operator should be required to have a CDL to ensure they have the needed background of a CMV's physical capabilities and the CMV driving task. However, because some controls for remote operation are designed for hand-only operation (e.g. joystick only), meeting some of the physical exam requirements may not apply (e.g. individuals with limb differences may be fully capable of performing CMV remote operation).

3. Drivers' Hours of Service (HOS) Rules

3.1. Should HOS rule changes be considered if ADS technology performs all the driving tasks while a human is off-duty or in the sleeper berth, or physically remote from the CMV?

For an on-board human driver who is off-duty or in the sleeper berth while the ADS is driving, the human should record his time as off-duty or sleeper berth, so no regulation change is required for this case. Changes to the regulations for Electronic Logging Devices may be required to account for the automatic recording of duty status while the engine is operating.

For a remote operator, the current off-duty, on-duty, driving and sleeper berth statuses could be used, but the concept of recording HOS for inspection by a highway patrolman or other roadside official is not valid for this case. Also, the time and task demands of a remote operator will likely be markedly different, so the current HOS rules may not be relevant.

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

The need for an operator to have adequate attentiveness available is still valid for on-board and remote operators, but research and study are needed to understand how much time off-task and on-task are ok. Also the nature of work for an on-duty remote operator who is not performing a driving task may have different impact on fatigue and attentiveness to a driving task and may even be beneficial to attentiveness as compared to continuous driving.

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

Research and study are needed to understand how much time off-task and on-task are ok. Also the nature of work for an on-duty remote operator who is not performing a driving task may have different impact on fatigue and attentiveness to a driving task and may even be beneficial to attentiveness as compared to continuous driving.

4. Medical Qualifications for Human Operators

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?

Some of the physical considerations around continuous CMV driving (e.g. all hands and feet, diabetes) may not be required, if the associated equipment addresses the related physical limitations. For example if a remote control only operates with hand controls, then a leg amputee could be qualified to drive, or if the time requirements for attentiveness are relatively shorter than a full-time driver, then the qualifications around diabetes may not be relevant.

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 impairments)?

Yes, particularly for remote operation with equipment designed accordingly.

5. Distracted Driving and Monitoring

5.1. How should the prohibition against distracted driving apply to onboard operators responsible for taking control of the CMV under certain situations, and to remote operators with similar responsibilities?

For SAE L5 systems this is not an issue by definition. It is also not an issue for SAE L4 systems because the human cannot be the fallback minimal risk condition by definition. The distracted driving requirements while a human is in charge of the driving task of an ADS-CMV should be the same as current.

6. Safe Driving

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?

- 1) A human exercising control of an ADS-CMV is fully operating a CMV, and therefore must comply with the Part 392 requirements.
- 2) An SAE L4 or L5 system will likely fallback to some safe MRC in the event of "hazardous conditions, such as those caused by snow, ice, sleet, fog, mist, rain, dust, or smoke, adversely affect visibility or traction"³. The ADS will likely be programmed to either slow to a safe speed or stop entirely. This is the essence of this part of the regulation, but a regulation requiring this may or may not be necessary. However, it would be difficult for a human enforcement official in the field to judge what is "sufficiently dangerous" for an ADS, so it begs the question on how such a regulation would be enforced.

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?

This requirement is likely based on past history of very serious accidents at railroad crossings, and the requirement to stop is meant to allow a driver to take more than adequate care and not feel the urge to rush. An ADS would not feel this emotional urge and would make the decision based on physical observation and physics, if this type of crossing is programmed within the intended ODD. On the other hand, other road users may expect a CMV to stop at a railroad crossing and make tactical decisions accordingly, so it may be prudent to extend the requirement to ADS operated CMV's.

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?

³ 49CFR392.14

Yes. Both should be fully capable.

7. Inspection, Repair and Maintenance

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

The pre-trip inspection of an ADS-CMV should be ADS self-diagnosis plus the current CMV pre-trip inspection, so whoever performs the pre-trip inspection should be qualified to perform a normal CMV pre-trip inspection. If the ADS detects a fault that would compromise the safe operation of a vehicle, then the ADS would not engage or would operate in some fallback MRC.

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

Inspection, repair and maintenance requirements will be determined by manufacturers as they gain more knowledge of the systems during the development phases. As with any new technology, the ADS manufacturer would have to provide the necessary information and training on inspecting, maintaining and repairing the ADS-CMV. At a minimum the ADS sensor system could be a candidate for visual/physical inspection (e.g. securely fastened, no obstructions of view, good working order).

8. Roadside Inspections

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

It is too early to say whether or not notification is needed, but if a permitting system is enacted the process and requirements should have some level of federal oversight to ensure consistency for operation across state borders.

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, an ADS-CMV should be able to comply with officials and move out of the way of first-responders. Many state ADS laws contain requirements for ADS operation that the ADS must be able to obey all traffic laws. Proper reaction to officials and first-responder vehicles is usually one of these traffic laws.

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

An SAE L4 or L5 ADS system would be programmed to preclude autonomous operation, if there is some defect or issue detected, so notification of roadside enforcement personnel may not be needed.

10 Confidentiality of Shared information

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 (e.g., how well does the ADS keep the vehicle in its lane and under what environmental conditions, etc.) and details about the system design (e.g., the specific types of sensors, or the arrays of sensors and cameras used for input to the central processing unit for the ADS). To what extent do ADS developers believe performance data should be considered proprietary and withheld from the public?

As ADS technology matures, common standards for qualifying different aspects of ADS vehicle operation (e.g. how well does an ADS keep a lane, how well does it handle merging or lane changing, how well does it handle unknowns or emergency situations) will be developed. These types of standards and tests are better developed using standards developed by organizations like ISO or SAE. This will ensure that the relevant manufacturers and ADS developers will have the established, needed processes to protect proprietary information.

CONCLUSION

The Volvo Group appreciates the opportunity to comment on this significant rulemaking activity and recognizes the effort FMCSA is putting forth to understand and eliminate barriers to the adoption of ADS commercial motor vehicles. ADS vehicles have the potential to significantly improve safety on our nation's highways while improving the efficiency and effectiveness of commercial motor vehicle transportation. As a heavy duty vehicle manufacturer who is developing ADS technology, we look forward to working with FMCSA, the other DOT Agencies, and other stakeholders on the safe introduction of ADS equipped CMV's. If you have any questions, please contact Robert Fasnacht at 336-392-9153 or robert.fasnacht@volvo.com.