August 28, 2019

Raymond Martinez
Administrator
Federal Motor Carrier Safety Administration
1200 New Jersey Avenue SE
W12-140
Washington, DC 20590

Re: Docket No. FMCSA-2018-0037: Advance Notice of Proposed Rulemaking: Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles

Dear Administrator Martinez,

Locomation, Inc. ("Locomation") is pleased to respond to the Federal Motor Carrier Safety Administration's (FMCSA or the Agency) Advance Notice of Proposed Rulemaking (ANPRM) regarding the Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles (CMVs). Locomation appreciates the FMCSA's efforts to seek input from stakeholders in informing the Agency's approach to supporting the development, deployment, and integration of Automated Driving Systems (ADS). As a company engaged in developing driver-guided autonomous relay convoy technology, Locomation shares FMCSA's goal in ensuring that there are performance-based safety requirements that will support the integration of ADS-equipped CMVs.

I. Background on Locomation's Driver-Guided Autonomous Relay Convoy Technology

Locomation[1], a Pittsburgh, Pennsylvania based venture-backed start-up, is seeking to commercialize driver-guided autonomous relay convoy technology. Locomation's team consists of autonomy experts from Carnegie Mellon University Robotics Institute, with its founders having more than 100 years of combined experience in developing autonomous vehicle technology, as well as licensed truck drivers with impeccable driving records and best-in-class business advisors. Additionally, Locomation partners with truck fleet operators, transportation logistics companies, and regulatory and compliance experts to ensure that its technological solutions meet specific commercial needs of the trucking industry, as well as the safety and reliability goals of local, state and federal CMV regulators. Locomation is well positioned to become a thought-leader in the area of trucking autonomy and is eager to work alongside interested and appropriate stakeholders to build public-private partnerships with the goal of promoting and achieving world-class autonomous truck safety on the road to zero fatalities.

Locomation has teamed up with a Top 5 fleet operator partner and other national and regional truck fleet operators and transportation companies to test and demonstrate Locomation's autonomous relay convoy ("ARC") platooning technology on trucks on test tracks and public

[1] www.locomotion.ai

highways in 2019 and 2020, with the goal of moving towards commercial deployment of the systems in 2021. The goal of the demonstrations, beyond testing the technology, is to prove commercial feasibility of autonomous truck platooning, demonstrating that such operations can improve truck driver and highway safety, while reducing costs to truck fleet operators, reducing traffic congestion, improving fuel economy and increasing vehicle throughput. Locomation has begun testing and demonstrations on Pennsylvania highways and the I-10 Corridor (TX, AZ, NM, and CA) to start, with subsequent expansion to other freight corridors in the U.S.

As part of its pilot program with its fleet operator partner, Locomation intends to conduct, in 2019, demonstration operations on public highways in the United States designed to establish commercial viability of its technology. During the demonstration phase of the program, each operation will consist of two trucks traveling from a Point A location (e.g., distribution center) to a Point B destination (e.g., relay point, receiver, consignee), where the route transits a public highway/interstate. The two trucks will follow one another and, at the point on the highway where it is determined that the Operational Design Domain (ODD) is such that allows for safe engagement of Locomation's ARC technology, the trucks will form a convoy, or "platoon" and the "follower" truck will enter into a driver-guided autonomous relay mode behind the "leader" truck. During the demonstration phase, both trucks will have licensed and trained truck drivers operating the vehicles. After each shift, the truck drivers will take turns leading and following in the convoy.

Upon the successful completion of its demonstration phase, Locomation intends to move towards a commercial testing and deployment phase. In this phase, a human driver will be in control of the lead truck at all times; however, at a requisite ODD, the follower truck will enter into Level 4 autonomy mode, with no need for human oversight or intervention required. This model is designed to allow ARC-enabled truck drivers to rest without disrupting the convoying delivery schedule and process.

Locomation's technology consists of the following: (1) an autonomy system that that can self-drive the follower truck without affecting or disabling the truck's Federal Motor Vehicle Safety Standard (FMVSS) -compliant functional and safety features; (2) a wireless (V2V) communication system between the two trucks, with perception-based leader tracking to ensure safe, close-distance following; and (3) signaling technology to inform the public that the platoon is either in its "ARC" or normal "driver" mode.

