National Transportation Safety Board
Office of the Chair
Washington, DC 20594

August 28, 2023

Docket Management Facility (M-30)
US Department of Transportation
1200 New Jersey Avenue SE
West Building Ground Floor
Room W12–140
Washington, DC 20590

Re: Docket Numbers NHTSA–2023–0023 and FMCSA-2022-0171

Dear Sir or Madam:

The National Transportation Safety Board (NTSB) has reviewed the National Highway Traffic Safety Administration's (NHTSA) and the Federal Motor Carrier Safety Administration's (FMCSA) joint notice of proposed rulemaking (NPRM) titled "Heavy Vehicle Automatic Emergency Braking; AEB Test Devices," published at 88 *Federal Register* 43174 on July 6, 2023.[1] In the NPRM, NHTSA proposes adopting a Federal Motor Vehicle Safety Standard (FMVSS) requiring automatic emergency braking (AEB) systems on heavy vehicles with a gross vehicle weight rating (GVWR) greater than 10,000 pounds.[2] The NPRM also proposes to amend FMVSS No. 136 to require nearly all heavy vehicles to have an electronic stability control (ESC) system.[3] Additionally, the FMCSA is proposing new Federal Motor Carrier Safety Regulations (FMCSRs) requiring ESC and AEB systems to be on at all times during vehicle operation and that the systems be inspected and maintained.

[1] This NPRM is responsive to a Congressional mandate in section 23010 ("Automatic Emergency Braking System") of the Infrastructure Investment and Jobs Act (Public Law 117-58) which directs the US Department of Transportation (USDOT) to prescribe a FMVSS that requires heavy commercial motor vehicles (CMV) be equipped with an AEB system.

[2] An AEB system uses multiple sensor technologies and subsystems that work together to sense when the vehicle is in a crash imminent situation and automatically applies the vehicle brakes if the driver has not done so or automatically applies more braking force to supplement the driver's applied braking.

[3] ESC builds upon the antilock brake system by adding two sensors, a steering wheel angle sensor and an inertial measurement unit. These sensors allow the ESC controller to determine intended steering direction, compare it to the actual vehicle direction, and then modulate braking forces at each wheel to induce a corrective yaw moment when the vehicle starts to lose lateral stability. FMVSS No.136 currently requires ESC on heavy vehicles with a GVWR greater than 26,000 pounds. This proposed amendment will expand the requirement for ESC to include heavy vehicles with a GVWR between 10,000 and 26,000 pounds.

The NTSB supports this proposed rulemaking, which would annually prevent a NHTSA-estimated 19,118 crashes, save 155 lives, and reduce 8,814 non-fatal injuries once all vehicles covered in the rule are equipped with AEB and ESC. We are pleased that NHTSA plans on expanding the scope of the requirement for ESC and AEB to all commercial motor vehicles (CMV) over 10,000 pounds, including school buses, single-unit trucks, and medium-size buses. Moreover, we agree with NHTSA's plan to test the technology at higher operating speeds and include requirements that help ensure that AEB systems do not inappropriately activate and can detect a system malfunction. Finally, the NTSB concurs with the FMCSA's proposed requirement that ESC and AEB systems be active during heavy vehicle operation and that the systems be inspected and maintained on a regular schedule.

While the NTSB is supportive of this proposed rulemaking and encourages NHTSA and the FMCSA to move forward as quickly as possible, we encourage both agencies to develop additional performance requirements to further enhance the collision avoidance capabilities of CMVs. For example, we believe AEB systems should detect vulnerable road users (i.e., pedestrians, bicyclists, and motorcyclists), unusual vehicle profiles and configurations, and traffic safety hardware. Additionally, there are many real-world operating conditions such as curved roadways, inclement weather, and darkness, in which the performance of AEB systems will not be tested. We urge both agencies to evaluate additional testing protocols and work to continuously expand these requirements.

