A Report to Congress and the
National Transportation Safety Board

The U.S. Department of Transportation's Status of Actions Addressing the Safety Issue Areas on the NTSB's Most Wanted List

2017 Annual Report

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Executive Summary

The U.S. Department of Transportation's (DOT or Department) highest priority is safety within all modes of transportation. The Department is committed to the continued improvement of our safety mission across DOT.

Since 1990 the National Transportation Safety Board (NTSB) has annually published the "Most Wanted List," which is a list of safety recommendations intended to provide a substantial benefit to the traveling public. In November 2016, NTSB announced it will publish the NTSB Most Wanted List every two years, with an update on the status of safety recommendations every year. This reporting period allows the transportation industry, safety advocates, regulatory agencies, and individuals time to develop solutions and promote increased collaboration between DOT and NTSB. Pursuant to section 1135(e) (1) of Title 49, *United States Code*, and the Department is required to review and report the status of actions responding to the NTSB's annual Most Wanted List report. This report fulfills this requirement.

The following 10 safety issue areas make up the 2017-2018 NTSB Most Wanted List.

1. Increase Implementation of Collision Avoidance Technologies
2. Ensure the Safe Shipment of Hazardous Materials
3. Prevent Loss of Control in Flight in General Aviation
4. Improve Rail Transit Safety Oversight
5. End Alcohol and Other Drug Impairment in Transportation
6. Reduce Fatigue-Related Accidents
7. Require Medical Fitness
8. Eliminate Distractions
9. Strengthen Occupant Protection
10. Expand Use of Recorders to Enhance Safety

Nine of the safety issue areas are the same from the 2016 NTSB Most Wanted List: reduce fatigue-related accidents, improve rail transit safety oversight, increase implementation of collision avoidance technologies, strengthen occupant protections, eliminate distractions, prevent loss of control in flight in general aviation, end alcohol and other drug impairment in transportation, require medical fitness, and expand use of recorders to enhance safety with some slight changes in the wording. The new safety issue area for the 2017-2018 Most Wanted List is ensure safe shipment of hazardous material.

In this report, a summary of the NTSB safety issue area are paraphrased and will appear in *italics*, followed by DOT's response[1]. The DOT Operating Administrations (OA) and the Office of the Secretary of Transportation (OST) provide a description of recent activities related to addressing the safety concerns identified in the Most Wanted List. The OAs contributing to this report and DOT's response are:

- Federal Aviation Administration (FAA);
- Federal Highway Administration (FHWA);
- Federal Motor Carrier Safety Administration (FMCSA);
- Federal Railroad Administration (FRA);

[1] Note that the vessel-related responses to the 2017-2018 Most Wanted List are not included in this report because the U.S. Coast Guard, which is located in the Department of Homeland Security, has regulatory jurisdiction over vessel safety.

- Federal Transit Administration (FTA);
- National Highway Traffic Safety Administration (NHTSA); and
- Pipeline and Hazardous Materials Safety Administration (PHMSA).

1. Increase Implementation of Collision Avoidance Technologies[2]

What is the issue?

Motor vehicle crashes continue to be a leading cause of death and injury in the United States. More than 35,000 people died in traffic crashes in 2015, a 7.2 percent increase in deaths from 2014. The last single year increase of this magnitude was in 1966, when fatalities rose 8.1 percent from the previous year. Vehicles become involved in crashes for numerous reasons, but driver error is the single biggest factor. In 2015, the National Highway Traffic Safety Administration (NHTSA) found that drivers were the primary cause of 94 percent of highway crashes. The cause of driver error can vary from distraction to impairment, but most frequently, it is due to driver inattention.