II. Specific Responses on the Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles

1. *Do the FMCSRs require a human driver?*

The Federal Motor Carrier Safety Regulations (FMCSRs) do not require a human driver, as FMCSA recognized in the ANPRM.[2]

[2] Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles, 84 Fed. Reg. 24,449, 24,450 (May 28, 2019) ("FMCSA's current regulations . . . do not explicitly require human operators or drivers").

The Volpe National Transportation System Center also recognized this in its 2018 Review of the Federal Motor Carrier Safety Regulations for Automated Commercial Vehicles, stating that the FMCSRs "do not appear to contain an explicit requirement that CMVs be operated by a human driver, but instead present requirements that apply to human drivers."[3] The National Highway Safety Administration (NHTSA) has also recognized, in a letter of interpretation, that it would interpret "driver" in the FMVSS to be the ADS, not any of the human vehicle occupants.[4] NHTSA has since upheld this interpretation in later guidance documents.[5]

While Locomation does not believe that the FMCSRs require a human driver, Locomation's technology platform requires a human driver in the follower truck during its demonstration phase, and as Locomation moves towards commercial deployment the human driver could rest in the sleeper berth of the follower truck while the ADS performs the dynamic driving task. In each instance, a human will be present during the operation, either as a driver or as a passenger (with the ability to disengage the ADS and take over driving duties). This is designed in recognition that a human driver would be necessary to drive the CMV when the vehicle is outside of its ODD. However, while the ADS is engaged in the vehicle's ODD, such as on highways and convoying behind a leader truck, the human driver could remove themselves and retire to the sleeper berth. In this scenario, the ADS would take over as the "driver" of the CMV. By allowing a human driver in the follower truck to go off duty while the CMVs are convoying, Locomation's technology enables trucking companies to reduce labor costs and increase asset utilization.

FMCSA should consider making distinctions in the FMCSRs between a "human" driver and an "ADS" driver because certain FMCSRs may not be applicable to an "ADS" driver, but should continue to apply to human drivers operating CMVs, such as commercial driver licensing, drug and alcohol testing, and other safety-related requirements.

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

FMCSA should require entities to define and document ODDs for their ADS-equipped CMVs and require entities to test and validate the ADS functionality within the defined ODD. FMCSA could provide guidance as appropriate on the characteristics of an ODD, such as operating speeds, weather conditions, or geographic areas, that a manufacturer should consider in defining its ODD, but also recognize that manufacturers should be responsible for designating ODDs based on the capabilities and within the limitations of their technologies.

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[3] Volpe, Review of the Federal Motor Carrier Safety Regulations for Automated Commercial Vehicles at 7 (2018), https://rosap.ntl.bts.gov/view/dot/35426.

[4] NHTSA Letter of Interpretation to Chris Urmson, Director, Self-Driving Car Project, Google, Inc. (Feb. 2016), https://isearch.nhtsa.gov/files/Google%20--%20compiled%20response%20to%2012%20Nov%20%2015%20interp%20request%20--%204%20Feb%2016%20final.htm.

[5] *See e.g.*, Removing Regulatory Barriers for Vehicles with Automated Driving Systems, 84 Fed. Reg. 24,433, 24,436 (May 28, 2019).

Locomation believes that as ADS technologies are being developed, improved and deployed, entities will need flexibility in defining, designating, and operating within ODDs to achieve optimal performance and safety results. While Locomation's ARC technology will only engage when the CMV is in its ODD, onerous oversight might hinder an entity's ability to expand, revise, or further define completely acceptable ODDs.

Instead of prohibiting the operation of ADS-equipped CMVs outside of a designated ODD, FMCSA should consider requiring entities to have a documented process for how an ADS-equipped CMV would transition to a minimal risk condition when the vehicle is begins exiting its ODD, or for other situations where the ADS cannot operate safely. Such process and its implementation and compliance requirements should be well documented and available for review and audit by FMCSA, and FMSCA should be involved in developing guidance or sharing best practices surrounding the development of such processes. However, entities should have flexibility in determining the ODD and establishing the optimal minimal risk condition level of safety for deploying their ADS technology.

FMCSA, in its oversight capacity, can conduct compliance audits to ensure that ADS-equipped CMVs are operating within their ODD and achieve a minimal risk condition when outside of their ODD. FMCSA should establish clear guidance for the type of record keeping and retention required to demonstrate that ADS-equipped CMVs are operating within their ODDs and achieving a minimal risk condition when outside of their ODD.

