

May 20, 2019

Ms. Heidi King  
Deputy Administrator  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue, SE  
Washington, DC 20590

**Request for Comment Related to General Motors, LLC, Petition for Temporary Exemption from Various Requirements of the Safety Standards for an All-Electric Vehicle with Automated Driving System: Docket Number NHTSA-2019-0016**

Dear Deputy Administrator King:

We appreciate the opportunity to comment on GM's petition for temporary exemption from various requirements of the safety standards as part of the National Highway Traffic Safety Administration's deliberation of the merits of the petition. The Insurance Institute for Highway Safety and Highway Loss Data Institute (IIHS-HLDI) recognize the potential for automated driving technology to improve upon the current state of safety on our nation's roads and expects NHTSA will use its authority to ensure that the technology is developed toward improved safety.

We offer the following observations and suggestions regarding GM's petition.

**Evaluate GM's petition under 49 CFR part 555.6(b)**

NHTSA seeks comment on the most appropriate statutory basis for GM's petition. IIHS-HLDI recommend that NHTSA evaluate GM's petition under 49 CFR part 555.6(b), which requires that "the level of safety of the feature is equivalent to or exceeds the level of safety established in the standard from which exemption is sought," rather than the lesser requirement of 49 CFR part 555.6(c) that the "temporary exemption would not unreasonably degrade the safety or impact protection of the vehicle," even if the petition satisfies the requirement of substantiating that "temporary exemption would facilitate the development or field evaluation of the vehicle."

We offer these two reasons for our recommendation:

1. All the exemptions requested by GM relate more to its Zero-Emission Autonomous Vehicle (ZEAV) being designed to operate without a human driver than its propulsion system being all-electric. Indeed, numerous all-electric vehicles, including the Chevrolet Bolt upon which GM's ZEAV is based, already have been sold or leased into the fleet of U.S. vehicles without the extensive exemptions GM seeks for its ZEAV.
2. The criticality of ensuring that automated driving technology is safely deployed into the field is too great for NHTSA to attempt to balance the facilitation of field evaluation against a level of safety less than provided by existing safety standards. The promise of automated vehicle (AV) technology is that it will make our roads safer than they are today. It would be imprudent to facilitate the commercial deployment of AV technology, even on a small scale, at a lower level of safety.

**Impose requirements that can compel safer operations of AVs with exemptions**

IIHS-HLDI further recommend that NHTSA impose requirements on GM and other petitioners for exemption that can compel safer operations of AVs with exemptions and foster public confidence in the

technology, even though GM argues against such an approach. GM's petition notes that:

NHTSA has consistently declined to impose additional requirements on petitions beyond those imposed by the Safety Act and implementing regulations. (p. 16)

... NHTSA has declined to use the petition as a forum to determine the merits or promise of a new technology or vehicle design. (p. 19)

...the Agency did not set a new or de facto Standard for..., technologies or evaluate whether..., technologies warrant a deviation from the Safety Act's approach to regulating new technologies. (p. 20)

While GM's argument may accurately represent NHTSA precedent, NHTSA ought to use its authority to compel developers of AV technology to deliver on its safety promise even in the context of temporary exemptions. We note that the agency acknowledges, "Chapter 301 of title 49, United States Code, authorizes the Secretary of Transportation to exempt, on a temporary basis, under specified circumstances, and on terms the Secretary deems appropriate [emphasis added], motor vehicles from a FMVSS or bumper standard." As such, NHTSA need not be bound by its precedent in the context of evaluating petitions for exemption for AVs, especially those as extensive as GM seeks.

#### **Require GM to share its ZEAV field safety performance and crash test data**

Among the requirements we recommend NHTSA impose would be to compel the sharing of GM's ZEAV field safety performance data in such a way that would facilitate not only NHTSA's but the public's ability to compute statistics for comparing crash and safety-critical-event experience with that of relevant conventional vehicle populations. For example, information about miles driven, functional class of roads, speed, hours of operation, and climate/weather and related road surface conditions along with the dates, times, and characteristics of crashes, near misses, safety critical events, and aborted trips could be compiled into a data file and made available to the public through NHTSA's website<sup>1</sup>.

