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April 1, 2021

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

Re: **Request for Comments on Advance Notice of Proposed Rulemaking Regarding Framework for Automated Driving System Safety**

Docket No. NHTSA-2020-0106

Submitted By:

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TuSimple submits these comments on the National Highway Traffic Safety Administration's ("NHTSA") Advanced Notice of Proposed Rulemaking regarding a Framework for Automated Driving Systems ("ADS") Safety, Docket No. NHTSA-2020-0106 (the "ANPRM").

About TuSimple

TuSimple is a self-driving technology company that makes it possible for long-haul heavy-duty trucks to operate autonomously on highways and surface streets. Founded in 2015, we operate in the U.S. in Arizona, New Mexico, Texas, and internationally. TuSimple is working to bring to market an autonomous truck able to drive depot-to-depot with the highest levels of safety as outlined in our Voluntary Safety Self-Assessment.[1] Safety is TuSimple's North Star, and we operate everyday with that ethos in mind.

[1] See https://www.tusimple.com/wp-content/uploads/2021/03/TuSimple-Safety-Report.pdf

All TuSimple's vehicles today and at production are planned to be FMVSS compliant. Due to the nature of the business model of operating SAE level 4 automated trucks for the movement of freight, there will be situations where the vehicles will need to be manually driven (e.g., yard movements, maintenance, operation outside its operating design domain (ODD)). TuSimple is focused on the long-haul middle mile of distribution center to distribution center similar to the pilot we did with the United States Postal Service (USPS) in 2019 running loads from Phoenix to Dallas and back using TuSimple's automated truck fleet.[2]

TuSimple is currently testing 50 research and development vehicles and hauling freight for UPS, US Xpress, McLane Company and others. In July 2020, TuSimple announced an OEM partnership with Navistar[3] to bring a factory-built SAE Level 4 truck to the market in 2024. The TuSimple testing fleet is registered with the Federal Motor Carrier Safety Administration (FMCSA) Safety and Fitness Electronic Records (SAFER) System[4] and is also a participant in the NHTSA AV Test Initiative tracking tool.[5] By participating in both the SAFER System and the AV TEST initiative, TuSimple provides information to the public regarding the operation of our automated truck test fleet.

TuSimple is working with local, state, and federal officials as well as public universities and non-profits to identify and resolve issues related to the testing and deployment of autonomous driving system (ADS)-equipped trucks. Educating the public regarding the benefits and capabilities of ADS-equipped commercial motor vehicles (CMVs) has been a goal of TuSimple since our founding. TuSimple and partners have published a fuel savings study[6], created a workforce development program[7], and are currently conducting a tire wear study[8] to look at the possible benefits related to reduced tire scrub in ADS-equipped CMVs. We have also presented numerous technology and safety demonstrations to media outlets, including but not limited to 60 Minutes, NBC Nightly News with Lester Holt, YouTube's Age of AI, Vice News, Axios, and others.

General Comments

TuSimple supports NHTSA's efforts to create a framework for ADS safety that addresses motor vehicle safety while enabling innovative design. Safety is, and must remain, the

[2] See https://www.reuters.com/article/us-tusimple-autonomous-usps-idUSKCN1SR0YB
[3] See https://news.navistar.com/2020-07-15-Navistar-and-TuSimple-Partner-to-Bring-Autonomous-Trucks-to-Market-Navistar-Invests-in-Autonomous-Trucking-Company
[4] See https://safer.fmcsa.dot.gov/query.asp?searchtype=ANY&query_type=queryCarrierSnapshot&query_param=USDOT&original_query_param=NAME&query_string=3062297&original_query_string=TUSIMPLE%20INC
[5] See https://www.nhtsa.gov/automated-vehicles-safety/av-test-initiative-tracking-tool
[6] See https://www.sae.org/news/2019/12/tusimple-autonomous-trucks-cut-fuel
[7] See https://www.pima.edu/news/press-releases/2019/201906-tu-simple.html
[8] See https://corporate.goodyear.com/en-US/media/news/goodyear_and_tusimpl.html

paramount concern in evaluating any ADS technology or self-driving vehicle (SDV). Likewise, NHTSA's commitment to remaining technology neutral and promoting innovation is incredibly important. More to the point, this commitment by the agency feeds back into the overarching safety principal by providing SDV industry players across the continuum with sufficient flexibility to develop and test new safety technology. SDVs have lifesaving, and life-improving, potential for the public. Remaining technology-neutral and encouraging innovation within a framework that provides appropriate levels of guidance, regulation and enforcement will help to unlock and encourage these benefits.