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?

Locomation's Level 4 ARC technology is intended to be available for Pilot expansion in 2020 and is expected to be commercially available in 2021. Locomation is working to develop appropriate safety standards for any operations that exceed Level 2 autonomy as part of its future commercial deployment plans and will certify as such in compliance with required Federal and or State Regulations. It is worth noting that the SAE autonomy levels, while a useful tool for driving coherency and consistency among technology developers, may not adequately capture all ADS-related business models. For example, it is a reasonable position to categorize the ARC-enabled follower truck as being at Level 2 when the driver is fully engaged in the driving task, and then in Level 4 autonomy only at the point when a human operator is removed from the driving oversight/intervention function; when, for example, the driver retires to a sleeper berth and the ADS takes over the follower-driving decision-making functions. In exercising its rulemaking authority, FMCSA should be aware and sensitive to the imperfect SAE categorization of autonomy and its effects on different business models that utilize ADS technologies and require that ADS manufacturers accurately specify the correct level of autonomy in effect at any given moment.

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

Yes, the defined terms "driver" and/or "operator" will need to be amended to permit operation of ADS-equipped CMVs; specifically, a new defined term such as "ADS driver" will also be necessary. New definitions are needed to recognize that certain driving operations may be performed by the ADS or by a human driver, and other non-driving requirements might be accomplished by either a human driver, ADS, remote operator, or a person who does not have any role in the driving task. As NHTSA accomplished in its 2016 letter of interpretation to Google[6], FMCSA should consider using interpretations where feasible to interpret references to driver and/or operator in the FMCSRs.

2. ***Commercial Driver's License (CDL) Endorsements***

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

Yes, all drivers and remote-operators of ADS-equipped CMVs should be required to have CDLs. A specific CDL "ADS endorsement" is not necessary at this time due to the myriad technologies, each with individual nuisances and not much industry-wide standardization, and it would be difficult to create knowledge or skills tests applicable to ADS-equipped CMVs at this time. The manufacturer of ADS-equipped CMVs should have the responsibility, and take seriously, to ensure that the companies and or end-users operating CMVs equipped with their ADS technology are properly trained. FMCSA could require documentation of such training protocols, but broad regulation at this stage would be overly burdensome as commercial entities need the flexibility and freedom to develop customized training protocols appropriate for their intended operation.

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

Not applicable, please see Locomation's response to Question 2.1.

2.3. What would be the impacts on SDLAs?

If a CDL endorsement was required for ADS-equipped CMVs, this would place a huge burden on SDLAs by requiring additional technical expertise and training in order to administer the tests. Moreover, given the rapidly changing technological advancements in ADS, it is unclear that SDLAs are in the best position to develop tests appropriately designed for and adequate to address such changing technology.

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

Yes, drivers should be required to complete specialized training developed and administered by manufacturers of ADS-equipped CMVs and their motor carrier customers prior to operation of these vehicles. While a Level 4 or 5 ADS-equipped CMV is designed to accomplish all aspects of the driving task, operators must still receive training to interact and communicate with and, as necessary, disengage or override the technology. CMVs equipped

[6] *See* Footnote No. 3 above for reference.

with Level 1 to 3 ADS will likely require more training as the constancy of the driver's oversight role is crucial to the safe operation of the vehicle. ADS driver training programs are not new, as states permitting ADS-equipped vehicle testing generally require manufacturers to have an autonomous vehicle test driver training program.[7] Locomation is currently developing a driver training curriculum and would be open to sharing this curriculum with Federal and State regulators and its industry partners.

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?

While Locomation's autonomous convoy technology does not contemplate remote operators because a human driver will be present in all trucks, Locomation finds that for the safety of the public FMCSA should initially limit the number of vehicles a remote driver can monitor to one. FMCSA should study the potential safety implications associated with remote operators monitoring more than one ADS-equipped CMV prior to increasing this limitation.

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

Yes, any operator, whether remote or not, should be subject to existing driver qualifications. FMCSA might consider in the future whether, due to differences between remote operation and in-vehicle operation, remote operators should not be subject to certain driver qualifications.

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?