Likewise, NHTSA should require that GM submit data from its ZEAV crash and other tests conducted to evaluate conformance with various safety standards (e.g., performance of the electronic stability control (ESC) system [FMVSS 126], stopping distance, and grade-holding performance [FMVSS 135]) to NHTSA who in turn could make these data available to the public to facilitate third party scrutiny. Safety evaluations of AV technology should not be based solely on analysis and statistics computed by the companies with business interests in the outcome of those evaluations.

#### **Additional suggestions for requirements based on observations about GM's petition**

IIHS-HLDI offer additional suggestions for requirements NHTSA might consider imposing as a condition of granting exemption from various safety standards in the following observations about GM's petition.

#### **Require that the ADS respond to telltales and indicators as a condition for granting exemptions**

GM requests numerous exemptions from certain requirements imposed by safety standards that require certain information be presented to human drivers, arguing that no human driver will be present to observe these telltales and indicators and that the automated driving system (ADS) will have access to analogous information. (e.g., p. 24 regarding FMVSS 101, p. 28 regarding ESC and brake malfunction indicators, p. 29 regarding low tire pressure warning, p. 31 regarding seatbelt reminders, and pp. 31 & 32 regarding airbag-ready indicators)<sup>2</sup>.

<sup>1</sup> <https://www.nhtsa.gov/research-data>

<sup>2</sup> Page numbers refer to those in GM's petition (Safety Petition Submitted by General Motors, Petition Under 49 U.S.C. § 30113 and 49 C.F.R. Part 555 to Advance Safety and Zero-Emission Vehicles Through Technology that Achieves the Safety Purpose of the FMVSS, January 11, 2018).

In general, the approach GM describes for dealing with situations that would require a notification be presented to a driver seem prudent. For example, GM indicates that a low-pressure condition occurring in one of the ZEAV tires will result in the ADS taking one of two courses of action depending on the nature of the low-pressure condition. In the case of a tolerable low-pressure condition (not further defined), the ZEAV would complete its current trip and then return, presumably without passengers, to a maintenance facility to have its tires checked before returning to service. If the low-pressure situation is severe enough to degrade the ZEAV's safe performance, then the ADS would abort its current trip in a safe manner, notify its passengers of the reason for the trip termination, and await assistance. Similar responses are described for malfunctions of airbags, brakes, and stability control systems. These ideal responses by the ADS to deleterious conditions would be an improvement upon what many human drivers likely do in similar situations. As such, NHTSA should require similar ADS responses as a condition for granting GM's and others' requests to be exempt from requirements to present telltales and indicators.

#### **Require GM to design their ADS to prevent beginning a trip with unsecured passengers**

One opportunity for the ADS to improve upon the actions of a human driver is missed in GM's description of how it intends to deal with unbuckled seatbelts at occupied seating positions. In its petition, GM states that if the ADS detects unbuckled passengers then it will "convey appropriate reminders and warnings" to them (p. 31). IIHS-HLDI recommend that NHTSA require GM and similar petitioners design their ADS in a way that would prevent beginning a trip with any unsecured passengers. As the agency knows, despite great progress in convincing the U.S. public to use seatbelts their disuse remains a critical factor causing unnecessary injuries and deaths. More than half of vehicle occupants killed in 2017 were not wearing seatbelts<sup>3</sup>.

#### **Require high-beam headlights on GM's ZEAV**

GM also requests exemption from certain requirements imposed by FMVSS 108. We question GM's rationale that its ZEAV does not need high-beam headlights. While radar and lidar sensors do not require ambient or directed light to gather information about the environment, GM's petition also states that the ADS will utilize several cameras for the critical functions of object recognition and verification of data from other sensing modalities. The effectiveness of a camera sensor is greatly dependent on adequate illumination of its field of view. We recommend NHTSA consider not granting this particular request.

