May 4, 2018

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

Re: Docket Number PHMSA 2018-0001, Regulatory Challenges to Safely Transporting Hazardous Materials by Surface Modes in an Automated Vehicle Environment

Dear Docket Officer:

We appreciate the leadership of the Pipeline and Hazardous Materials Safety Administration (PHMSA) to engage in the conversation regarding the future of vehicle automation integration as it relates to the transport of hazardous materials (hazmat). Thank you for allowing the National Safety Council (NSC) the opportunity to provide comments on this important issue.

The National Safety Council is a 100-year-old nonprofit committed to eliminating preventable deaths in our lifetime by focusing on injuries in workplaces, in homes and communities, and on the road. Our 14,000 member companies represent employees at more than 50,000 U.S. worksites. We also educate more than 1 million drivers each year in defensive driving.

NSC believes advanced vehicle technology, up to and including fully automated vehicles, can reduce roadway fatalities and injuries, improve mobility for underserved populations and provide additional benefits to society. NSC is also one of the leaders of the Road to Zero coalition. Advanced driver-assistance systems (ADAS) and Automated Driving Systems (ADS) are a large part of the Road to Zero vision to eliminate roadway fatalities by 2050. We are particularly supportive of policy efforts that encourage the inclusion and adoption of higher levels of vehicle automation as we believe these technologies will be vital to improving safety on our nation's roads. We appreciate PHMSA's commitment to looking further down the road as the design of future vehicles may go so far as to lack controls for a human driver and how the safe transportation of hazardous waste could be integrated into a fully automated system.

For the first time U.S. history, unintentional injuries have recently become the third leading cause of death for Americans.[1] Motor vehicle crashes remain the leading cause of unintentional death for the 5 to 9 and 15 to 24 age groups and a leading killer in all age groups.[2] Driver behavior is the biggest single contributor to motor vehicle crashes and has proven to be the hardest problem to solve. If we are to eliminate preventable deaths in our lifetime, we must

[1] http://www.nsc.org/Connect/NSCNewsReleases/Lists/Posts/Post.aspx?ID=263
[2] injuryfacts.nsc.org

realize massive, near-term gains in roadway safety. NSC believes that as more crash prevention safety systems are introduced into the fleet, more lives will be saved.

For hazardous materials transport, there are extra layers of driver review that currently occur. These reviews help ensure the safest drivers are behind the wheel of trucks transporting these dangerous materials. As a result, incident rates involving commercial motor vehicles (CMVs) carrying hazmat is lower than personal vehicles.

As we transition to more automated driving features on the roadway, education will be key for all roadway operators to ensure safe transport. For hazmat drivers, they must learn how these new technologies will engage in vehicles around them, and for other vehicles, they should learn about how to operate safely around hazardous material vehicles. Also, vehicle manufacturers should incorporate knowledge about hazardous materials transport in to personal vehicle knowledge and learning features.

NSC supports the current robust review of hazmat drivers, and this safety record should allow for continued operation of hazardous materials trucks by human drivers with some level 2 safety features to assist in emergencies. These features include automatic emergency braking, blind spot monitoring and lane departure warning.

Education and Training

Initial development and deployment of vehicles with partial automation (levels 1 and 2) through the U.S. fleet provides the driving public, as well as government, original equipment manufacturers (OEMs) and all interested parties, a real world opportunity to experience first-hand how technology can provide an added margin of safety on the road. However, the manner in which drivers are introduced to these systems affects the rate of acceptance and adoption. Media and other interested parties may portray today's technology incorrectly and in a way that is confusing to the public with regard to the capabilities of particular systems. For the near term, drivers will need to remain in control of their vehicles for more practical reasons.

Prior to ADS levels 3, 4 and 5 operating in a widespread manner on the public roadway system, we can look to the national experience introducing the public to level 2 systems. Notably, we find confusion about capabilities, domains and a general lack of knowledge. It will be important to ensure consumer understanding as level 2 and level 3 will require drivers to take over the system anytime an operational boundary is breached and level 4 systems will not be able to operate in all Operational Design Domains. Communicating the appropriate operation of these systems may prove difficult without consistent education. Marketing is not education. With greater system complexity, we need greater knowledge and understanding of the system. We strongly recommend a robust and widely-accessible consumer education and training effort as we introduce level 2, 3 and 4 vehicles into the fleet, especially before ADS transport hazardous materials.

NSC agrees with DOT that many people operating on and around the roadways do not fully understand new automotive technologies. As we have seen already, this lack of understanding can be deadly, and it is our belief that education is required to speed adoption and proper use of these features. It is also our belief that education will need to continue through the life of the vehicle, as software and hardware updates modify the operational parameters for vehicle systems. As you may know, NSC created the nation's premier research-based vehicle automation education program – *MyCarDoesWhat*.