Operators of CMVs at Level 3 and below, whether physically in the vehicle or remotely monitoring or controlling, should comply with all HOS rules. At Levels 4 and 5, FMCSA should study whether the HOS rules are appropriate as applied to operators physically present or remote from the CMV. At such levels, it may be appropriate for a different, modified set of HOS rules to apply to drivers who are in the sleeper berth while the ADS is driving the CMV, or who are remotely monitoring the ADS-equipped CMV. In such scenarios, human operators would only count time spent actively controlling the CMV as "on-duty driving." Other times, such as when in the sleeper berth, should reasonably be considered as "off-duty." In this scenario, HOS limits could be calculated as an aggregated sum of "on-duty" hours, as opposed to evaluating consecutive hours of operation. In any event, proper fatigue management systems to ensure that CMV operators can perform their functions safely should be implemented to help address safety issues related to driver fatigue, distraction and/or inattention.

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

[7] *See e.g.,* Cal. Veh. Code tit. 13 § 227.36

Yes, at this time there does not appear to be a reason why HOS requirements should not apply to both onboard and remote operators.

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

Any human driver of an ADS-equipped CMV at Level 3 and below, whether physically present in the vehicle or remotely operating the CMV, should be subject to the HOS rules and considered to be "on-duty" at all times when they are actively controlling the vehicle or are in a position where they may be called upon by the system to take control of the driving task. For Levels 4 and 5, please see suggested approach in response to Question 3.1.

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?

FMCSA should maintain the current physical qualification rules for all individuals operating an ADS-equipped CMV, whether they be remote drivers or not. FMCSA might consider eliminating or reducing the qualifications for operators in the future; however, FMCSA should only make such a change after collecting data and studying whether a change is in the interest of safety.

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?

Not applicable, please see response to Question 4.1.

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)?

Not at this time given that the role of the driver in these vehicles remains substantially the same when the ADS technology is below Level 3. FMCSA might consider in the future studying whether operators of ADS-equipped CMVs should only be subject to a subset of rules and regulations.

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?

The prohibition against distracted driving should continue to apply to all operators of CMVs equipped with Level 3 and below ADS, regardless of whether the vehicle is remotely controlled or a driver is physically present in the vehicle. At Level 3 and below, drivers are either required to perform some portion of the driving task or be alert, receptive and ready to immediately intervene.[8] There is no reason why the distracted driving prohibitions should not apply to human drivers in ADS-equipped CMVs at these levels. However, FMCSA should consider permitting operators to interact with FMVSS-compliant screens that are used to control and monitor the ADS, as may be necessary for the safe operation of the ADS-equipped CMV.

At Levels 4 and 5, the ADS performs all aspects of the driving task and users are not expected to supervise the ADS, take control of the vehicle or respond to a request to intervene.[9] Therefore, FMCSA should consider exempting human operators in Level 4 and 5 CMVs from the distracted driving prohibitions.

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?

Part 392 should continue to apply to all human operators exercising control of an ADS-equipped vehicles and well as a Level 4 or 5 ADS that has complete control over the dynamic driving task. FMCSA may need to consider whether certain non-driving tasks in Part 392 could be accomplished by personnel not physically present in the CMV or responsible for operating the ADS-equipped 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?

As stated above, a Level 4 or 5 ADS-equipped CMV should be required to meet all operational requirements of Part 392, to the extent they are practicable and reasonable. This would include requiring the ADS to be capable of identifying highway-rail grade crossings and performing the appropriate response given the circumstances.

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, in such "dual operation" mode, the human operator and ADS should be required to comply with applicable operational rules when operating the CMV in their individual capacities.

[8] *See* 84 Fed. Reg. at 24,450; SAE J3016_201806.
[9] SAE J3016_201806.

7. *Inspection, Repair and Maintenance*

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

Individuals performing inspections of ADS-equipped vehicles should be required to meet the current qualifications for individuals performing inspections of non-ADS equipped CMVs. Locomation does not find that there is any need for additional qualifications for individuals performing inspections on ADS-equipped CMVs at this time, particularly where, as in Locomation's case, the ADS technology does not interfere with or impede FMVSS. FMCSA should study whether additional qualifications are needed in conjunction with studying whether any additional or specialized inspections are needed for ADS-equipped CMVs and pay attention to those instances where ADS systems may result in modification of CMVs that would trigger FMVSS non-compliance.