TuSimple agrees with NHTSA's statement in the ANPRM that "issuing performance standards for ADS competency has been and remains premature because of the lack of technological maturity and the development work necessary to support developing performance standards."[9] This likewise suggests the need for a flexible framework – one that does not lock NHTSA into a path that could later prove inappropriate or inefficient for assuring ADS safety. It is important to allow a flexible approach in which any necessary SDV testing appropriately assesses the performance of a SDV and facilitates public trust and confidence. If designed and implemented correctly, the framework NHTSA is considering for ADS safety will foster innovation and advancement within the transportation field. Doing so is crucial to realizing the tremendous potential of SDV technologies to expand mobility, reduce emissions, drive economic growth, and enhance safety.

Safety Framework Concept (Questions 1 and 3)

TuSimple encourages NHTSA to move forward with developing a technology-neutral, performance-based framework for evaluating ADS. The framework should begin with voluntary guidance from NHTSA supplemented by industry standards, supported by NHTSA's authority to recall vehicles that pose an unreasonable risk to safety. Where appropriate, NHTSA may use its exemption authority to authorize the deployment of ADS-equipped vehicles that do not conform to existing FMVSS but nonetheless demonstrate an equivalent level of safety.

NHTSA guidance documents and industry standards would provide best practices for assessing and assuring the safety of each core element. The guidance documents and industry standards could be updated to reflect lessons learned, and ultimately form a basis for developing regulations where necessary in the long-term. As ADS technology matures and more data becomes available, NHTSA will be better able to determine what new safety standards may be needed. Overall, this approach allows for the continued development of ADS to raise the safety level of vehicles, with guidance that is easily updated to incorporate best practices and lessons learned until the agency has sufficient data and knowledge to develop new regulations.

[9] See 85 Fed. Reg. 78072

Considerations for FMVSS Development (Questions 6-9)

NHTSA proposes to view ADS through a framework of sensing, planning, perception and control. While TuSimple agrees that this classification could assist the Agency in understanding an AV system's core functionalities, the Agency should also evaluate the interplay of these safety systems with each other and as a whole. ADS is more than just the siloed capabilities of four safety systems. In fact, the systems function together to respond to the external environment. NHTSA should be prepared to adapt its understanding of these four core safety systems as products develop, and, in writing regulations, prepare for future adaptations, as necessary.

TuSimple agrees with the following statement by NHTSA in the ANPRM:

> *"Establishing FMVSS prior to technology readiness hampers safety-improving innovation by diverting developmental resources toward meeting a specific standard. Such a regulatory approach could unnecessarily result in the Agency establishing metrics and standards without a complete understanding of the technology or safety implications and result in unintended consequences, including loss of potential benefits that could have been attained absent government intervention, a false sense of security, or even inadvertently creating additional risk by mandating an approach whose effects had not been known because regulation halted the technology at too early a stage in its development."*[10]

Implementing new FMVSS requirements for ADS would be a long-term action as there is insufficient information to determine what aspects of an ADS might need to be regulated or what an appropriate standard would be. Looking at the sensor level for example, ADS developers are using different combinations and placement of sensors. The requirements for a specific sensor may differ across ADS designs based on how they combine information from other sensors and sensor types (e.g., LIDAR, RADAR, cameras) that the vehicle may be using.

The ongoing development of certain ADS technology suggests that a prescriptive, rule-based regulatory approach such as FMVSS may ultimately prove unworkable for some of ADS technology. ADS are being designed with a range of sensors and software that could make it impractical for NHTSA to try to regulate through an engineering standard akin to current FMVSS. With ODD, for instance, the scenarios to test would need to be different for each ADS based on the specific ODD and deployment characteristics of that ADS-equipped vehicle. As noted in comments TuSimple filed previously with FMCSA:

> *TuSimple believes that an ADS developer should be responsible for defining the ODD for their own system, as they would have the most knowledge of the capabilities and limitations of the ADS technology installed on the vehicle. It should also be recognized*

[10] *Id.* at 78070.

that an ODD is something that may not be static for the life of an ADS, as it could be altered based on software updates or other changes by the ADS developer. In its oversight role, FMCSA should require that drivers and motor carriers not be permitted to operate the ADS of a CMV outside of its ODD. This could be done through amendments to regulations in Title 49, Part 392.7.[11]

TuSimple does not support developing standards before ADS-equipped CMVs and other vehicles are more widely deployed in the U.S. Validating standards using just one ADS design may not yield results that are applicable to other ADS designs which may be based on other concepts and technologies. NHTSA should focus on regulating ADS only after providing guidance and adopting industry-recognized best practices that can be adapted and modified more easily and quickly than regulations. Examples to include in federal guidance or best practices may be: vehicle design, ADS development, ODD testing and deployment, terms-of-service, real-world modifications, self-certifying, and industry-based research and standards.

TuSimple believes as the technology progresses over the next few years it is important that NHTSA understands the intended use cases of each ADS vertical (e.g., long-haul freight movement, urban delivery vehicle, rideshare or personal vehicle for transport of passengers). Each vertical has its own advantages and challenges to safety. Creating a technology to work safely in each vertical's ODD requires flexibility and understanding of the vehicle's use case.

