STATEMENT OF CATHERINE CHASE, PRESIDENT
ADVOCATES FOR HIGHWAY AND AUTO SAFETY

ON

"TRANSPORTATION OF TOMORROW: EMERGING TECHNOLOGIES THAT WILL MOVE AMERICA"

SUBMITTED TO THE

UNITED STATES SENATE
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

SEPTEMBER 13, 2018

Introduction

Advocates for Highway and Auto Safety (Advocates) is a unique coalition of public health, safety, and consumer organizations, insurers and insurance agents that promotes highway and auto safety through the adoption of federal and state laws, policies and regulations. Advocates works to prevent crashes, deaths and injuries through the advancement of safer vehicles, safer drivers and passengers, and safer roads and infrastructure.

Motor Vehicle Deaths Remain Unacceptably High

According to the federal government, each year motor vehicle crashes kill tens of thousands of people and injure millions more at a cost to society of over $800 billion.[1] According to the latest statistics from the National Highway Traffic Safety Administration (NHTSA), 37,461 people were killed on our nation's roads in 2016. This is an increase of over five percent from 2015,[2] and it follows a seven percent increase from 2014 to 2015.[3]

Advocates Consistently Promotes Proven Technology to Save Lives and Prevent Injuries

Advocates has always enthusiastically championed vehicle safety technology and for good reason; it is one of the most effective strategies for preventing deaths and injuries. NHTSA has estimated that since 1960, over 600,000 lives have been saved by motor vehicle safety technologies.[4] In 1991, Advocates led the coalition that supported bipartisan legislation that included airbag technology in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.[5] As a result, by 1997, every new car sold in the United States was equipped with a front seat airbag and the lives saved have been significant. Over the last decade airbags saved approximately 2,500 lives annually,[6] and have saved an estimated 47,625 lives since 1987, according to NHTSA.[7]

Advocates continued to build on this success by supporting additional lifesaving technologies as standard equipment in all vehicles in other legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;[8] rear outboard 3-point seat belts;[9] electronic stability control;[10] rear seat belt reminder systems;[11] rearview cameras;[12] brake transmission interlocks;[13] seat belts on motorcoaches;[14] and, electronic logging devices for commercial motor vehicles (CMVs).[15] These safety advances have saved hundreds of thousands of lives and many have been accomplished because of bipartisan leadership of Members of the Senate Commerce Committee.

Additionally, crash avoidance systems, such as automatic emergency braking (AEB), are critical to the development of autonomous vehicles (AVs).[16] This system uses on-board sensors such as radar, cameras or lasers to detect an imminent crash, warns the driver and applies the brakes or increases the braking effort if the driver does not take sufficient action. Research performed by the Insurance Institute for Highway Safety (IIHS) has revealed that AEB decreases front-to-rear crashes that cause injuries by 56%.[17] These already impressive safety benefits will be increased by implementing a federal performance standard for AEB and requiring that all new vehicles be equipped with this technology.

The Emerging Technology of Autonomous Vehicles Requires Sensible Safeguards

Advocates believes that AVs have the potential to make significant and lasting reductions in the number of deaths and injuries that occur each year on our Nation's roads. However, deploying AVs before they can be safely operated on public roads and without commonsense government oversight and industry accountability is not only reckless and ill-advised, but it will also substantially reduce public confidence in this new technology.

Experts and Industry Agree that the Widespread Deployment of Autonomous Vehicles is Decades Away

The pending AV START Act (American Vision for Safer Transportation through Advancement of Revolutionary Technologies Act, S. 1885) is being rushed through the Senate to facilitate the large-scale sale of experimental AV technology. The speed at which this legislation is being advanced is not aligned with the reality that AVs are a long way from being ready for prime time.

In fact, a number of auto industry executives have publicly stated that fully autonomous vehicles are still likely decades away. For example, Ford Motor Co. CEO Bill Ford, Jr. commented, "There's been a lot of over-promising and I think a lot of misinformation that's been out there. It's really important that we get it right, rather than get it quickly."[18] Toyota Research Institute CEO Gill Pratt stated, "It's a mistake to say that the finish line is coming up very soon. Things are changing rapidly, but this will be a long journey."[19] And, Nissan's Senior Vice President of Connected Vehicles and Mobility Services Ogi Redzic remarked, "Say a 2021 target is the example. What they may be saying is in a little, geofenced area with certain speed and conditions. If you ask generic statements, like 'when will all cars be driverless?', well of course we are talking about the very distant future."[20] The primacy of the technology was also underscored by a recent report by IIHS.[21] The report stated, a "production autonomous vehicle that can go anywhere, anytime isn't available at your local car dealer and won't be for quite some time. We aren't there yet."[22]

The Public is Deeply Skeptical about the Safety of Autonomous Vehicles

Numerous public opinion polls show strong public skepticism and reticence about AVs.[23] Those doubts are warranted based on the recent crashes as well as the past conduct of automakers.

Over the last few years, automakers have hidden from the American public and regulators safety defects which have led to numerous unacceptable and unnecessary deaths and injuries and the recall of tens of millions of vehicles.[24] Consumer acceptance of AV technology is critical to its success and to fully realizing the lifesaving potential of AVs. Right now families know that when they go into auto showrooms to buy a new car, the federal government has protections in place to ensure their safety. Similar oversight and regulation are needed for AVs to both assure and safeguard consumers, especially when considering recent the auto industry history of defects and cover-ups.

To provide some examples of the numerous recent surveys, in July of 2018, Advocates commissioned an independent public opinion poll[25] that showed intense apprehension regarding the widespread deployment of AVs with 69% expressing concern about safety. In a May 2018 poll commissioned by the American Automobile Association (AAA), 73% of American drivers said they would be too afraid to ride in a fully self-driving vehicle, up from 63% in late 2017.[26] A Reuters/Ipsos poll found that 67% of Americans were uncomfortable with the idea of riding in self-driving cars.[27] Lastly, in a May 2018 Public Policy Polling/Consumer Watchdog poll, 80% of respondents agreed that federal and state governments should regulate driverless vehicles for the safety of riders, pedestrians and other drivers.[28] Clearly, the public needs assurances that they will be safe driving in and around AVs, yet the AV START Act falls short of establishing safeguards to accomplish this.