Driver inattention played a critical role in 11 crashes we investigated between 2012 and 2015. These crashes involved drivers failing to respond in time to obstacles ahead of them, and they resulted in 32 fatalities and 115 injuries. For example, in one crash that occurred on March 3, 2013, in Elizabethtown, Kentucky, a truck-tractor in combination with a semitrailer struck a sport utility vehicle (SUV) after the driver failed to slow down in time. A post-crash fire ensued, killing six of the SUV's eight occupants. Crashes involving sudden roadway departures are also common and frequently preventable. In one such 2014 crash in Red Lion, Delaware, a motorcoach driver failed to negotiate a curve. The bus departed the roadway and overturned, killing three passengers and injuring the driver and 47 others

Train engineers and crews aren't immune to mistakes and can become distracted, fatigued, or commit crucial operator errors. Positive train control (PTC), a collision avoidance technology, prevents mistakes from turning tragic by taking over train operation if the human operator is not responding appropriately. PTC precisely locates a train along the railroad and enforces signal and speed restrictions. PTC is a proven technology that prevents train-to-train collisions, over speed derailments, and unauthorized train movement.

Congress and regulators have issued Federal mandates requiring that railroads install PTC; however, we've already seen delays in implementation. In 2008, after a deadly PTC-preventable head-on collision between a commuter train and a freight train in Chatsworth, California, that killed 25 people and injured more than 100, Congress passed a law requiring PTC implementation by the end of 2015. Many railroads spent billions of dollars implementing PTC, improving the safety of many tracks and trains. However, despite these efforts, it became clear that tens of thousands of track miles and millions of rail passengers would be left unprotected by PTC by the 2015 deadline. As a result, Congress granted the railroads an additional 3 years to implement their PTC systems.

In recent years, NTSB has investigated a long list of railroad crashes—both passenger and freight rail tank car—that would have been prevented by PTC. The NTSB issued reports on the

[2] https://www.ntsb.gov/safety/mwl/Pages/mwl2-2017-18.aspx

May 12, 2015, Amtrak passenger train derailment in Philadelphia, Pennsylvania, that killed 8 and injured 185, and the December 1, 2013 Metro-North passenger train derailment in Bronx, New York, which killed four and injured 61. NTSB called for a system like PTC for more than 45 years, yet it still has not been fully implemented in our commuter, intercity, and freight railroads.

What can be done?

Technology can help drivers avoid crashes, whether they result from driver error or from circumstances outside the driver's control, such as sudden intrusions into the driver's lane (for example, road hazards and other vehicles).

In-vehicle collision avoidance technologies, such as forward collision warning systems (FCWSs) and autonomous emergency braking (AEB), are especially helpful for avoiding or mitigating the impact of rear-end crashes, which represent nearly half of all two-vehicle crashes. Other collision avoidance technologies, such as adaptive cruise control, lane departure warning systems (LDWSs), blind spot detection, and advanced lighting technology can help prevent a crash regardless of the cause. These technologies improve a driver's view of the roadway; alert drivers to impending danger ahead or on the side of the vehicle.

Collision avoidance technologies can reduce fatalities and injuries over the long term. In 2012, NHTSA predicted that AEB (meeting certain requirements) could prevent 13,000 to 28,000 minor injuries and 500 to 700 serious injuries from rear-end crashes, and could save as many as 65 lives each year. The Surface Transportation Extension Act of 2015 requires railroads to install PTC by 2018. This extension should allow many more railroads to comply with the law, but we encourage railroads not to wait for 2018 and to implement PTC as soon as possible. Although the current law allows railroads to apply to the Department of Transportation for new extensions, we urge them not to do so. PTC implementation must not be delayed any further. Safety delayed is safety denied, and every day without these lifesaving advances holds the possibility of another accident like the ones in Philadelphia and Chatsworth.

DOT Response:

The Department is committed to reducing injuries and fatalities due to vehicle crashes on our Nation's roadways. NHTSA has made a historic non regulatory/ voluntary commitment to work with 20 automobile manufacturers to provide Automatic Emergency Braking (AEB) voluntarily in passenger vehicles by 2022. This technology could detect imminent crashes and apply the brakes if the driver doesn't act quickly. AEB provides drivers and occupants a new level of lifesaving safety. FMCSA funded a research project to conduct a retrospective effectiveness study on three commonly deployed On Board Safety Systems (OBSS), using data previously acquired directly from participating motor carriers. The study reviewed the effectiveness of Lane Departure Warning (LDW), Roll Stability Control (RSC), and Forward Collision Warning (FCW) systems.