The need for education and training arises from a lack of knowledge or confusion because:

- Many of today's drivers did not learn to drive on vehicles equipped with ADAS features (automation levels 1, 2 or 3), and thus have no background in how to interface with or properly operate them.
- ADAS safety features have different generic names and brand names that vary among manufacturers. These names may contain phrases that give the impression that systems have more capabilities than they truly do, potentially resulting in driver over-reliance. PHMSA should work with NHTSA to consider standardizing generic nomenclature and/or taxonomy. For instance, depending on the manufacturers, Automatic Emergency Braking is also referred to as forward collision mitigation, front crash protection, or automatic braking, among others.
- Warning or icon standardization issues persist resulting in confusion for the driver.
- Not all systems clearly indicate if safety features have been disabled.
- Safety features have different operational parameters and limitations across manufacturers, and potentially even within the same manufacturer's varying models or trim levels.
- Safety features may change over time – as software is updated, for example – and drivers need to be properly educated on how these changes affect the operation of their vehicle.
- Safety feature operational parameters and limitations may not be intuitive or obvious, particularly if drivers use different vehicles.
- Operational Design Domain or Object Detection and Response Characteristics are not explicitly and succinctly communicated to the driver, so they can be aware of limitations, shortcomings or differences in systems.

We appreciate the difficult task of ensuring a safe roadway system as we move into the future. For the foreseeable future, tens of millions of vehicles will be sold to the American public that are not levels 3, 4 or 5. Public experience with and introduction to higher levels of vehicle automation will directly impact the rate of adoption of these technologies and how rapidly the vehicle fleet turns over to more advanced levels of automation. A strong federal presence in preserving safety protections will go a long way to help speed adoption.

Dedicated Short Range Communication (DSRC)

Additionally, NSC supports ongoing development of V2V and V2I technologies. The National Highway Traffic Safety Administration (NHTSA) estimates that just two potential V2V applications (intersection movement assist and left turn assist) could prevent up to 50% of crashes, injuries and fatalities– and this is only a glimpse into the life-saving potential of this new technology.[3] The additions of interoperable aftermarket devices and future vehicle-to-infrastructure (V2I) devices may greatly enhance the lifesaving potential of this technology as well as achieve greater efficiency in roadway operations by managing traffic around acute events such as crashes, power outages affecting traffic control devices and infrastructure affected by severe weather.

Unlike ADAS sensors on vehicles, such as radar, Lidar and cameras, DSRC has the safety benefit of allowing the vehicle and the driver to discover potential hazards through and around vehicles, buildings and other objects. This capability potentially provides another level of awareness and introduces an important level of redundancy. V2V and eventually V2I enables a "safe system" environment on our roadways which we have not experienced before, and it is a technology that consumers may add as an aftermarket safety device. It could be especially important for hazardous material transport to offer a redundant safety system.

We will experience the biggest gains from V2V/V2I and similar technologies as more vehicles include them. The absence of a standard in this area has slowed deployment and resulted in fatalities that could have been prevented. Over half of state Departments of Transportation are already incorporating the technology in infrastructure, and it is imperative that the federal government take a leadership role in establishing appropriate standards for vehicle and infrastructure that has national and international implications.[4] NSC believes the rulemaking to require this technology in vehicles should move forward immediately and encourages PHMSA to work with their DOT colleagues.

Artificial Intelligence (AI) and Cyber Requirements

PHMSA should consider cyber and data protections for the electronic infrastructure in a vehicle and maintained externally in the cloud. As vehicles become more dependent on artificial intelligence for safety and critical operational elements, including over-the-air updates to operating systems, such protections should be required and enhanced.

> **AI:** As vehicle manufacturers and suppliers start deploying artificial intelligence in ADS, critical software assumptions, validation techniques and verification procedures should

[3] https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/v2v_fact_sheet_101414_v2a.pdf
[4] https://news.transportation.org/Documents/spectrum%20letter.pdf

be made explicit to ensure safety and help the public understand and thus begin to trust AI deployments.

Cybersecurity: PHMSA should work with NHSTA and Federal Railroad Administration to require that each vehicle manufacturer, train manufacturer and software supplier have a coordinated hacking/electronic infrastructure recovery plan in place to mitigate damage to individual, fleet-wide, and system-wide breaches.