In our response to this notice, the NTSB will first discuss our investigation and safety recommendation history. We then provide comments about selected aspects of the proposed performance requirements, vehicle test scenarios, and conditions for vehicle tests. Lastly, we provide comments expressing our concerns regarding the proposed deadlines for AEB implementation which could extend deployment of this proven lifesaving technology out to 2029 or later for certain manufacturers.

NTSB Investigation and Safety Recommendation History

The NTSB has a long history of advocating for crash avoidance technologies, starting with a 1995 safety recommendation to USDOT to conduct testing of collision warning technology in CMV fleets (Safety Recommendation H-95-44).[4] Since that time, the Board has issued more than 25 safety recommendations, frequently to NHTSA, related specifically to FCW and AEB systems.[5] Similarly, the NTSB has a long history of recommending ESC systems for CMVs to prevent loss of control crashes

[4] Because of a lack of progress, Safety Recommendation H-95-44 was classified Closed—Unacceptable Action in 1999.

[5] In the NPRM, AEB refers to a system that has: (a) a forward collision warning (FCW) component to alert the driver to an impending collision; (b) a crash imminent braking component that automatically applies the vehicle's brakes if the driver does not respond to an imminent crash; and, (c) a supplemental brake support component that automatically supplements the driver's brake application if the driver applies insufficient manual braking.

when a driver steers a vehicle beyond its capabilities, often resulting in uncontrolled yaw or vehicle overturn. Importantly, for an AEB system to be effective and able to apply emergency braking in crash scenarios, the vehicle must also be equipped with an ESC system to control any instability that may result from emergency braking. The following NTSB investigation and recommendation history is separated into two sections: the first addresses collision avoidance technologies and the second focuses on stability control systems.

Collision Avoidance Technologies

In a 2001 special investigation report titled *Vehicle- and Infrastructure-Based Technology for the Prevention of Rear-End Collisions*, the NTSB issued a series of recommendations to USDOT agencies, and to the trucking and motorcoach industry, to develop and implement a program to inform the public and CMV drivers about the benefits, use and effectiveness of collision avoidance technologies.[6] In that report, the NTSB also recommended that NHTSA develop performance standards for forward collision warning (FCW) systems and require those systems to be installed on all new CMVs (Safety Recommendations H-01-6 and -7).

Following the investigation of a 2005 crash near Osseo, Wisconsin in which a truck-tractor semitrailer rolled over and was then impacted by a motorcoach, the NTSB reiterated Safety Recommendations H-01-6 and -7.[7] We also issued a new recommendation, which asked NHTSA to determine whether equipping CMVs with collision warning systems with active braking and ESC systems would reduce crashes and, if they were found effective, to require their use on CMVs (Safety Recommendation H-08-15).

In 2015, the NTSB published another special investigation report titled *The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes*, in which we examined the state of collision avoidance technologies for preventing rear-end crashes and determined that the technologies were mature and effective in reducing such crashes.[8] Due to a decade of inaction by NHTSA in requiring these technologies, Safety Recommendations H-01-6 and -7, and H-08-15 were classified Closed—Unacceptable Action. In the same special investigation report, the NTSB reemphasized the urgent need for AEB systems in the CMV fleet and called on NHTSA to complete, as soon as possible, the development and application of performance standards for the assessment of forward collision avoidance systems in CMVs (Safety Recommendation H-15-5). At that time, the NTSB also issued

[6] NTSB. 2001. *Vehicle- and Infrastructure-Based Technology for the Prevention of Rear-end Collisions*. Special Investigation Report. NTSB/SIR-01-01. Washington, DC.

[7] NTSB. 2008. *Truck-Tractor Semitrailer Rollover and Motorcoach Collision with Overturned Truck, Osseo, Wisconsin, October 16, 2005*. NTSB/HAR-08-02. Washington, DC.