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

ADS-equipped CMVs will be inspected in accordance with current FMCSR inspection requirements. The American Trucking Association's Technology & Maintenance Council (TMC) is currently working on establishing best practices for the inspection of ADS-equipped CMVs. FMCSA should participate in this process in working to define any specific ADS-related inspection requirements.

FMCSA should study types of ADS-related maintenance records that should be required. As the technology evolves and improves, the maintenance and updates to the system and technology will likely be refined through industry input and engagement. Therefore, FMCSA should not prescribe certain ADS-related maintenance records at this time. In any event, the amount and type of information required should be consistent with current record keeping requirements.

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

No, the inspection period should not be more frequent than annual for an ADS-equipped vehicle.

7.4. Should inspections be mileage based or time-based (e.g., 1,000 miles, 3 months or 1,000 hours of operation)?

Inspections should be based on duty cycles that are defined by the motor carrier deciding to operate an ADS-equipped CMV in coordination with the ADS manufacturer. Because ADS-equipped CMVs may be able to operate longer and, likely, more efficiently than CMVs operated by human drivers, any inspections and inspection intervals should account for such differences.

Motor carriers should be provided flexibility in establishing inspection intervals based on ADS performance and maintenance records.

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?

No, FMCSA should not impose general requirements for motor carrier personnel responsible for ADS-related inspection, repair, and maintenance tasks. Motor carriers and ADS developers rely on qualified and skilled technicians in performing inspections, repairs, and maintenance tasks for ADS. Manufacturers and their motor carrier customers should be responsible for ensuring that their systems are inspected and maintained appropriately.

7.6. How could FMCSA ensure that motor carriers apply available aftermarket software updates?

ADS manufacturers may update their software daily. Locomation does find that it will be necessary for FMCSA to ensure ADS systems are updated with the most current software at all time. ADS manufacturers and their motor carrier partners should keep records of necessary software updates so that FMCSA, through its oversight role and inspections, could ascertain that ADS software is up-to-date.

Additionally, NHTSA has explained that ADS software and aftermarket software updates are defined as "motor vehicle equipment" under the National Motor Vehicle and Highway Safety Act, and therefore, subject to provisions regarding defects that present an unreasonable risk to safety.[10] NHTSA explained that it might consider the failure to apply software updates that are needed to keep a system functioning as a defect.[11] Given NHTSA's role in ensuring that software updates are provided, there is no need for FMCSA to similarly establish requirements to ensure manufacturers apply software updates.

8. *Roadside Inspections*

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

No, motor carriers should not be required to notify FMCSA that they are operating Level 4 or 5 ADS-equipped CMVs. Such a requirement would place an unnecessary burden on industry with little perceived benefit to highway safety. So long as the ADS-equipped CMV meets all applicable safety standards, there should be no need to notify FMCSA of the specific level of the ADS technology.

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

[10] NHTSA Enforcement Guidance Bulletin 2016–02: Safety-Related Defects and Automated Safety Technologies, 81 Fed. Reg. 65,705, 65,707 (Sept. 23, 2016).
[11] *Id*. at 65,709.

Not applicable, see response to Question 8.1.

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

No, FMCSA should not require markings that identify the ADS level of an ADS-equipped CMV at this time. It is unclear how markings identifying the ADS level of a vehicle will be relevant for the safe operation of a CMV-equipped vehicle on this nation's highways. Therefore, FMCSA should collect more data in order to determine whether identifying the ADS level of a vehicle provides safety benefits and what unintended consequences might also arise. Additionally, FMCSA should consult with NHTSA in addressing vehicle markings for any type of vehicle equipped with ADS technology. In any event, the ADS level of a vehicle, whether marked on the vehicle or not, should not inhibit that vehicle from operating at any ADS level at which it is equipped to operate at.

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

Yes, ADS-equipped CMVs should have a malfunction indicator. While the actual symbol and color of the indicator should be developed through industry standards, such as the American Trucking Associations' (ATA) Technology and Maintenance Councils' (TMC) Recommended Practices, the SAE, and or ADS manufacturers should have the responsibility for defining the functionality of such malfunction indicator as technology will vary among different platforms.

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?