Recall and update compliance: U.S. compliance with recalls is woefully low; in 2017 there were approximately 53 million open recalls equating to 1 in 4 vehicles on the road, and this impacts all road users. NHTSA should consider how to address vehicles that do not comply with latest patches and/or software and hardware updates. If safety critical updates are not installed, NHTSA should allow a manufacturer to take actions up to and including automatically shutting down the technology or vehicle until the update is complete.

Latency minimum requirements: Vehicle sensor fusion tasks and communication with the cloud has to occur with minimum latency to ensure that ADS vehicles have the information they need at the right time to make the right decision(s). Additionally, some systems contemplated may require remote human or AI monitors. The effective control parameters in such a deployment need to be defined. PHMSA should evaluate minimum requirements with significant input from manufacturers and the industry, to enable onboard and remote ADS to make the best decisions at the right time.

Data Recording, Sharing and Privacy

NSC is very bullish on vehicle automation, and eventually fully automated vehicles, because we know when implemented safely and properly, they will help us realize huge gains in reducing roadway fatalities. If we are to realize the life-saving benefits, at minimum we must ensure that we have reliable event data recorders that produce downloadable data in a standardized format for investigators, law enforcement, state highway safety offices, insurers and other relevant stakeholders. Following a crash, we must be able to answer simple questions like whether the vehicle systems or the human driver had control of the car, if and how the vehicle was communicating with the driver or remote operators, and if all systems were working as designed. This is not only important for the vehicles involved in a crash, but it allows learning for all vehicles, including hazardous material transports, operating on our roadways.

Understanding the circumstances and causes surrounding malfunctions, including at lower levels of automation, will help make this technology safer, and ensure failures are less likely to occur as technology evolves. This will be especially important in assuring consumers of the reliability of ADAS and ADS systems. NSC believes that minimum parameters should be set for

data preservation, standardization of formats, ease of access for post-crash evaluation, and privacy protections early in the process. Reliable data-sharing programs require greater maturity and a strong safety culture committed to continuous improvement.

There is a strong public health argument for collecting data from electronic devices in the event of a crash. Acquiring an understanding of what happens when systems perform as intended, fail as expected, or fail in unexpected ways will yield valuable information for manufacturers–some of whom have common suppliers. Further, in-service data, as well as near miss and post-crash information sharing, can help engineers and planners design better and safer roadways, as well as help safety and health professionals design better interventions to discourage risky driving or affect the behaviors of other roadway users.

Vehicle manufacturers should use event data recorders (EDRs) to gain a better understanding of how human operators engage with advanced technology. And, more sophisticated EDRs connected to the cameras and other technology can better record and allow for greater understanding of how ADS vehicles react in the real world. This knowledge will allow manufacturers to be nimbler and make adjustments in near real-time for technology and systems based on what is actually occurring in the driver's seat, rather than making changes based on assumptions and estimations that must be accommodated in a later model year. Collecting and sharing de-identified data about near misses and other relevant problems could also help by aggregating useful information for the automotive industry, allowing them to take proactive steps based on leading indicators rather than waiting for a crash or a series of crashes to occur. Finally, this data would be useful to researchers and the safety community in analyzing the safety benefits–and potential drawbacks–of these technologies as they continue to mature.

While there are competing priorities regarding protecting personal privacy and proprietary systems or designs, NSC believes that safety should be the ultimate priority, and that other concerns need to be accommodated to prioritize safety. NHTSA, FMCSA and PHMSA should facilitate data sharing as widely as possible and require that manufacturers provide accessible, standardized data to law enforcement, state highway safety offices, investigators, insurers, and/or other relevant stakeholders.

Just as the National Safety Council educated the driving public about the benefits of seat belts and airbags 20 years ago, NSC stands ready to work with PHMSA, as well as vehicle manufacturers, hazardous materials transporters, suppliers and technology developers, vehicle dealers, regulators, state government officials, law enforcement, first responders, driver training educators, and highway safety advocates to develop education and training materials and platforms that will address the requirements of integrating hazardous material transport, as well as the potential confusion points noted above.

As stated earlier, NSC believes that fully automated vehicles have the potential to save lives and prevent injuries and ADAS and ADS are an essential component of the Road to Zero vision to eliminate roadway fatalities by 2050.

NSC applauds both PHMSA and DOT for your engagement for the development and potential use of automated technologies for hazardous materials transport and continued efforts to promote safe and appropriate use of increasing levels of driving automation, while at the same time, encouraging innovation and continuous improvement among vehicle makers and suppliers. We support research and development to achieve fully automated vehicles and needed investment in the infrastructure needed to support such a mobility option.

Thank you for your leadership role into how to safely integrate these vehicles in our fleet, and I appreciate your ongoing consideration of NSC input.

Sincerely,

Deborah A.P. Hersman
President & CEO