The Safe Operation of Autonomous Vehicle Systems Has Yet to be Proved

The artificial urgency to deploy immature AVs is disconnected from public opinion as well as the reality that serious and fatal crashes have revealed significant flaws in this still developing

technology. On May 7, 2016, in Williston, Florida, a Tesla Model S on "Autopilot" struck and passed beneath a semitrailer killing the driver.[29] On January 22, 2018, in Culver City, California, another Tesla Model S operating on "Autopilot" collided with a parked fire truck that was responding to the scene of a separate crash.[30] Remarkably, neither the Tesla driver nor any first responders were injured.[31] On March 18, 2018, in Tempe, Arizona, an Uber test vehicle operating on self-driving mode struck and killed a pedestrian walking a bicycle.[32] Then, just a few days later on March 23, 2018, in Mountain View, California, a Tesla Model X operating on "Autopilot" collided with a safety barrier resulting in the death of the driver.[33] According to the National Transportation Safety Board (NTSB) preliminary report on the crash, the vehicle was being operated under "Autopilot", had moved out of the lane of travel on its own and accelerated to 70 miles-per-hour (MPH) before colliding with the barrier.[34] The collision and subsequent intense fire closed the freeway for at least five hours.[35] On May 29, 2018, a Tesla Model S operating on "Autopilot" struck a parked police vehicle in Laguna Beach, California.[36] Late last month on August 25, 2018 in San Jose, CA, a Tesla Model S collided with a fire truck that was stopped in the far right lane with its emergency lights activated. The NTSB has investigated or is investigating all of these crashes except the last two.[37]

In addition to the tragic crashes that have already happened involving autonomous systems, data accumulated from the limited miles traveled also paints an alarming picture. In 2016, the latest year for which final data is available, on average a person was killed in a traffic collision every 84.7 million miles traveled on U.S. roads.[38] Before the fatal crash in Arizona, Uber had reportedly logged two million autonomous miles as of the end of 2017 and was predicted to accrue another one million miles over the next 100 days.[39] Based on a simple evaluation of this data, the autonomous Uber had one fatality in three million miles; that is a fatality rate 28 times

that of human drivers. This analysis highlights just how little proof there is that these systems are safe. While it must be stated that the Uber crash is a single data point and may not be necessarily indicative of future performance statistically, if we are going to ignore this data point, then AV manufacturers must likewise stop touting the millions of miles their AVs have driven as evidence of their safety, as they are currently doing in the voluntary safety self-assessments filed with NHTSA. The fact is that the industry has yet to prove the safety of these systems and has yet to even agree upon a metric or method for comparing the safety of these systems, yet they are pushing to allow these vehicles into showrooms and onto the roads. Moreover, these numbers pale in comparison to the more than three *trillion* miles traveled by human drivers on U.S. roads each year.[40]

Similar misdirection about safety performance data has been used in response to recent crashes involving AVs. After the 2016 fatal Tesla crash in Florida, the NHTSA Office of Defects and Investigation (ODI) issued a report which included an analysis of data supplied by Tesla that showed "that the Tesla vehicles crash rate dropped by almost 40 percent after Autosteer [a feature of the Autopilot system] installation."[41] However, included in the ODI report was a critical footnote that the crash rates reported were "for all miles travelled before and after Autopilot installation and are not limited to *actual Autopilot use*" (emphasis added).[42] Despite this clear statement by NHTSA, Tesla continues to mischaracterize the ODI analysis in response to subsequent fatal crashes involving vehicles operating under the "Autopilot" system.[43] NHTSA has since clarified again that the effectiveness of the "Autopilot" system was not evaluated in its prior investigation, refuting the claims by Tesla.[44] Moreover, Tesla was removed as a party to the NTSB investigation of the second fatal crash involving one of its vehicles shortly after a March blog post once again made this same claim.[45]

These types of details matter when it comes to AVs, particularly when evaluating claims that are made to support their introduction. Some members of the industry assert that waiting for AV technology to be perfect would be "the enemy of the good."[46] In some cases, they point to a report of the same title by the Rand Corporation (RAND) to bolster this argument.[47] In fact, the RAND report concluded that allowing the deployment of AVs, which have a safety performance that is just 10 percent better than that of the average human driver, would save more lives than waiting for a perfectly safe AV.[48] However, the critical underpinning of this statement, which is being widely missed in the use of this report, is that these vehicles are in fact demonstrably better, even in some minute amount, than human drivers -- this is a fact which has yet to be proved. Again, the industry and regulators have not even agreed upon the proper metrics for evaluating the safety performance of an AV, let alone requirements for operation which would assure that these vehicles are ten percent, one percent, or even a tenth of a percent better than the average human driver.

Minimum Performance Standards Have Both Immediate and Long Term Benefits for Nascent Safety Technologies

Advocates has always supported the introduction of safety technologies once its benefits have been identified and verified. Often additional advantages arise out of the widespread implementation of the base technology. For example, Advocates evaluated an abundance of research and data demonstrating that installing a rearview camera in passenger vehicles would help to prevent backover crashes and resultant deaths and injuries, often to young children and disabled persons.[49] Advocates, together with others in the safety community especially KidsAndCars.org and the remarkable families of backover victims, then fought for a decade in total to obtain a rearview camera requirement for all new vehicles, which took effect on May 1,

2018. The IIHS conducted research, published in their November 17, 2016 *Status Report*, demonstrating additional benefits of rearview cameras such as reducing property damage crashes during backing, and assistance with backing maneuvers such as parking.[50] Furthermore, if a video sensor stream was required, including additional driver assistance technologies such automatic rear braking, parking guidance and automated parking assistance, even more advantages could be realized.

Similarly, Advocates supported equipping vehicles with anti-lock braking systems (ABS), which helps a driver to maintain control of the vehicle when braking on slippery surfaces. ABS has also resulted in wide ranging benefits. In fact, ABS is the base technology for electronic stability control (ESC) which helps to prevent rollover and loss of control crashes and is attributed to having saved more than 7,000 lives since 2011.[51] The applications which are in ABS and ESC are also an underlying technology for AVs. A critical component of both of these safety successes is a federal standard that ensures these technologies have a specific level of performance so that consumers can have confidence in the technology as well as familiarity with a new feature of their vehicle. Federal standards also pave the way to build public acceptance and use of these technologies which magnifies the safety benefits. Effective government oversight and performance standards are critical to the success of new safety technologies placed into motor vehicles.