Communicating and interacting with Federal and State officials or first responders is critical for the safe operation of any vehicle on this nation's highways and should not be any different for ADS-equipped CMVs. FMCSA should ensure that ADS developers have defined, documented, and proven measures that its system will respond to and communicate accurately with Federal and State officials or first responders. FMCSA should study the effects of a one-size-fits-all approach to this interaction as it could either be different or standardized among competing technologies and platforms based on many different factors.

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

Manufacturers of ADS are currently developing and considering ways in which their systems will accomplish communication with Federal and State officials or first responders.

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

ADS manufacturers are currently developing methods and avenues that will allow roadside enforcement personnel to know if a vehicle can no longer operate safely. Such designs

might include a malfunction indicator light(s), audible communications, minimal risk conditions, or other methods.

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

Governmental representatives, industry members and organizations, and members of the public should collaborate on establishing either consensus industry standards and best practices regarding communication with enforcement personnel. The ATA TMC is well suited to initiate such a process. TMC's Automated and Electric Vehicles Study Group was recently created with this objective and the Commercial Vehicle Safety Alliance (CVSA) has already connected with developing Task Forces for maintenance, repair, and inspection focused on ADS-equipped CMVs.

9. *Cybersecurity*

9.1. What types of safety and cargo security risks may be introduced with the integration of ADS-equipped CMVs?

Cybersecurity is a growing concern for the trucking and automotive industry. However, the primary risks posed by security breaches are most likely to stem from complex embedded software and communication technologies that provide wireless connectivity to trucks and other vehicles. ADS technologies certainly can create vulnerabilities in a CMV, enabling rogue elements to hijack vehicle acceleration, braking and steering functions; and a myriad of other software/network-based technologies present within the CMV could also be susceptible to interference by bad actors. Some examples include:

- Bluetooth and WiFi communication system vulnerabilities
- Software system vulnerabilities, both wireless and connected
- V2V or V2I communication vulnerabilities
- Mapping and other navigation technologies that may be essential to the safe routing of AVs

These software vulnerabilities could lead to malicious hacks and take-overs or result in the disruption or failure of safety-critical systems. Security risks of CMVs equipped with embedded software technologies and remote communication systems must therefore be evaluated and addressed in the context of the entire CMV ecosystem.

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

Rather than developing specific cybersecurity rules and regulations (as security practices and technologies are rapidly evolving), FMCSA could require that motor carriers establish operational risk assessments that include cybersecurity risk assessments, as well as security and incident response plans, recordkeeping and document retention policies designed to address these risks. Additionally, FMCSA should continue to coordinate with NHTSA and other agencies in

addressing cybersecurity concerns. As previously discussed, NHTSA considers software issues and vulnerabilities to be safety-related defects. NHTSA established voluntary guidelines in 2017, which recommend that manufacturers and software companies design AV systems according to existing international standards, such as those published by the National Institute for Standards and Technology, NHTSA, SAE, the Alliance of Automobile Manufacturers and others.[12] FMCSA could rely on NHTSA guidelines or develop its own voluntary guidelines customized for motor carriers. In any event, FMCSA, in collaboration with industry partners, should perform its own independent research and assessment of cybersecurity issues created by the continued and accelerated deployment of CMVs with complex embedded software systems and technologies, including ADS, and share its findings with the public as well as with other agencies through training and educational materials and programs.

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?

FMCSA should continue to work with ADS developers as the technology continues to be developed. Locomation is open to sharing certain performance data with FMCSA, and the public, but there may be some information that is proprietary and confidential and subject to the exclusions of the Freedom of Information Act (FOIA). Under no circumstances should it be expected that manufacturers make confidential or trade secret information protected under FOIA open to the public. FMCSA might consider establishing a voluntary information sharing program to gather information on the performance of ADS technology. Of course, any information necessary to determine or establish compliance with the FMCSA's regulations would be provided.

10.2. Are the Agency's current processes under 49 CFR 389.9 for submission and protection of confidential business information in the context of a rulemaking sufficient to allow ADS developers and motor carriers to communicate essential information to the Agency regarding the operation of ADS?

Yes, at this time these processes appear sufficient.

10.3. If not, how should those processes be modified?

Not applicable, please see response to Question 10.2.

[12] NHTSA. (2017). Automated driving systems 2.0 a vision for safety. National Highway Traffic Safety Administration, U.S. Department of Transportation.