In cooperation with the Intelligent Transportation Systems Joint Program Office (ITS JPO), NHTSA is accelerating the development of advanced safety technologies such as vehicle-to-vehicle (V2V) communications and autonomous driving. The Secretary acknowledges the developing technology and its benefits to safety. On March 29, 2017, while celebrating DOT's

50th Anniversary, Secretary Chao stated, "Self-driving cars and trucks will talk to each other—vehicle to vehicle communication—and keep a safe distance, reducing the number of highway fatalities. Our infrastructure will be 'smart'—like our phones—so it can talk to and direct all the vehicles around it."

Federal Railroad Administration:

FRA's Positive Train Control (PTC) Implementation Task Force continues to assist railroads to implement PTC systems in accordance with the statutory deadline. This congressionally mandated safety technology will prevent many accidents caused by human error and save lives.

For more than three years, FRA informed Congress and the public that most railroads were not making sufficient progress to meet the December 31, 2015, PTC implementation deadline established by the Rail Safety Improvement Act of 2008 (RSIA), Pub. L. No. 110-432,

Division A, 122 Stat. 4848 (Oct. 16, 2008). FRA highlighted its concerns about the challenges to PTC system implementation in 2012 and 2015 Reports to Congress.

On October 29, 2015, President Obama signed into law the Positive Train Control Enforcement and Implementation Act of 2015 (PTCEI Act) that extended the statutory implementation deadline to at least December 31, 2018. Pub. L. No. 114-73, 129 Stat. 568, 576-82 (Oct. 29, 2015). The PTCEI Act authorizes the Secretary of Transportation and FRA, who has delegated the authority to FRA under 49 C.F.R. §1.89(a), to approve an additional extension up to December 31, 2020, for certain operational, non-hardware aspects of PTC implementation, if a railroad demonstrates, to the satisfaction of FRA, by delegation, that it has completed certain statutory prerequisites.

As mandated by the PTCEI Act, FRA is conducting reviews to ensure each railroad is complying with its revised PTC implementation plan, which the PTCEI Act required each railroad to submit to FRA by January 27, 2016. FRA requires each subject railroad to submit quarterly reports to FRA on its progress toward full PTC system implementation. In August 2016, FRA released a comprehensive report describing each railroad's PTC system implementation status, and FRA periodically publishes status updates on its website.

Thus far, FRA has conditionally certified the Interoperable Electronic Train Management System to be implemented by the Southern California Regional Rail Authority, CSX Transportation, and BNSF Railway and the Advanced Civil Speed Enforcement System to be implemented by the Southeastern Pennsylvania Transportation Authority. FRA is also currently considering PTC system certification requests from five other railroads.

FRA recognizes implementation of PTC systems will result in significant safety improvements. FRA is committed to providing the railroad industry with technical guidance and financial assistance, and to using its oversight and enforcement tools to ensure railroads fully implement this life-saving technology expeditiously and safely. Since 2008, FRA has met regularly with railroads, hired staff to oversee PTC system implementation, and worked with the Federal Communications Commission to resolve issues with spectrum acquisition and availability. FRA will continue to do so until every Class I, intercity passenger, and commuter railroad has implemented PTC fully and successfully.

National Highway Traffic Safety Administration (NHTSA):

In March, 2016, NHTSA and the Insurance Institute for Highway Safety announced a groundbreaking commitment on the part of 20 automobile manufacturers to voluntarily provide Automatic Emergency Braking (AEB) in virtually all passenger vehicles by 2022. AEB has tremendous lifesaving potential because these systems can apply the brakes if the driver doesn't act quickly enough. The historic voluntarily commitment ensures that this lifesaving technology is incorporated into vehicles faster than through traditional regulatory channels, and not just as a high-end luxury option. NHTSA will continue to explore strategies to expand AEB to other vehicle types, such as heavy vehicles and motor coaches.