Moreover, examples of the success of effective standards and oversight of automated systems fly over our heads every single day. According to the U.S. Bureau of Transportation Statistics, 741 million passengers traveled on domestic flights in 2017.[52] The tragic April 2018 death of a Southwest Airlines passenger was the first U.S. commercial airline fatality since 2009.[53] Over

that same span of time (2010-2017), nearly 5.4 billion passengers travelled safely through our skies. The Federal Aviation Administration (FAA) estimates that airline pilots use automated systems 90 percent of the time while flying.[54] Meanwhile, on our roads from 2010 to 2017, crashes claimed the lives of approximately 275,000 road users.[55] The federal government, particularly the U.S. Department of Transportation (DOT), has experience in developing standards and implementing effective oversight of autonomous systems in transportation. While adaptation for governing AVs on roads is necessary, this is not an entirely new concept. The U.S. DOT would do well to coordinate with other departments and its own agencies, and make the best use of its past research, current regulations, and the latest technologies to set standards ensuring the safe introduction of AVs.

Proper Government Oversight is Needed for the Safe Deployment of Autonomous Vehicles

Over fifty years ago, Congress passed the National Traffic and Motor Vehicle Safety Act of 1966 because of concerns about the death and injury toll on our highways.[56] The law required the federal government to establish minimum vehicle safety performance standards to protect the public against "unreasonable risk of accidents occurring as a result of the design, construction or performance of motor vehicles."[57] While motor vehicles have changed dramatically since that time and will continue to do so in the future, the underlying premise of this crucial law and NHTSA's safety mission have not.

Unfortunately, NHTSA has chosen to issue only "voluntary guidelines" for the development of AVs.[58] Voluntary guidelines are not enforceable because they are not legally binding, and, therefore, are inadequate to ensure safety and protect the public. Manufacturers may unilaterally

choose to deviate from the guidelines or ignore them entirely at any time and for any reason including internal corporate priorities such as cost or marketing considerations.

The AV START Act Fails to Ensure Public Safety

Compounding NHTSA's inaction are the deep flaws of the AV START Act. Advocates opposes the bill in its current form as it falls well short of the oversight and accountability necessary to ensure public safety. The legislation unnecessarily takes aim at the current federal regulatory scheme protecting those traveling on America's roads that has been in place for decades.

Furthermore, for the Senate to fully consider all of the public safety implications associated with the mass deployment of AVs, the AV START Act should not move forward until the ongoing multiple investigations by the NTSB of the serious and fatal crashes involving AVs noted above are completed. Our Nation's foremost investigatory body has highly regarded expertise and will issue recommendations that should help guide Congress as it sets our Nation's first AV policy which will likely set the stage for years.

We urge the Senate to adopt the following reasonable improvements to the bill, which will ensure public safety and industry accountability, while still allowing for the development and deployment of AVs:

- ***Reduce the Size and Scope of Exemptions:*** Section six of the AV START Act will allow potentially millions of vehicles to be deployed into the public domain that are exempt from existing critical Federal Motor Vehicle Safety Standards (FMVSS). Providing broad statutory exemptions from the FMVSS for AVs is both unnecessary and unwise. There is already a statutory process in place for manufacturers to seek an exemption from the FMVSS. Moreover, Section 24404 of the Fixing America's Surface

Transportation (FAST) Act[59] permits auto manufacturers to test or evaluate an unlimited number of vehicles exempt from one or more of the FMVSS.[60] Additionally, the exemption provision in current law, 49 USC Section 30113(a), provides that manufacturers may receive an exemption from compliance with the FMVSS for the sale of 2,500 vehicles to be sold in the United States in any 12-month period. No evidence has been presented to show that the development and deployment of AVs requires wholesale exemptions for an untold number of AVs from critical federal safety standards that are essential to protecting public safety.

- ***Prohibit Crashworthiness and Occupant Protection Exemptions:*** The legislation currently contains no prohibition on AVs receiving an exemption from crashworthiness or occupant protection standards which protect the vehicle's passengers. Such exemptions can diminish the level of occupant protection that has been established through years of research under the existing regulations.[61] Prohibiting such exemptions will in no way inhibit the development of AV technology but will ensure that passengers of AVs are properly protected in a crash.
- ***Strike Provision Allowing Vehicle Systems to be Turned Off:*** Section seven of the AV START Act drastically alters current federal law which prohibits manufacturers from rendering safety systems, such as the steering wheel and brake pedals, inoperable. This provision is a dangerous change in settled law because it would allow automakers to turn off safety systems while the AV is being driven by the computer. This could unnecessarily dilute safety at the discretion of the manufacturer and sets a precedent of Congress allowing manufacturers to unilaterally circumvent many of the existing safety standards. Currently, automakers cannot turn off safety systems without government oversight.

- ***Require Sufficient Documentation in NHTSA Submission:*** Section nine of the AV START Act requires manufacturers of AVs and AV technology to submit to NHTSA a Safety Evaluation Report (SER) that details the development of the technology and its expected performance in real world conditions. While Advocates supports the mandatory submission of such information, this provision as currently written only directs manufacturers to "describe" their AV systems. In the absence of a legislative directive to require that sufficient information and data are included in the SER, manufacturers are permitted to continue submitting slick marketing brochures such as those already released by three manufacturers[62] instead of providing data and documentation that will allow the public and NHTSA to accurately evaluate the safety of the technology.
- ***Provide for Adequate Consumer Information:*** The AV START Act should ensure that consumers are given essential information about an AV. Every manufacturer should be required to provide each consumer with information about the capabilities, limitations and exemptions from safety standards for all vehicles sold in the U.S. at the time of sale. This information should be made available to consumers from day one, even before NHTSA issues a rule. NHTSA should also be required to establish a public website with basic safety information about AVs for consumers and for use in safety research. This online database would be similar to the safercar.gov website that NHTSA maintains to inform the public about safety recalls applicable to their vehicle. This would enable consumers to enter their VIN to obtain critical information about their AV such as the level of automation, any exemptions granted by NHTSA from the FMVSS, and the operational design domain which includes limitations and capabilities of each autonomous driving system with which a vehicle is equipped. Such a database will be critical for consumers who purchase AVs, whether first-hand or as a pre-owned vehicle,

and will also allow NHTSA and other research groups to perform independent evaluation of the comparative safety performance of AV systems.