[8] NTSB. 2015. *The Use of Forward Collision Avoidance Systems to Prevent and Mitigate Rear-End Crashes*. NTSB/SIR-15-01. Washington, DC.

recommendations to passenger, bus, and truck manufacturers to install AEB as standard equipment on their vehicles (Safety Recommendation H-15-8 and -9).[9]

Over the following years, the NTSB continued investigating rear-end crashes that could have been prevented or mitigated with AEB systems. Our investigations involving both CMV and passenger vehicles also revealed the necessity of expanding testing protocols to account for varying crash characteristics to include a variety of hazards including pedestrians, bicyclists, motorcyclists, and traffic safety hardware. Related investigations are discussed later in this response.

Stability Control Systems

A key component of this NPRM is that all newly manufactured heavy vehicles be required to be equipped with an ESC system. In January 2009, as a result of our investigation of a medium-size bus loss of control and rollover near Dolan Springs, Arizona, the NTSB noted the value of ESC systems in preventing crashes.[10] The NTSB issued recommendations to NHTSA asking the agency to develop performance standards for ESC systems applicable to newly manufactured buses above 10,000 pounds and, once the performance standards were developed, to require the installation of stability control systems in all newly manufactured buses (Safety Recommendations H-10-5 and -6).

In 2011, following our investigation into a rollover of a cargo tank semitrailer carrying liquified petroleum gas and subsequent fire in Indianapolis, Indiana, the NTSB superseded the safety recommendations issued in the Dolan Springs investigation, and called upon NHTSA to develop performance standards for ESC systems for all CMVs over 10,000 pounds (regardless of whether the vehicles are equipped with a hydraulic or a pneumatic brake system) and to require the installation of ESC on all newly manufactured CMVs over 10,000 pounds (Safety Recommendations H-11-7 and -8).[11]

In June 2015, NHTSA issued a final rule establishing FMVSS No.136 to require ESC systems on truck-tractors and certain buses over 26,000 pounds.[12] In the rule, NHTSA excluded CMVs between 10,000 and 26,000 pounds stating that it had begun research on the safety benefits and performance criteria of ESC systems on single-

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[9] Safety Recommendations H-15-8 and -9 were issued to 31 passenger vehicle, truck, and motorcoach manufacturers. Open—Acceptable Response is the overall (plurality) classification for each of the recommendations. However, the NTSB remains concerned regarding the slow pace of deployment of these technologies in the CMV fleet.

[10] NTSB. 2010. *Bus Loss of Control and Rollover, Dolan Springs, Arizona, January 30, 2009*. NTSB/HAR-10-01. Washington, DC.

[11] NTSB. 2011. *Rollover of a Truck-Tractor and Cargo Tank Semitrailer Carrying Liquefied Petroleum Gas and Subsequent Fire, Indianapolis, Indiana, October 22, 2009*. NTSB/HAR-11-01. Washington, DC.

[12] See Federal Motor Vehicle Safety Standards, "Electronic Stability Control Systems for Heavy Vehicles," final rule, June 23, 2015 (80 Federal Register 36050, docket no. NHTSA-2015-0056).

unit trucks and medium-size buses and that follow-on rulemaking would be initiated if needed. Because NHTSA had excluded a large percentage of the CMVs from the rule, NTSB classified Safety Recommendations H-11-7 and -8 Open-Unacceptable Response.

The NTSB reiterated Safety Recommendations H-11-7 and -8 in a 2018 special investigation report on school bus safety issues, which included the investigation of a school bus crash in Chattanooga, Tennessee, in which the driver lost control of a school bus.[13] In that report, the NTSB concluded that, had the school bus involved in the Chattanooga crash been equipped with an ESC system, the technology could have assisted the driver in maintaining vehicle control and mitigated the severity of the crash. School buses were excluded from FMVSS No.136. In response to the reiteration of our recommendations, NHTSA stated that school buses were excluded from the ESC rule because crash statistics indicated that most school bus crashes are not rollover or loss-of-control crashes.