For these reasons, NHTSA should seek to avoid at this time promulgating traditional FMVSS for ADS that are focused on a single or a few discrete safety features with prescriptive metrics and test procedures. Proceeding to an FMVSS regulation too soon could in fact have unintended and negative consequences on the innovative development of ADS technology, potentially even harming safety. To the extent FMVSS may eventually be needed, a better approach would be to assess the relevant data as it becomes available. Such an approach would allow for the development (if necessary) of a new generation of FMVSS that could account for the unique considerations of ADS and other technologies. While gathering data to determine whether and what regulation may be needed, the use of voluntary guidance and industry standards will provide a baseline of best practices and make sure that manufacturers of vehicles, sensors, software, and other technologies needed for ADS have the flexibility to change and improve without the need for frequent modifications to regulations.

In the meantime, NHTSA has available several tools to assess vehicles equipped with ADS and promote and ensure the safety of our roadways. For example, NHTSA will administer the existing FMVSS that will continue to cover features of ADS-equipped vehicles that are unrelated to autonomous operation, but nonetheless have a bearing on safety. Also, NHTSA will be able to use its exemption authority to authorize the deployment of ADS-

[11] TuSimple comments to Docket No. FMCSA-2018-0037 dated August 28, 2019, p. 3

equipped vehicles that do not conform to existing FMVSS but nonetheless demonstrate an equivalent level of safety. NHTSA can use the exemption process to gather specific, relevant data from AV companies that will inform the development of future FMVSS relating to ADS. Moreover, NHTSA will continue to exercise its safety enforcement authority to prevent "unreasonable risks" to motor vehicle safety.

NHTSA Research and Other Activities (Question 14)

TuSimple believes that the core elements and ISO and UL standards identified in Section III of the notice provide a good starting point in developing a NHTSA framework that supports rulemaking, enforcement, and Agency authority. Industry technical standards and industry-recognized best practices, such as SAE, ISO, and the American Trucking Association's Technology and Maintenance Council (TMC), are currently improving trucking industry equipment and operations and will into the future. Specifically, TuSimple suggests a greater emphasis on NHTSA's involvement in standards and best practice setting bodies, such as SAE's On-road Automated Driving Committee, Automated Safety Committee, and TMC's Automated & Electric Truck Study Group. Collectively, these groups of transportation stakeholders provide guidance and best practices used widely by market available manufacturers and suppliers of ADS. Although the UL 4600 guidance does provide a reasonable level of assurance to the completeness of ADS safety, more stakeholder collaboration should be considered in developing such standards. NHTSA research activities could be undertaken to support the work of these standards development committees.

Administrative Mechanisms (Questions 15-19)

TuSimple believes that NHTSA should continue developing guidance on engineering and process measures as a basis for voluntary mechanisms in combination with NHTSA's authority to recall vehicles that pose an unreasonable risk to safety as the approach that would best enable the Agency to carry out its safety mission. This approach would allow the continued development of ADS to raise the safety level of vehicles, with guidance to incorporate best practices and lessons learned and the safeguard of recall authority. The trucking industry favors adopting new technology voluntarily and have regulations follow if necessary, when more data is available from stakeholder partners who have deployed the technology.

TuSimple views the Agency assessment of ADS-equipped vehicles in the same manner that the Agency currently assesses whether each truck and auto manufacturer adequately demonstrates its ability to meet each relevant FMVSS. TuSimple supports manufacturer self-certification and equal enforcement and equipment recall authority from the federal government on all vehicle classes. Truck and auto manufacturers put their vehicles through strenuous testing to meet and exceed the minimum standards set by the FMVSS. It is important for the Agency to develop a framework that is practical, consistent, and does not

create unnecessarily burdensome requirements for testing ADS components which may be better assessed at a system level or may not be relevant for all ADS designs.

Conclusion

In summary, TuSimple encourages NHTSA to move forward with developing a technology-neutral, performance-based framework for evaluating ADS. The framework should begin with voluntary guidance from NHTSA supplemented by industry standards, supported by NHTSA's authority to recall vehicles that pose an unreasonable risk to safety. Where appropriate, NHTSA may use its exemption authority to authorize the deployment of ADS-equipped vehicles that do not conform to existing FMVSS but nonetheless demonstrate an equivalent level of safety. As the technology matures and more data becomes available, NHTSA will be better able to determine what new safety standards may be needed. Overall, this approach allows for the continued development of ADS to raise the safety level of vehicles with guidance that is easily updated to incorporate best practices and lessons learned until the agency has sufficient data and knowledge to develop new regulations.

TuSimple is looking forward to working with NHTSA, FMCSA, and other partners to bring this game-changing technology to market. If you have further questions or comments, please do not hesitate to contact me by email at robert.brown@tusimple.ai

Respectfully,

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