A critical tool for advancing safety is the New Car Assessment Program (NCAP). Manufacturers respond very quickly to meet the challenges set forth by NCAP. NHTSA is exploring updates to NCAP, which already includes advanced technologies, thus promoting consumer demand for vehicles with these potentially-lifesaving technologies.

These actions are components of an approach that NHTSA refers to as "Proactive Safety." By working collaboratively with manufacturers and suppliers, NHTSA encourages voluntary deployment of lifesaving technologies. More information can be found at https://www.nhtsa.gov/about-nhtsa/proactive-safety-principles. On September 20th, 2016 DOTDOT issued Federal policy for automated vehicles, laying a path for the safe testing and deployment of new auto technologies that have enormous potential for improving safety and mobility for Americans on the road. The policy sets a proactive approach to providing safety assurance and facilitating innovation through four key components: a 15 Point Safety Assessment; a Model State Policy; NHTSA's regulatory tools; and potential new tools needed. More details about the policy may be found at www.transportation.gov/AV.
To create a motor vehicle platform that encourages the development of Lane Departure Warning (LDW), Roll Stability Control (RSC), and Forward Collision Warning (FCW) systems, NHTSA released a vehicle-to-vehicle communications (V2V) NPRM in December 2016. The proposed rule mandates V2V communication on light vehicles, allowing cars to 'talk' to each other to avoid crashes through standardized messaging. DOT analysis indicates that a fully mature V2V system could potentially address:

- An estimated 4,409,000 police-reported or 79 percent of all vehicle target crashes,
- 4,336,000 police-reported or 81 percent of all light-vehicle target crashes, and
- 267,000 police-reported or 81 percent of all heavy-truck target crashes annually[3].

The NPRM comment period ended on April 12, 2017, and NHTSA is reviewing those comments and considering next steps. AEB systems, along with promising innovations such as vehicle-to-vehicle communications (V2V) and automated vehicle technologies hold great promise to save even more lives and prevent even more crashes, building upon the successes of crashworthiness and crash avoidance technologies currently available in vehicles today.

Federal Motor Carrier Safety Administration:

The FMCSA based on the *Beyond Compliance* initiative under the FAST Act § 5222 expects the use of such technology will increase. Through this effort, FMCSA is working with stakeholders to identify advanced safety technology and management practices that provide improved commercial vehicle safety that go beyond the regulatory requirements and how best to give these carriers credit for their efforts.

While FMCSA does not require the use of collision avoidance technologies, the Federal Motor Carrier Safety Regulations (FMCSRs) allow the use of additional equipment and accessories, not inconsistent with or prohibited by the regulations, provided such equipment and accessories do not decrease the safety of operation of the commercial motor vehicles on which they are used 49 CFR 390.17.

The FMCSRs prohibit the obstruction of the driver's field of view by devices mounted at the top of the windshield. Antennas, transponders and similar devices could not be mounted more than 152 mm (6 inches) below the upper edge of the windshield. These devices are required to be located outside the area swept by the windshield wipers and outside the driver's sight lines to the road and highway signs and signals. However, in response to Section 5301 of the FAST Act, "Windshield Technology," FMCSA published a final rule on September 23, 2016, amending 49 CFR 393.60(e) to allow for the voluntary mounting of certain vehicle safety technologies including fleet-related incident management systems, performance or behavior management systems, speed management systems, lane departure warning systems, forward collision warning or mitigation systems, active cruise control systems, and transponders. FMCSA believes that this amendment lead to greater adoption of these safety technologies in CMVs, while also enhancing safety for the general public.