Our crash investigations continue to show that ESC systems are critical to preventing loss-of-control and rollover crashes. In September 2019, we investigated a medium-size bus loss of control and rollover crash near Bryce Canyon City, Utah.[14] Our investigation determined that had the bus been equipped with an ESC system, the technology would have assisted the driver in maintaining control of the bus and reduced the likelihood of a vehicle rollover. Additionally, we found that the safety of buses between 10,000 and 26,000 pounds would be enhanced by equipping them with ESC systems. As a result, we again reiterated Safety Recommendations H-11-7 and -8 to NHTSA.

In February 2020, we investigated another bus rollover crash near Pala Mesa, California.[15] The bus weighed 29,000 pounds but was not equipped with an ESC system because it was manufactured in 2013, before NHTSA required the technology on certain large buses. Our investigation determined that had the bus been equipped with an ESC system it would have assisted the driver in maintaining control, which could have prevented the crash.

In summary, our investigation history has shown that AEB and ESC technology, if installed on CMVs, will save lives. We included our investigation history as part of this response to provide additional supporting information to USDOT and interested stakeholders on real-world crashes that could have been prevented if these

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[13] NTSB. 2018. *Selective Issues in School Bus Transportation Safety: Crashes in Baltimore, Maryland, and Chattanooga, Tennessee*, NTSB/SIR-18-02. Washington, DC.

[14] NTSB. 2021. *Medium-Size Bus Roadway Departure, Return, and Rollover, Bryce Canyon City, Utah, September 20, 2019*, NTSB/HAR-21-01. Washington, DC.

[15] NTSB. 2022. *Bus Roadway Departure and Rollover, Pala Mesa, California, February 22, 2020*, NTSB/HAR-22-02. Washington, DC.

technologies were installed. We will now provide comments on a few aspects of the proposed rulemaking that deserve emphasis.

Proposed Performance Requirements

We appreciate the comprehensive research and hard work by NHTSA and the FMCSA in developing the proposed performance requirements in the NPRM. While we do not intend on addressing every aspect of the proposed requirements, our response will focus on the following areas in the NPRM: (1) a requirement to include nearly all heavy vehicles in the rule; (2) a requirement that ESC be a prerequisite for AEB systems; (3) a requirement for FCW functionality; (4) a requirement that AEB activation results in no-contact between the striking vehicle and lead vehicle ahead; (5) a requirement for malfunction detection; (6) a requirement for false activation detection; and (7) a requirement for targeted data recording.

(1) Vehicle Coverage Requirement. NHTSA is proposing to require nearly all CMVs greater than 10,000 pounds be equipped with AEB. This includes single unit trucks ("class 3 through 6"), medium-sized buses, school buses, transit buses, motorcoaches (or over-the-road buses), and other multipurpose vehicles.[16] We applaud this decision as it is supported by research, crash data, and our investigation experience. It is also notable that NHTSA's research found that about half of all heavy vehicle rear-end crashes, injuries, and fatalities resulted from a medium-size striking vehicle – weighing between 10,000 to 26,000 pounds – rear ending another vehicle. Exempting such vehicles would severely diminish the potential safety benefit of the proposed rulemaking.

(2) ESC Requirement. Currently, pursuant to FMVSS No.136, only class 7 and 8 truck tractors and certain large buses are required to have ESC systems. Under the proposed rule, FMVSS No.136 would be amended to require nearly all heavy vehicles to have an ESC system.[17] We strongly support this aspect of the proposed rule as our investigations have shown that ESC, in combination with AEB, will prevent crashes.[18] From a technical standpoint, there are significant safety risks associated with the installation of an AEB system without an ESC system. For example, a driver who responds to an imminent collision by steering to avoid a collision while an AEB system is simultaneously applying braking may induce lateral instability for which ESC is needed to prevent loss of vehicle control.

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[16] The term "class 3 through 6" refers to vehicles with a GVWR greater than 10,000 lbs. and up to 26,000 lbs., while the term "class 7 to 8" refers to vehicles with a GVWR greater than 26,000 lbs.