- ***Compel AVs to Capture Necessary Crash Data:*** The NTSB in their investigation of the fatal Tesla crash in Florida noted that event data recorders (EDRs) are not required nor would current standards mandate the capturing of data necessary to evaluate the performance of AVs. The AV START Act does not require that this critical safety data generated by AVs will be recorded, shared or even provided to NHTSA and the NTSB for critical crash investigations. It is also essential that the legislation require all crashes involving AVs be reported immediately to NHTSA by manufacturers.
- ***Direct Final Rules for Minimum Performance Standards:***
    - ***Cybersecurity:*** A failure to adequately secure AV systems and to protect against cyber-attacks could endanger AV passengers, non-AV motorists, pedestrians, bicyclists and other vulnerable roadway users. It could also clog roads, stop the movement of goods and hinder the responses of emergency vehicles. The real possibility of a malevolent computer hack impacting hundreds or thousands of AVs, perhaps whole model runs, makes strong cybersecurity protections a crucial element of AV design. Yet, Section 14 of the AV START Act merely requires manufacturers to have a cybersecurity plan in place with no minimum standards of protection or effectiveness. Instead, the legislation should require NHTSA to establish a minimum performance standard to ensure cybersecurity protections are required for AVs of all levels. Considering the recent record of high-profile cyber-attacks,[63] allowing manufacturers merely to have a cybersecurity plan in place is grossly inadequate to ensure that AVs are protected against potentially catastrophic cyber-attacks and breaches.[64]

- ***Driver Distraction:*** In AVs that require a human to take control from the AV system (Levels 2 and 3), the automated driving system must keep the driver engaged in the driving task. Research demonstrates that even for a driver who is alert and performing the dynamic driving task, there is a delay in reaction time between observing a safety problem and taking appropriate action.[65] For a driver who is disengaged from the driving task during autonomous operation of a vehicle, that delay will be longer because the driver must first be alerted to re-engage, understand the situation, and then take control of the vehicle before taking appropriate action. The failure of the automated driving system to keep the driver engaged in the driving task during the trip was identified as a problem by the NTSB Tesla crash investigation. The NTSB found that the Tesla "Autopilot" facilitated the driver's inattention and overreliance on the system, which ultimately contributed to his death.[66] The "Autopilot" was active for 37 minutes of the 41 minute trip and the system detected hands on the steering wheel only 7 times for a total of 25 seconds.[67] The NTSB also found that these problems are widespread across manufacturers with similar systems.[68] The AV START Act fails to address this serious safety problem, yet technology to discern distraction and provide alerts is already available. NHTSA should be directed to establish a minimum performance standard to ensure driver engagement throughout the trip.
- ***Electronics Systems:*** Motor vehicles and motor vehicle equipment are powered and run by highly complex electronic systems and will become even more so with the future deployment of autonomous driving systems. Interference from non-safety systems can affect the electronics that power critical safety systems if they share the same wiring and circuits. For example, in one reported instance a

vehicle model lost power to its dashboard lights when an MP3 player was plugged in and used.[69] Similar to FAA requirements to protect the electronics and their functions in aircraft under any foreseeable operating condition,[70] NHTSA should require minimum performance standards for the electronics in all motor vehicles, particularly AVs. However, the AV START Act fails to direct NHTSA to develop and issue performance standards for the electronics systems of modern motor vehicles.

- ***AV "Vision Test":*** In order for an AV to properly interact with its surrounding environment, it must not only detect other vehicles and roadway infrastructure but also other participants using our Nation's transportation systems including pedestrians, bicyclists, wheelchair users, construction workers in work zones, first responders providing assistance after crashes, and law enforcement officers directing traffic. A failure to properly detect and react to any of these could have tragic results. AVs and automated driving systems must be subject to objective testing to ensure that they properly detect other road users, as well as pavement markings and infrastructure, can correctly identify the type of object that has been detected, and can then also respond properly and safely. Therefore, the AV START Act should direct the Secretary of Transportation to initiate a rulemaking proceeding to require automated driving systems, including SAE Level 2 automated driving systems, to meet a minimum performance standard for detecting and reacting to the AV's driving environment.

- ***Safety and Accessibility for People with Disabilities:*** The long-term promise of AVs to improve mobility for those with disabilities is significant. However, the AV START Act

fails to ensure safety and access to all members of the disability community who have varying needs.

- ***Include Level 2 AVs:*** The AV START Act does not include Society of Automotive Engineers (SAE) Level 2 AVs, which require a human driver to monitor their performance and be available to take over the driving task when necessary, like the Tesla vehicles which have been involved in several crashes. During a September 12, 2017, hearing on the 2016 crash conducted by the NTSB, deadly failures of Tesla's Level 2 "Autopilot" system were readily identified.[71] The NTSB found that similar problems also exist in other Level 2 AVs across many manufacturers.[72] In the near term, Level 2 AVs will likely comprise a majority of the passenger vehicle AV fleet. Proper safeguards to curb Tesla-like failures must be put in place. Level 2 AVs should be subject to all safety critical provisions in the AV START Act.
- ***Do Not Preempt State Action in the Absence of Federal Regulations:*** It is the statutory mission of NHTSA to regulate the design and performance of motor vehicles to ensure public safety which, in modern day terms, includes AVs and automated driving system technology. However, in the absence of comprehensive federal standards and regulations to govern the AV rules of the road, the states have every legal right, indeed a duty to their citizens; to fill the regulatory vacuum with state developed proposals and solutions for ensuring public safety. Section three prohibits this state action.

U.S. DOT Requires Sufficient Funding and Authority to Properly Regulate Vehicle Safety

As emerging technologies are developed and deployed, the U.S. DOT is already facing and will continue to confront unique challenges which warrant additional tools and funding to protect against potentially catastrophic defects and failures. NHTSA should be granted imminent hazard

authority to expedite the grounding of vehicles that the agency has identified as having a potentially dangerous, widespread problem or when it detects a cybersecurity threat that could lead to inordinate crashes, deaths and injuries. Additionally, because of the potential serious nature of software defects that could imperil safety in thousands of vehicles, the ability to levy enhanced penalties is essential. The unacceptable level of current motor vehicle crashes, fatalities and injuries combined with the demands being placed on NHTSA with regard to AV technology necessitates an increase in agency funding.

