



National Transportation Safety Board

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OFFICE OF THE CHAIRMAN

December 20, 2018

Docket Management Facility
US Department of Transportation
Room W12-140
1200 New Jersey Avenue SE
Washington, DC 20590-0001

Attention: Sujeesh Kurup
Notice of request for comments: Preparing for the Future of Transportation: Automated
Vehicles 3.0 (AV 3.0)
Docket No. DOT-OST-2018-0149

Attention: Dee Williams
Advance notice of proposed rulemaking: Pilot Program for Collaborative Research on Motor
Vehicles With High or Full Driving Automation
Docket No. NHTSA-2018-0092

Dear Sir or Madam:

The National Transportation Safety Board (NTSB) has reviewed the Department of Transportation (DOT) announcement of an updated policy for Automated Vehicles 3.0 (AV 3.0) and is providing comments. The NTSB has also considered the National Highway Traffic Safety Administration (NHTSA) advance notice of proposed rulemaking (ANPRM), titled "Pilot Program for Collaborative Research on Motor Vehicles With High or Full Driving Automation" (83 *Federal Register* 196, October 10, 2018). This correspondence includes comments on both AV 3.0 and the ANPRM; we are providing two copies, one for each docket, and request that the correspondence be filed in both dockets.

NHTSA issued its initial policy statement (Federal Automated Vehicles Policy) in September 2016. On September 12, 2017, after the first fatal crash involving a vehicle operating with automated control systems,¹ the DOT announced Automated Driving Systems 2.0: A Vision for Safety (AV 2.0), an update to its previous policy on automated vehicles. That guidance provided manufacturers and other entities with a summary approach they could use to disclose their voluntary safety self-assessments to the public, stakeholders, and to federal, state, and local

¹ See the NTSB's report, *Collision Between a Car Operating With Automated Vehicle Control Systems and a Tractor-Semitrailer Truck Near Williston, Florida, May 7, 2016*, NTSB/HAR-17/02, at <http://nts.gov>.

governments. The policy focused on highly automated vehicles (HAVs), including Levels 3–5, and while allowing for the guidance to apply to Level 2 automation, it made no provisions for those less advanced systems. The NTSB provided comments on AV 2.0 (NHTSA Docket No. 2017-0082-0001), urging NHTSA to specifically include Level 2 automation, as well as Levels 3–5, in its guidelines and policy. As manufacturers advance the development of automated control systems, it is becoming evident that there is a fluid progression of capabilities, even within given models of vehicles. Distinct automation levels may not adequately reflect operational use of the control systems, and policy should apply seamlessly as we proceed.

In October 2018, the DOT announced “Preparing for the Future of Transportation: Automated Vehicles 3.0” (83 *Federal Register* 50746; Docket No. DOT-OST-2018-0149). AV 3.0 builds on AV 2.0 and presents a policy architecture that the DOT intends to use to organize continuing regulatory work. Specific details for manufacturers to comply with AV 2.0 and AV 3.0 policy are not contained in those documents. As additional details are added to the policy framework, our understanding of DOT and NHTSA’s approach is that AV specifications and requirements should develop.

Both AV 2.0 and AV 3.0 are notable for the voluntary approach to manufacturers’ safety self-assessments, testing and validation of system safety, and AV reporting requirements. The NTSB believes automation that senses the environment, determines task action, and controls vehicle movement needs more structure than voluntary self-assessment and general guidelines. Examples of AV policy issues that need development include: definition of “driver” or “operator” to recognize that such terms do not refer exclusively to humans, but may include an automated system (as addressed in 83 *Federal Register* 2607, January 18, 2018); how exemptions to existing safety standards will be granted; how system safety will be established for the purposes of liability; and how states can structure the licensing and operation of automated vehicles in a consistent, national manner. Similarly, as reflected in the subject ANPRM, NHTSA is considering policy guidance for HAVs involved in on-road system testing.

The DOT’s AV 3.0 policy recognizes operational design domains as an important consideration for operating conditions on roadways. The DOT has stated that it believes that any pilot program for the testing of vehicles with high and full driving automation should include defined operational design domains as a component of safe automated vehicle operation. The NTSB agrees, and also believes that operational design domain constraints should apply to vehicles with all levels of automation, including those classified as Level 2 vehicles. The Williston, Florida, investigation report summarizes the need for operational design domain constraints, addressed in Safety Recommendation H-17-38 (the NTSB’s recommendations from the Williston investigation are listed at the end of this letter).

The inclusion of “Key Terms and Acronyms” in AV 3.0 is encouraging because it points to the necessary expansion and continued development of standardized technical definitions applicable to automated systems. A taxonomy for common use that facilitates understanding of and communication about system capability and operational design domains was addressed in the NTSB’s report on the Williston crash (Safety Recommendation H-17-40) and in ongoing industry workgroups (see Consumer Reports webinar: “The Future of ADAS: New CR Ratings for Today’s Vehicles, Tomorrow’s Vehicles, and the Road Ahead”). A common taxonomy will allow for comparisons between manufacturers and for establishing an evaluation framework. The NTSB

recognizes the DOT's need to coordinate and continually develop automated vehicle terminology in response to the evolving technology that will be associated with Level 4 and Level 5 vehicles. AV 3.0 also introduces relevant data needs for understanding the operation and safety of HAVs (as in NTSB Safety Recommendations H-17-37, -39, and -40). However, the necessary specifications for data structure (such as standard data elements, timing, and format) have yet to be addressed.