[17] The vehicles excluded from this proposal include trailers, which by definition, are towed by other vehicles, and vehicles already excluded from NHTSA's foundational braking requirements.

[18] NHTSA found that class 3 through 6 heavy vehicles are involved in approximately 17,000 rollover and loss of control crashes annually.

(3) FCW Requirement. To satisfy the performance requirements of the proposed rule, heavy vehicles must have FCW functionality that provides a warning to the vehicle operator if a forward collision with a lead vehicle is imminent. The NTSB supports the proposed requirements for FCW, specifically pertaining to the use of a bi-modal (visual and auditory) alert and the requirement that activation of FCW must never delay AEB activation. Our support is rooted in NTSB investigations that have shown that a visual alert alone may be insufficient to warn a driver of an impending crash, especially if the driver is distracted.[19]

To accomplish the goal of improved advance warning, the most viable solution is that all heavy vehicles be equipped with connected-vehicle (V2X) technology, which would significantly enhance the detection distance of potential hazards ahead. We urge NHTSA to review our research, investigation history, and safety recommendation correspondence calling for a mandate of V2X technology and develop complementary rulemaking (without delaying the proposed rulemaking) that will significantly enhance AEB system performance.[20]

(4) No-Contact Provision. For all vehicle tests where a subject vehicle approaches a lead vehicle, NHTSA is proposing that the minimum performance requirement is the complete avoidance of contact with the lead vehicle. NHTSA chose the performance criterion of collision avoidance (no contact) because it maximizes the safety benefits of the rule as compared to a metric that might permit a reduced speed collision. NHTSA has concluded that a no-contact criterion for the performance test requirements is practicable to achieve, consistent with the need for safety, and may be necessary to ensure test repeatability. The NTSB supports a no-contact criterion as it sets the highest possible safety standard.

(5) Malfunction Detection Requirement. As part of the proposed rule, NHTSA and the FMCSA are requiring AEB systems to continuously detect system malfunctions, including malfunctions caused solely by sensor obstructions. If the system detects a malfunction, the system must provide the vehicle operator with a telltale indication that the malfunction exists. This proposed requirement would include any malfunction attributable to sensor obstruction, such as by accumulated snow or debris, dense fog, or sunlight glare. The malfunction telltale indication must remain active as long as the malfunction exists, and the vehicle's starting system is on. We support this malfunction detection requirement. The NTSB recently investigated a

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[19] Three recent examples involve drivers operating passenger vehicles in partial driving automation mode who failed to detect hazards ahead due to inattention and distraction. See NTSB investigations: (a) NTSB. 2020. *Collision Between a Sport Utility Vehicle Operating with Partial Driving Automation and a Crash Attenuator, Mountain View, California, March 23, 2018.* NTSB/HAR-20-1. Washington, DC. (b) NTSB. 2019. *Rear-End Collision Between a Car with Advanced Driving Assistance Systems and a Stationary Fire Truck, Culver City, California, January 22, 2018.* NTSB/HAB-19-07. Washington, DC. (c) NTSB. 2017. *Collision Between a Car Operating With Automated Vehicle Control Systems and a Tractor-Semitrailer Truck Near Williston, Florida, May 17, 2016.* NTSB/HAR-17-02. Washington, DC.

[20] See our safety topics website "V2X: Preserving the Future of Connected Vehicle Technology" for additional information regarding our related crash investigations and recommendations in this area.

crash in Mt. Pleasant Township, Pennsylvania, in which a CMV had operated with a non-functional forward collision avoidance system for 6 months due to a sensor misalignment. In that report, the NTSB concluded that maintaining the full functionality of the installed FCW and AEB systems is critical to safety.[21] As a result, the NTSB recommended that the FMCSA add collision avoidance systems, including AEB, to the parts and accessories that the driver vehicle inspection form will cover (Safety Recommendation H-22-5). We are pleased that the FMCSA will be requiring all CMVs equipped with ESC and AEB systems be inspected and maintained so that the malfunctioning systems can be detected early and repaired.