#### **Require GM to submit data that demonstrates how their ZEAV's ADS perceives the world**

The petitioner requests exemption from requirements under FMVSS 111 to equip vehicles with interior and exterior rearview mirrors, arguing that the sensors on the ZEAV provide "significantly more breadth and detail than interior and exterior rearview mirrors provide to human drivers." While the sensing hardware gives the software the opportunity to see the world in more breadth and detail than humans using side and rearview mirrors, NHTSA should require GM to submit data that demonstrates their ZEAV's ADS perceives the world as well as or better than we presume humans do when using mirrors (e.g., Does the ZEAV exhibit safe lane-changing behavior in the presence of other traffic? Does it respond appropriately to obstructions in its path while backing?).

#### **Require GM to provide a ZEAV with manual controls for evaluation by NHTSA**

The confirmation test procedures under FMVSS 126, which requires vehicles be equipped with electronic stability control (ESC), pose a challenge in the context of vehicles without traditional human-activated controls. We appreciate that GM intends to include the full functionality required under FMVSS 126 in its ZEAV and find GM's proposal for confirming its function reasonable. We suggest that NHTSA could require GM to provide NHTSA with a ZEAV that has manual controls, so that NHTSA could independently verify the performance of the ESC system (FMVSS 126), stopping distance and

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<sup>3</sup> Insurance Institute for Highway Safety. (2018). Fatality facts: 2017 yearly snapshot. Retrieved from <https://www.iihs.org/topics/fatality-statistics/detail/yearly-snapshot#seat-belt-use>

grade-holding performance (FMVSS 135), and other standards requiring manual controls that GM currently claims it will do on its own.

**Require the ADS to operate in ways that reduce the risk of ESC intervention**

Moreover, we wonder whether in the context of an ADS-controlled vehicle it may be possible to provide an even higher level of safety by designing the ADS to rarely, if ever, execute maneuvers that could lead to a loss of control. The inclusion of ESC functionality as part of an independent “Safety Co-Pilot<sup>4</sup>” system could ensure that any miscalculations of the main ADS did not lead to loss of control, but if automated driving technology is to improve upon human driven safety then the principal ADS needs to be designed to avoid the kinds of mistakes made by humans, e.g., driving too fast in slippery conditions or around sharp curves. We suggest that NHTSA consider imposing such a functional requirement as a condition to granting this exemption.

**Require that GM notify NHTSA of any expansions of the operational design domain of its ZEAV**

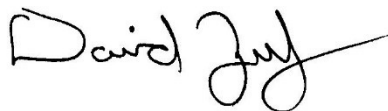
Finally, we note that GM indicates its intentions to gradually expand the operational design domain of its ZEAV over time. We recommend NHTSA require that GM notify NHTSA of any such expansions and provide to the agency information demonstrating how the expansion will be managed safely. This might include GM’s ZEAV field safety performance data from the more limited domain combined with detailed descriptions about how the ZEAV or its ADS have been modified to cope with new conditions that may be encountered in the expanded domain.

NHTSA should stand ready to prohibit any expansion if its analysis of this information does not support a conclusion that the expansion can be managed safely.

**Conclusion**

In general, IIHS-HLDI appreciate GM’s approach to implementing an autonomous-vehicle-based, on-demand mobility service. Their petition describes reasonable explanations of how the design of their ZEAV meets or exceeds the intent of the safety standards from which they request certain exemptions. Nevertheless, we urge NHTSA to consider wherever possible making its granting of exemptions contingent upon GM sharing with NHTSA test data demonstrating the ZEAV’s conformance with functional requirements under certain safety standards as described in the petition (e.g., FMVSS 126, 135, 208) and also demonstrating that the ADS is designed in ways that improve upon the actions and decisions of human drivers.

Sincerely,



David Zuby  
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Insurance Institute for Highway Safety &  
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<sup>4</sup> It is not clear from GM’s petition whether ESC functionality will be part of the Safety Co-pilot system or part of programming in the Automated Driving System computers.