The ANPRM addresses factors appropriate for the DOT to consider in designing a national pilot program to facilitate, monitor, and learn from the testing and development of the emerging advanced vehicle safety technologies and to assure the safety of those activities. NHTSA is considering establishing a pilot program for vehicles with Level 4 (high) automation and Level 5 (full) automation for entities wishing to engage in the testing, or in some cases the deployment, of vehicles with high and full driving automation that would require an exemption from NHTSA's existing standards. The ANPRM specifically asks for comments on 22 questions. The NTSB's response is not specific to each question, but rather, expresses concerns about the assumptions that underlie the questions.

Among the NTSB's concerns is that on-road testing by manufacturers of new technology cannot serve to demonstrate safety. This assumption is implicit in most of the ANPRM questions, for example: what factors affect on-road pilot testing (question 1), what types of exposure measures ensure safety (question 7), what areas are to be considered for a safe pilot program (question 12), what categories of data are of value (question 15), and what regulations may be needed if industry participation in a voluntary reporting points toward a compliance requirement (question 18). Initial risk assessments indicate that the accumulated mileage necessary to approach safety assessments in such a manner is not feasible. That conclusion is supported by technical work from industry: P. Koopman and M. Wagner, "Toward a Framework for Highly Automated Vehicle Safety Validation" (SAE 2018-01-1071); and Mobileye's Responsibility-Sensitive Safety model (S. Shalev-Schwartz, S. Shammah, and A. Shashua, "On a Formal Model of Safe and Scalable Self-driving Cars," arXiv: 1708.06374v5, March 2018). A comprehensive, multipronged approach that defines system safety before on-road pilot testing is needed.

Efforts are under way to facilitate the technical understanding of automated vehicle systems. As an example of government efforts, the Transportation Research Board of the National Academies of Science, Engineering and Medicine has published a National Cooperative Highway Research Program (NCHRP) request for proposals: Assessing the Impacts of Automated Driving Systems (ADS) on the Future of Transportation Safety (project 17-91). The project seeks to develop a framework for practitioners to use in current and future safety planning, design, operational decisions, and investments on multimodal infrastructure. The NTSB recognizes work under way to establish a developing framework (such as the NCHRP project), the characterization of voluntary technical standards published by standards organizations (as listed in AVC 3.0, appendix C), and the ongoing development of ANPRMs to clarify policy challenges.

The ANPRM makes common reference to safety, without defining the term. For the purposes of on-road testing, the definition of *safe* must be qualified by NHTSA and the states; the question for prequalification cannot be left to manufacturers. Following the NTSB recommendations resulting from its investigation of the fatal crash near Williston, Florida, the collection and dissemination of data to NHTSA, the DOT, and the NTSB when appropriate, is critical to establishing safety (as in NTSB Safety Recommendations H-17-37 and -39). As a final note, the DOT has an important

responsibility to ensure the safe development and deployment of AV technologies, and this safety should not be voluntary. Policy thus far has carried an overarching message of promoting AV development, but a clear logic to require safety has not yet been crafted. The DOT can and should provide this required safety leadership.

The NTSB supports the automation of all types of road vehicles, in anticipation that they will improve safety and reduce injuries and fatalities on our roadways—a promise that we need to judge as those system capabilities develop. The NTSB appreciates the opportunity to comment on NHTSA's ANPRM and on AV 3.0. We applaud NHTSA's efforts to work with industry. However, NHTSA's general and voluntary guidance of emerging and evolutionary technological advancements shows a willingness to let manufacturers and operational entities define safety. We urge NHTSA to lead with detailed guidance and specific standards and requirements.

Sincerely,

A handwritten signature in blue ink that reads "Robert L. Sumwalt, III". The signature is written in a cursive style with a horizontal line at the end.

Robert L. Sumwalt, III
Chairman

Attachment:

NTSB Recommendations Resulting from Investigation of Fatal Crash Near Williston, Florida, on May 7, 2016 (NTSB/HAR-17/02)

To the US Department of Transportation:

Define the data parameters needed to understand the automated vehicle control systems involved in a crash. The parameters must reflect the vehicle's control status and the frequency and duration of control actions to adequately characterize driver and vehicle performance before and during a crash. (H-17-37)

To the National Highway Traffic Safety Administration:

Develop a method to verify that manufacturers of vehicles equipped with Level 2 vehicle automation systems incorporate system safeguards that limit the use of automated vehicle control systems to those conditions for which they were designed. (H-17-38)

Use the data parameters defined by the US Department of Transportation in response to Safety Recommendation H-17-37 as a benchmark for new vehicles equipped with automated vehicle control systems so that they capture data that reflect the vehicle's control status and the frequency and duration of control actions needed to adequately characterize driver and vehicle performance before and during a crash; the captured data should be readily available to, at a minimum, National Transportation Safety Board investigators and National Highway Traffic Safety Administration regulators. (H-17-39)

Define a standard format for reporting automated vehicle control systems data, and require manufacturers of vehicles equipped with automated vehicle control systems to report incidents, crashes, and vehicle miles operated with such systems enabled. (H-17-40)