(6) False Activation Detection Testing Requirement. The proposed requirements include two tests to ensure that the AEB system does not activate inappropriately when no collision is imminent. These false positive tests provide some assurance that an AEB system can differentiate between an imminent collision and a non-threat. While these tests are not comprehensive, they establish a minimum performance standard for non-activation of AEB systems. We strongly support the inclusion of false positive tests in the proposed rule as false positive alerts may erode the trucking industry's trust in the technology. The NTSB is aware that some segments of the trucking industry are concerned by the potential for false activation.[22] Additionally, NHTSA recently opened a preliminary investigation into a series of complaints that AEB systems may inaccurately identify an object and command the vehicle to stop unexpectedly, resulting in a hazard to other motorists.[23] We understand these concerns, but believe that the proposed performance standards, requirements for false activation and malfunction tests, and the FMCSA's proposed maintenance and inspection requirements will significantly reduce the potential for false positive AEB activations. We urge NHTSA to include documentation in the final rule showing how the significant lifesaving benefits of AEB systems outweigh the relatively rare potential of false activation incidents.

(7) Data Storage Requirements. As part of the proposal, NHTSA is considering requiring targeted data recording and storage of significant AEB activations. This data could then be used by manufacturers to improve system performance. NHTSA is considering requiring that an AEB event that results in a speed reduction of greater than 12 mph should activate the recording and storage of key data. We strongly support this aspect of the proposed rule.

In 2015, following our investigation of a multivehicle work zone crash in Cranbury, New Jersey, we determined that collision avoidance systems capable of

[21] NTSB. 2022. *Multivehicle Crash Near Mt. Pleasant Township, Pennsylvania, January 5, 2020*, NTSB/HIR-22-1. Washington, DC.

[22] See June 29, 2023 article in Landline Media article titled, "Opponents to AEB Mandate Point to False Activation Reports."

[23] See NHTSA's Office of Defect Investigations Document dated May 29, 2023.

storing and retrieving vehicle and system performance information would aid in the evaluation and improvement of such systems, as well as facilitate a better understanding of crashes.[24] As a result, the NTSB made a recommendation to the manufacturers of collision warning and avoidance systems to include the capability to store and retrieve data pertaining to object detection, driver audible/visual alerts, and interventions by the system (Safety Recommendation H-15-24). As part of the recommendation, we specifically urged NHTSA to require a data recording rate adequate to support accident investigation and reconstruction activities.

In August 2022, NHTSA published an NPRM that discussed the agency's intent to amend regulations regarding event data recorders to extend the recording period and increase the data recording frequency.[25] In our response, the NTSB supported the proposed rule change but urged NHTSA to expand the required recording metrics to include information related to advanced driver assistance systems, including AEB and FCW.[26]

In response to the current NPRM, the NTSB again urges NHTSA to require recording of data related to activation of AEB and FCW systems. Without such data, it will be extremely challenging to determine whether and to what extent these systems were engaged during a crash.

Vehicle Test Scenarios and Conditions

NHTSA has included three test scenarios in the proposed rule: (1) test vehicle traveling straight at a constant speed approaching a stopped lead vehicle in the same lane of travel, (2) test vehicle encounters a slower moving lead vehicle, and (3) test vehicle following a decelerating lead vehicle. The proposed protocols would be evaluated at a range of test speeds up to 62 mph with the lead vehicle representing a profile of a compact passenger car. We will now provide comments on a few key aspects of the vehicle test scenarios and conditions that deserve attention.

Test Speed Range. The NTSB agrees with NHTSA's decision to propose testing of AEB systems at a broad range of speeds from 6.2 mph (for the stopped lead vehicle test) up to 62 mph for scenarios with manual brake application. (Test speeds are only up to 50 mph when manual braking is not applied by the driver.) In the 2020 crash in Mt. Pleasant Township, Pennsylvania, the NTSB determined that the circumstances of the multiple impacts of three heavy vehicles involved in the crash were outside the operational characteristics of the installed AEB systems due to the

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[24] NTSB. 2015. *Multivehicle Work Zone Crash on Interstate 95 Cranbury, New Jersey, June 7, 2014*, NTSB/HAR-15-2. Washington, DC.