Today, 95 percent of transportation-related fatalities and 99 percent of transportation injuries involve motor vehicles on our streets and highways.[73] Yet, NHTSA receives only one percent of the overall DOT budget.[74] NHTSA will be required to take on new significant responsibilities under the driverless car legislation. In order to efficiently execute all of these tasks, an office dedicated to AV safety should be established within NHTSA. The protection of public safety should not be compromised and progress should not be slowed because the agency does not have adequate technical expertise, organization, resources and funding to oversee the development and deployment of AVs.

Many Significant Obstacles and Uncertainties Remain Regarding the Safe Deployment of Emerging Technologies

AVs will be operating on public roads, therefore ensuring that our Nation's infrastructure can accommodate the safe and successful deployment of AVs is essential. "Stand-alone" AVs (those that will not communicate with other vehicles) will be limited by the capability of the on-board sensors and therefore, will largely suffer from the same types of limitations that afflict human drivers.

With the advent of AVs, more emphasis must be placed on consistency of road design, and consideration must be given to the effects variations can have on autonomous technology. While a human driver can see a unique situation and interpret those circumstances fairly well, an AV may not be able to do the same. As the Senate Committee on Environment and Public Works Ranking Member Senator Tom Carper (D-DE) discussed during the June 13, 2018 hearing, "Innovation and America's Infrastructure: Examining the Effects of Emerging Autonomous Technologies on America's Roads and Bridges", research has already shown that minor distortion of a sign can result in havoc for AVs, causing stop signs to be interpreted as speed limit signs, a confusion which can have serious and even potentially fatal results.[75] Additionally, roadway deterioration and delayed repair, which are common occurrences on existing infrastructure, will have a negative impact on AV operation.

Claims made by the AV industry that the introduction of these vehicles will reduce congestion, improve environmental quality, and advance transportation efficiency may amount to nothing more than fanciful theories.[76] Instead, AVs may bring about so-called "hyper-commuters" who work from their vehicles on long commutes thereby making living further from offices and/or city centers more palatable. Likewise, the possibility of empty AVs adding substantial miles on the roads as they re-position autonomously after dropping off riders could undermine many of the benefits claimed.[77]

Connected Vehicle Technology Has the Potential to Augment Safety

Connected vehicle technologies allow a vehicle to send and receive communications with other vehicles (vehicle-to-vehicle (V2V)) and the infrastructure (vehicle-to-infrastructure (V2I)). These messages can relay information ranging from the relative location and direction of motion

of other vehicles to warning messages that traffic lights are about to change or weather conditions are soon to be encountered. These systems will likely help fill in gaps in the performance of AVs. For instance, V2V communication can provide safety applications for advanced driver-assistance systems (ADAS) such as Left Turn Assist (LTA) and Forward Collision Warning (FCW). LTA warns drivers to the presence of oncoming, opposite-direction traffic when attempting a left turn. FCW warns drivers of stopped, slowing or slower vehicles ahead. In a 2017 Notice of Proposed Rulemaking to require V2V technology, NHTSA noted that "[b]ecause of V2V's ability to provide vehicles with information beyond a vehicle's range of perception, V2V is the only source of information that supports applications like Intersection Movement Assist (IMA) and Left Turn Assist (LTA). These applications have the unique ability to address intersection crashes, which are among the most deadly crashes that drivers currently face in the U.S."[78] Advocates filed comments in support of requiring V2V because of the technology's ability to help prevent serious crashes.[79] However, despite the identified safety benefits of V2V technology, this rule is languishing at DOT.

Autonomous and Connected Trucks

The emergence of experimental autonomous commercial motor vehicles (ACMVs) and their interactions with conventional motor vehicles demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs be regulated. For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid commercial driver's license in the vehicle at all times. In addition, critical safety regulations administered by the Federal Motor Carrier Safety Administration (FMCSA) such as those that apply to driver hours-of-service, licensing requirements, entry level training and medical

qualifications must not be weakened. Advocates outlined safety concerns and recommendations for ACMVs in a September 12, 2017 letter to the Committee, which is attached.

Advocates is also concerned with a number of issues presented by truck platooning. In order to achieve any efficiency benefits, the trucks in a platoon must operate much closer together than is current practice. This presents very real safety concerns. Issues such as vehicle maintenance may hamper the ability to execute these types of operations outside of controlled experiments. In real-world scenarios, realities of brake and tire maintenance as well as vehicle loading can all affect handling capability. Currently, one in five heavy vehicles inspected at the roadside are placed out of service for vehicle issues, a large number of which are related to brakes or tires.[80] Moreover, until the first vehicle in a platoon is operated by a verifiably safe automated driving system, the safety of the platoon relies on the lead human driver. There are also questions concerning the interaction of platoons with other road users, including the ability of other vehicles to pass a platoon safely or navigate between them if need be in order to reach an exit or enter a road safely.

Rural Considerations

There are many unique transportation characteristics present in rural America that will affect the performance of, and access to, emerging technologies. Necessary infrastructure such as broadband connectivity and up-to-date mapping may be limited. Maintenance of roadway markings, signs and pavement may vary. Unpaved roads in rural areas could increase sensor fouling which could degrade or prevent safe operation. More consideration must be given to this complex issue before AVs can be deployed on a large scale.

Conclusion

Every day on average 100 people are killed and 6,500 more are injured in motor vehicle crashes in the U.S. Advocates has consistently promoted technology to reduce this unacceptable death and injury toll. So too, does Advocates proffer that automated technology has the potential to make significant and lasting reductions to this public health epidemic. However, AVs should not be prematurely deployed and sold before they can be safely operated on public roads and without commonsense government oversight in place. Serious and fatal crashes involving AVs which have already occurred reveal significant flaws in this still developing technology. In sum, the path to the safe and effective introduction of AVs requires government oversight, transparency and a comprehensive regulatory framework in all aspects from vehicle standards to infrastructure design.