[25] NHTSA. "Event Data Recorders." Notice of proposed rulemaking (NPRM). 87 *Federal Register* 37289. June 22, 2022.

[26] In our response, the NTSB discussed several data recording safety recommendations, including H-17-37, -39, and -40, which were issued in the already referenced Williston, Florida report. All three of these safety recommendations are classified Open—Unacceptable Response.

involved speeds, the curved roadway, and the weather conditions (light snow).[27] For AEB systems to address most fatal crashes involving a heavy vehicle, the technology must function at both low and high speeds. This is supported by NHTSA's data showing that while most crashes occur at lower speeds, the overwhelming majority of fatalities result from high-speed crashes.[28]

Test Conditions. The NTSB acknowledges that there are limits to testing systems in controlled environments due to the wide range of real-world operating conditions. AEB systems will be subject to many scenes and stimuli that are not present on a test track – i.e., precipitation, lighting, roadway curvature and elevation changes, signage, unusual traffic safety hardware, and vulnerable road users – and these conditions could potentially influence real world effectiveness of AEB systems. Our crash investigations have shown the impact that unusual conditions can play in the performance of AEB systems. In 2018, the NTSB investigated an AEB-equipped passenger vehicle crash in Culver City, California.[29] In the crash, the AEB system on the vehicle did not activate when the vehicle encountered a stopped fire truck with lights activated, parked at an angle in the traffic lane. Given the circumstances of the crash, it is very possible that the proposed AEB performance standard would be insufficient to address similar crashes: those involving a heavy CMV approaching untested vehicle profiles (non-passenger vehicle), or vehicles angled or offset in a traffic lane.

Similarly, in another AEB-equipped passenger vehicle crash in Mountain View, California, the AEB system was unable to detect traffic safety hardware.[30] NTSB testing, however, has shown that some CMV AEB systems can avoid hazards such as a crash attenuator. For example, in our 2016 investigation of a motorcoach crash in San Jose, California, our testing found that had the bus been equipped with collision avoidance technology, it could have alerted the driver of the forward hazard (a crash attenuator) in sufficient time to mitigate the severity of the crash.[31]

The NPRM also includes a requirement that AEB be tested under ideal weather and roadway conditions and on a straight test path. The test conditions do not reflect the real-world operating conditions found in our investigation of the Mt. Pleasant

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[27] NTSB. 2022. *Multivehicle Crash Near Mt. Pleasant Township, Pennsylvania, January 5, 2020.* NTSB/HIR-22-1. Washington, DC.

[28] The NPRM notes that "in approximately 17 percent of crashes, the striking vehicle was traveling over 55 mph (89 km/h). Those crashes resulted in 89 percent of fatalities from rear-end crashes involving heavy vehicles."

[29] NTSB. 2019. *Rear-End Collision Between a Car with Advanced Driving Assistance Systems and a Stationary Fire Truck, Culver City, California, January 22, 2018.* NTSB/HAB-19-07. Washington, DC.

[30] NTSB. 2020. *Collision Between a Sport Utility Vehicle Operating with Partial Driving Automation and a Crash Attenuator, Mountain View, California, March 23, 2018.* NTSB/HAR-20-1. Washington, DC.

[31] NTSB. 2018. *Motorcoach Collision With Crash Attenuator in Gore Area US Highway 101, San Jose, California, January 19, 2016.* NTSB/HAR-17-1. Washington, DC.

Township, Pennsylvania crash.[32] In the crash, three heavy vehicles were unable to detect an overturned motorcoach in a traffic lane while traversing a curve in inclement weather. The NTSB has found that AEB systems often have difficulty detecting hazards while negotiating curved roadways due to the line of sight needed for most radar systems and other sensors to detect hazards. We encourage NHTSA to continue to evaluate additional testing protocols for these real-world scenarios and develop complementary rulemaking. This complimentary rulemaking should be undertaken without delaying the current proposed rule.

Detection of Vulnerable Road Users. The NTSB continues to investigate crashes that could have been prevented or mitigated with AEB systems. Our investigations revealed the necessity of expanding test protocols to account for the varying crash characteristics associated with vulnerable road users. In 2018 and 2019, the NTSB published a special investigation report and two safety studies, each focusing on specific vulnerable road users: *Pedestrian Safety; Select Risk Factors Associated with Causes of Motorcycle Crashes;* and *Bicyclist Safety on US Roadways: Crash Risks and Countermeasures*.[33] In these reports, the NTSB determined that collision avoidance technologies could reduce the frequency of crashes with pedestrians, motorcyclists, and bicyclists and identified the need for performance test protocols.

In summary, we encourage NHTSA to continue expanding the proposed testing conditions to examine the functionality of AEB systems in other crash-relevant scenarios including those involving untested profiles (such as non-passenger vehicles), varying vehicle angles and offsets, and vulnerable road users.

Proposed Compliance Date Schedule

In the proposed rule, all class 7 and 8 heavy vehicles would be required to meet the AEB standards 3 years after the publication of the final rule because these vehicles are already required to have ESC systems. All class 3 through 6 vehicles would be required to meet the AEB and ESC requirements in 4 years. Small-volume manufacturers, final-stage manufacturers, and alterers would have 5 years to meet the AEB and ESC requirements. Based upon this time schedule, it is likely that the requirement for this lifesaving technology will extend well beyond 2029. In the NPRM, NHTSA has concluded that good cause exists for implementation of the proposed performance requirements to extend out to 3 years or more.[34] We do not agree with

[32] NTSB. 2022. *Multivehicle Crash Near Mt. Pleasant Township, Pennsylvania, January 5, 2020*, NTSB/HIR-22-1. Washington, DC.

[33] (a) NTSB. 2018. *Pedestrian Safety*, NTSB/SIR-18/03; (b) NTSB. 2029. *Bicyclist Safety on US Roadways: Crash Risks and Countermeasures*, NTSB/SS-19-01; (c) NTSB. 2018. *Select Risk Factors Associated with Causes of Motorcycle Crashes*, NTSB/SS-18/01.

[34] 49 U.S.C. 30111 (d) states that a standard may not become effective before the 180th day after the standard is prescribed. However, the Secretary may prescribe a different effective date after finding, for good cause shown, that a different effective date is in the public interest.

NHTSA's assessment that this lengthy delay is in the public interest. As shown in studies referenced in the NPRM, the proposed test protocols and passing criterion are within the capabilities of currently available systems. We urge USDOT to oversee the implementation of this important rulemaking effort and look for opportunities to expedite the completion and implementation of a final rule mandating AEB systems on heavy vehicles.

Summary

The NTSB strongly supports the proposed rulemaking and urges NHTSA and the FMCSA to more forward expeditiously. Although we have identified some shortcomings in the NPRM, we believe this proposal is an important first step in establishing a collision avoidance standard that will save lives. It will also improve on an existing standard by expanding the vehicle fleet required to be equipped with an ESC system. For those critical issues that still require attention, such as the ability to detect vulnerable road users and unusual vehicle profiles and configurations, we believe additional complementary rulemaking will be necessary to ensure the maximum safety benefits of AEB can ultimately be realized and to not delay this rulemaking. Additionally, because V2X technology would significantly increase the detection distance of potential hazards, we urge NHTSA to move forward with long overdue rulemaking in this area.

While manufacturers may continue to improve AEB systems, only a regulation will ensure that all heavy vehicles are equipped with an AEB system that can avoid a collision. We appreciate the opportunity to provide this response and we urge NHTSA and the FMCSA to expedite the rulemaking process.

Sincerely,

[original signed]

Jennifer Homendy
Chair