---

[1] The Economic and Societal Impact of Motor Vehicle Crashes, 2010 (Revised), HS 812 013, U.S. DOT, NHTSA (May 2015 (Revised)), available at http://www-nrd.nhtsa.dot.gov/Pubs/812013.pdf. (NHTSA Cost of Motor Vehicle Crashes Report).

[2] Traffic Safety Facts Research Note, 2016 Fatal Motor Vehicle Crashes: Overview, NHTSA, Oct. 2017, DOT HS 812 456.

[3] National Center for Statistics and Analysis, 2015 Motor Vehicle Crashes: Overview, Report No. DOT HS 812 318, NHTSA (Aug. 2016).

[4] Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012, DOT HS 812 069 (NHTSA, 2015); See also, NHTSA AV Policy, Executive Summary, p. 5 endnote 1.

[5] Pub. L. 102-240 (Dec. 18, 1991).

[6] National Center for Statistics and Analysis, Lives Saved in 2015 by Restraint Use and Minimum-Drinking-Age Laws, NHTSA, Report No. DOT HS 812 319 (Aug. 2016); National Center for Statistics and Analysis (2017, October). Lives saved in 2016 by Restraint Use and Minimum-Drinking-Age Laws (Traffic Safety Facts Crash Stats) Report No. DOT HS 812 454, Washington, DC: NHTSA.

[7] Traffic Safety Facts 2015, Lives Saved by Restraint Use, and Additional Lives that Would Have been Saved at 100 Percent Seat Belt and Motorcycle Helmet Use, 1975-2015, DOT HS 812 384, NHTSA (2017); National Center for Statistics and Analysis (2017, October). Lives saved in 2016 by Restraint Use and Minimum-Drinking-Age Laws (Traffic Safety Facts Crash Stats) Report No. DOT HS 812 454, Washington, DC: NHTSA.

[8] Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Pub. L. 106-414 (Nov. 1, 2000).
[9] Anton's Law, Pub. L. 107-318 (Dec. 4, 2002).
[10] Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59 (Aug. 10, 2005).
[11] *Id.*
[12] Cameron Gulbransen Kids Transportation Safety Act of 2007, Pub. L. 110-189 (Feb. 28, 2008).
[13] *Id.*
[14] Moving Ahead for Progress in the 21st Century (MAP-21) Act, Pub. L. 112-141 (Jan. 3, 2012).
[15] *Id.*
[16] 80 FR 62487 (Oct. 16, 2015).
[17] IIHS, Real-world benefits of crash avoidance technologies Fact Sheet (May 2018).
[18] CBS News, Bill Ford on self-driving cars, his company's future and the cost of Trump's tariffs (Jun. 20, 2018).
[19] David Welch and Gabrielle Coppola, Don't Worry, Petrolheads. Driverless Cars Are Still Years Away, Bloomberg News (Jan. 8, 2018).
[20] Craig Duff, Nissan says autonomous cars still have a long way to go, news.com.au (Feb 15, 2018).
[21] IIHS, Status Report, Reality Check: Research, deadly crashes show need for caution on road to full autonomy (Aug. 7, 2018).
[22] *Id.* at pg. 4.
[23] Advocates for Highway and Auto Safety, Public Opinion Polls Show Deep Skepticism About Autonomous Vehicles (June 2018).
[24] United States Department of Transportation, NHTSA, Docket No. NHTSA-2015-0055, Coordinated Remedy Program Proceeding; NHTSA, safercar.gov, Vehicle Owners, Consumer Alert: GM Ignition Switch Recall Information; *U.S. v. Volkswagen*, Case. No. 16-CR-20394 (E.D. Mich.).
[25] ORC International, CARAVAN Public Opinion Poll, July 2018
[26] American Automobile Association (AAA), Driverless Cars Are a Tough Sell to Americans, May 2018.
[27] Reuters and Ipsos, Reuters and Ipsos Poll poll of 2,592 participants conducted between Jan. 11-18, 2018, January 2018.
[28] Consumer Watchdog, As Americans Hit the Road for Memorial Day, Consumer Watchdog Poll Finds Voters Want Congress to Apply the Brakes on Driverless Cars, May 2018.
[29] National Transportation Safety Board, *Collision Between a Car Operating With Automated Vehicle Control Systems and a Tractor-Semitrailer Truck Near Williston, Florida*, Report No.: NTSB/HAR-17/02 (Sep. 12, 2017) (NTSB Tesla Crash Report).
[30] Peter Valdes-Dapena, Tesla in Autopilot mode crashes into fire truck, CNN Tech, (Jan. 24, 2018).
[31] *Id.*
[32] Everett Rosenfield, Tempe police release video of deadly Uber accident, CNBC (Mar. 21, 2018).
[33] David Shephardson, U.S. opens probe into fatal Tesla crash, fire in California, Reuters (Mar. 27, 2018).
[34] National Transportation Safety Board, Preliminary Highway Report, HWY18FH011, Jun. 7, 2018.
[35] *Id.*
[36] Brittny Mejia, Tesla in Autopilot mode crashes into parked Laguna Beach police cruiser, L.A. Times (May 29, 2018).
[37] Tatiana Sanchez and Annie Sciacca, Tesla crashes into San Jose fire truck on Highway 101, The Mercury News (August 27, 2018)
[38] National Center for Statistics and Analysis. (2017, October). 2016 Fatal Motor Vehicle Crashes: Overview. (Traffic Safety Facts Research Note. Report No. DOT HS 812 456). Washington, DC: NHTSA.
[39] Carzon, B., Uber's Self-Driving Cars Hit 2 Million Miles As Program Regains Momentum, Frobes, (Dec. 22, 2017).
[40] National Center for Statistics and Analysis. (2017, October). 2016 Fatal Motor Vehicle Crashes: Overview. (Traffic Safety Facts Research Note. Report No. DOT HS 812 456). Washington, DC: NHTSA.
[41] NHTSA Office of Defects Investigation, ODI Resume: Investigation PE 16-007.
[42] NHTSA Office of Defects Investigation, ODI Resume: Investigation PE 16-007.
[43] Tesla, An Update on Last Week's Accident, Mar. 30, 2018.
[44] Reuters, 'Effectiveness' of Tesla self-driving system was not assessed in probe: US traffic safety agency, May 2, 2018.
[45] Levin, A., Beene, R., Tesla Was Kicked Off Fatal Crash Probe by NTSB, April 12, 2018.

[46] David Strickland, We Can't Afford to Put Up Any More Roadblocks on Self-Driving, Morning Consult (Dec. 1, 2017).
[47] *Id.*; Kalra, N., Groves, D., The Enemy of the Good: Estimating the Cost of Waiting for Nearly Perfect Automated Vehicles, RAND Corp., 2017.
[48] *Id.*
[49] Vehicle Backover Avoidance Technology Study, Report to Congress, NHTSA (Nov. 2006).
[50] Insurance Institute for Highway Safety (IIHS), Rearview cameras reduce police-reported backing crashes, Status Report, Vol. 51, No. 9 (Nov. 17, 2016).
[51] Webb, C. N. (2017, March). Estimating Lives Saved by Electronic Stability Control, 2011–2015. (Traffic Safety Facts Research Note. Report No. DOT HS 812 391). Washington, DC: NHTSA.
[52] U.S. Bureau of Transportation Statistics, Annual Passengers on All U.S. Schedules Airline Flights (Domestic & International) and Foreign Airline Flights to and from the United States, 2003-2017.
[53] Gardner, L., Southwest passenger dies in first U.S. airline fatality since 2009, April, 17, 2018, Politico.
[54] Federal Aviation Administration, Office of the Inspector General, Audit Report: Enhanced FAA Oversight Could Reduce Hazards Associated with Increased Use of Flight Deck Automation, Report Number AV-2016-013, Jan. 7, 2016.
[55] National Center for Statistics and Analysis. (2017). A Compilation of Motor Vehicle Crash Data from the Fatality Analysis Reporting System and the General Estimates System.(Traffic Safety Facts 2015. Report No. DOT HS 812 384). Washington, DC: NHTSA. National Center for Statistics and Analysis. (2017, October). 2016 Fatal Motor Vehicle Crashes: Overview. (Traffic Safety Facts Research Note. Report No. DOT HS 812 456). Washington, DC: National Highway Traffic Safety Administration. National Center for Statistics and Analysis. (2018, May). Early estimate of motor vehicle traffic fatalities for 2017 (Crash•Stats Brief Statistical Summary. Report No. DOT HS 812 542). Washington, DC: NHTSA.
[56] Pub. L. 89-563 (Sept. 9, 1966).
[57] Title 49, U.S.C. Sec. 30102.
[58] NHTSA, Automated Driving Systems 2.0: A Vision for Safety (Sep. 12, 2017).
[59] Pub. L. 112-141 (Dec. 4, 2015), codified at 49 USC § 30112(b)(10).
[60] Exempt vehicles under this provision may not be sold or resold to the public.
[61] For example, removing the steering wheel should not eliminate the requirement to protect the occupant from injury using safety systems such as airbags.
[62] Waymo, *Waymo Safety Report: On the Road to Fully Self-Driving* (Oct. 2017); General Motors, *2018 Self-Driving Safety Report* (Jan. 2018); Ford, *A Matter of Trust – Ford's Approach to Developing Self-Driving Vehicles* (Aug. 2018).
[63] Stacy Cowley, Equifax Breach Exposed Data From 2.5 Million More People Than First Disclosed, N.Y. Times, Oct. 3, 2017 at B2.
[64] Chester Dawson, The Dangers of the Hackable Car, Wall St. J, Sep. 17, 2017.
[65] Human Factors, Koppa, R.J., FHWA, Ch.3, Sec. 3.2.1 Perception-Response Time.
[66] NTSB Tesla Crash Report.
[67] *Id.*
[68] *Id.*
[69] General Motors, LLC, Receipt of Petition for Decision of Inconsequential Noncompliance, NHTSA, 79 FR 10226, Feb. 24, 2014.
[70] 14 CFR 25.1309.
[71] *Id.*
[72] *Id.*
[73] National Transportation Statistics 2015, U.S. DOT, RITA, BTS, Tables 2-1, and 2-2 (2017).
[74] Budget Highlights Fiscal Year 2018, U.S. DOT.
[75] Evtimov, Ivan & Eykholt, Kevin & Fernandes, Earlence & Kohno, Tadayoshi & Li, Bo & Prakash, Atul & Rahmati, Amir & Song, Dawn. (2017). Robust Physical-World Attacks on Machine Learning Models.
[76] Self-Driving Coalition For Safe Streets, FAQs.
[77] Bliss, L., Even Shared Autonomous Vehicles Could Spell Traffic Disaster, Citylab, May 10, 2017.
[78] NHTSA, Federal Motor Vehicle Safety Standards; V2V Communications, Notice of Proposed Rulemaking (NPRM), Jan. 12, 2017, 82 FR 3854.
[79] Advocates for Highway and Auto Safety, Comments, NHTSA-2016-0126-0473, May 19, 2017.
[80] FMCSA, Roadside Inspection Out of Service Rates (Jul. 27, 2018).

ADVOCATES
FOR HIGHWAY
& AUTO SAFETY

September 12, 2017

The Honorable John Thune, Chairman
The Honorable Bill Nelson, Ranking Member
Senate Committee on Commerce, Science, and Transportation
Washington, DC 20510

Dear Chairman Thune and Ranking Member Nelson:

Thank you for convening tomorrow's important hearing, "Transportation Innovation: Automated Trucks and our Nation's Highways." We are pleased that the Committee is considering the role of autonomous commercial motor vehicles (ACMVs) and urge you to adopt a strong regulatory framework for their development and deployment. We respectfully request that this letter be included in the hearing record.

Advocates for Highway and Auto Safety (Advocates) supports the development of automated vehicle technology because it has the potential to significantly reduce crashes, including those involving large trucks and buses. Advancing proven technological solutions is especially critical given that truck crashes have skyrocketed in recent years. In 2015, 4,067 people were killed in crashes involving large trucks. This is an increase of more than 4 percent from the previous year and a 20 percent increase from 2009. Additionally, in 2015, 116,000 people were injured in crashes involving large trucks. This is the highest number of injuries since 2004. Since 2009 there has been a 57 percent increase in the number of people injured in large truck crashes. Moreover, in fatal two-vehicle crashes between a large truck and a passenger motor vehicle, 97 percent of the fatalities were occupants of the passenger vehicle. It is clear that this is a serious and growing public health problem that merits urgent attention.

While Advocates sees great potential for fully autonomous vehicles, including CMVs, to be the catalyst for meaningful and lasting reductions in deaths and injuries, in the interim there are many effective technologies that could be implemented immediately. In 2015, Advocates filed a petition with the National Highway Traffic Safety Administration (NHTSA) seeking the issuance of a rule to require forward collision avoidance and mitigation braking systems (F-CAM), also known as automatic emergency braking (AEB), on trucks and buses with a gross vehicle weight rating (GVWR) of 10,000 pounds or more. The agency granted the petition in October of that year but, nearly two years later, no further regulatory action has been taken despite studies showing the potential to significantly reduce crashes, deaths and injuries. The agency should be required to expeditiously issue this rule.

Additionally, Advocates has consistently supported the use of speed limiting devices for CMVs because high speed crashes involving CMVs are far more deadly than those that occur at lower speeds. As such, Advocates filed comments with the Federal Motor Carrier Safety Administration (FMCSA) and NHTSA urging that the devices, already installed on most CMVs, be turned on and set at a safe speed. These technologies are readily available and could be saving lives now if they were standard on every truck. Again, this is another truck safety rule that is needlessly languishing at the DOT. Both AEB and speed limiter technologies are already required as mandatory equipment on commercial vehicles in Europe. In fact, speed limiting technology has been required in the European Union for over two decades and AEB since 2012. The European Union is far ahead in providing a safer operating environment for CMVs, while the U.S. lags behind as deaths in truck-involved crashes skyrocket.

The emergence of experimental ACMVs and their interactions for the foreseeable future with conventional motor vehicles demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs be regulated. If not, the development and deployment of ACMVs will be subject to the ineffective and unenforceable voluntary guidelines developed by NHTSA for new vehicles. Moreover, the FMCSA has not even issued voluntary guidelines for the operating rules to govern the safety of ACMVs once on the road. The lack of proper oversight clearly will have a negative impact on public safety. Some experts predict that automated technology will be placed in commercial vehicles before light passenger vehicles. The potential for an 80,000 pound truck using unregulated and inadequately tested technology on public roads is a very real and dangerous scenario if these vehicles are only subject to voluntary guidelines. In addition, automated passenger carrying commercial motor vehicles that have the potential to carry as many as 53 passengers will need additional comprehensive safeguards that will be unique to this mode of travel.

In order to minimize major threats to the public and ensure that ACMVs are developed and deployed safely, they must be subject to the following essential provisions:

- Each manufacturer of an ACMV must be required to submit a detailed safety assessment report that details the safety performance of automated driving systems and automated vehicles. Manufacturers should be required to promptly report to NHTSA all fatal, injury and property damage only crashes involving ACMVs.

- ACMVs that do not comply with Federal Motor Vehicle Safety Standards (FMVSS) should not be sold and they should not be subject to exemptions. Sales of CMVs in the United States do not nearly equal passenger vehicle sales and therefore exempting large numbers of CMVs from FMVSS is unnecessary for the development of ACMVs and will result in a potentially significant and unnecessary threat to public safety.

- NHTSA must require that manufacturers of ACMVs meet a "functional safety standard" to guarantee the safety of ACMVs. This is a well-known process by which a product is tested to ensure that, as a whole, it will function safely and will prevent or mitigate defects or misuse which could lead to unsafe conditions.

- Any safety defect involving the ACMV must be remedied before the ACMV is permitted to return to operation. The potential for defects to infect an entire fleet is heightened with AV technology. Therefore, manufacturers should be required to promptly determine if a defect affects an entire fleet. Those defects that are fleet-wide should result in an immediate suspension of operation of the entire fleet until the defect is remedied.

- ACMVs must be required to meet a minimum cybersecurity standard that should be issued by the Secretary within 3 years of enactment of the legislation.

- The Secretary should be required to establish a database for ACMVs that includes such information as the vehicle's identification number; manufacturer, make, model and trim information; the level of automation of each automated driving system with which the vehicle is equipped; the operational design domain of each automated driving system with which the vehicle is equipped; and the federal motor vehicle safety standard or standards, if any, from which the vehicle has been exempted.

- In the near term, rulemakings should be considered for elements of ACMVs that may require performance standards including human machine interface, sensors and actuators and the need for software and cybersecurity standards. Standards for ACMVs should be required to be issued by specific deadlines set by Congress and before there is large scale deployment.

- Manufacturers of ACMVs should be required to have in place a privacy plan before an ACMV is sold.

- For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid commercial driver's license in the vehicle at all times. Drivers will need to be alert to monitor not only the standard operations of the truck but also the automated system. Therefore, the Secretary must issue a standard for driver engagement. In addition, critical safety regulations administered by FMCSA such as those that apply to driver hours-of-service, licensing requirements, entry level training and medical qualifications must not be weakened.

- Motor carriers using ACMVs should be required to apply for additional operating authority.

- Drivers operating an ACMV must have an additional endorsement on their CDL to ensure they have been properly trained to monitor and understand the operating design domain of the vehicle and, if need be, to operate an ACMV. This training should include a minimum number of hours of the behind-the-wheel training.

- FMCSA must consider the additional measures that will be needed to ensure that ACMVs respond to state and local law enforcement authorities and requirements, and what measures must be taken to properly evaluate an ACMV during roadside inspections. In particular, the safety impacts on passenger vehicle traffic of several large ACMVs platooning on roads and highways should be assessed.

- NHTSA should be given imminent hazard authority to protect against potentially widespread catastrophic defects with ACMVs, and criminal penalties to ensure manufacturers do not willfully and knowingly put defective ACMVs into the marketplace.

- NHTSA and FMCSA must be given additional resources, funding and personnel, in order to meet demands being placed on the agency due to the advent of AV technology.

Without these necessary safety protections, truck drivers and those with whom they share the road are at risk. Advocates has always been a champion for technology and the advent of AV technology is no different. However, allowing technology to be deployed without adequate testing, oversight, and safety standards is a direct threat to the motoring public which is exacerbated by the sheer size and weights of large commercial motor vehicles. We look forward to working with the Committee to address these important issues and advance legislation that provides for the safe development and deployment of lifesaving technologies.

Sincerely,

Jacqueline Gillan
President

Catherine Chase
Vice President of Governmental Affairs