FMCSA funded a research project to conduct a retrospective effectiveness study on three commonly deployed On Board Safety Systems (OBSS) types using data previously acquired directly from participating motor carriers. These OBSS technologies included LDW, RSC, and the FCW systems. The study assessed the effectiveness of these three systems installed on Class 7 and 8 trucks (trucks with a gross vehicle weight rating above 26,000 pounds) as they operated in their normal revenue-producing routes. Crash data acquired from 14 carriers representing small, medium, and large carriers hauling a variety of commodities included a total of 88,112 carrier crash records—DOT reportable crashes as well as minor incidents—and 151,624 truck-years of operation that represented 13 billion miles traveled.

The final report (FMCSA-RRT-12-012, October 2013) concluded that the benefit-cost analyses clearly showed the estimated benefits of LDW and RSC systems deployed at participating fleets outweighed the estimated costs. Focus groups were also conducted with drivers and safety managers who had experience with LDW, RSC, or FCW systems. Drivers' and safety managers' opinions and perceptions of each OBSS type were generally very positive.

Federal Highway Administration:

FHWA has an important role to play in the deployment of crash avoidance technologies that depend upon infrastructure improvements to function. The DOT has awarded funding to the New York City Department of Transportation; Tampa Hillsborough Expressway Authority (THEA); and ICF/Wyoming for the deployment of next-generation connected vehicle technology. The Intelligent Transportation Systems Joint Program Office (ITS JPO), in collaboration with our Modal partners at the DOT has worked with these three sites to develop comprehensive deployment plans and will initiate a design, test, and build phase before running an operational environment. Documentation from these projects are available publicly and used in various training and outreach activities by the ITS JPO. More information can be found at www.its.dot.gov/pilots.

In June of 2016, the DOT granted $40 million to the City of Columbus, Ohio as part of the Department's Smart City Challenge, a competitive grant program to develop ideas for an integrated, first-of-its-kind smart transportation system that will use data, applications, and technology to reimagine how people and goods move throughout cities. Through a Cooperative Agreement, the ITS JPO and DOT will work with the City of Columbus to implement its 'Smart Columbus program.' The DOT will provide technical assistance to support planning, design, implementation, evaluation, and outreach. The Smart City Challenge has garnered global interest, catapulting the United States and DOT into a leadership position in the Internet of Things (IoT) for Smart Cities emerging technology field. This effort will produce a template to inspire duplication throughout the United States and globally.

Federal Transit Administration:

FTA has worked with the ITS JPO office for a number of years in support of demonstration programs on Collision Avoidance Technologies for Transit Buses. The most notable programs include research on Connected Vehicle Technology and the development and evaluation of research pertaining to V2V and Vehicle to Infrastructure technologies. The vision for Transit V2V research is to apply connected vehicle technologies to develop safety, mobility, and environmental applications that address transit needs and priorities while providing interoperability and coexistence with connected-vehicle equipped cars and trucks. FTA recently started a new research program, Safety Research and Demonstration (SRD) program. The FY16 SRD program targets 1) collision avoidance and mitigation; and 2) transit worker safety protection. The program provides financial and technical assistance for transit agencies to pursue cutting-edge technologies and innovative approaches to safety. The funding is intended to assess the practicality and effectiveness of potential solutions to improve safety as well as influence transit industry guidance and standards.

Section 3020 of the Fixing America's Surface Transportation (FAST) Act required the Secretary to conduct a review and evaluation of public transportation safety standards in consultation with the public to determine the efficacy of the standards and the need to establish additional Federal minimum public transportation safety standards. FTA examined multiple sources to develop an inventory of existing voluntary or regulatory safety standards and protocols that are applicable to or used in all public transit modes referenced in the National Transit Database (NTD). FTA also

engaged in a public evaluation of its review of the inventory of standards through a Federal Register (FR) request for comments to ensure the completeness of the inventory, obtain statements related to the efficacy of existing standards, and gain valuable industry observations and insight into areas of risk and standards that could be advanced for rulemaking. In January 2017, FTA issued a report of its findings which is available on FTA's website.[4] The Report presents findings from FTA's review of transit safety standards and protocols, including those related to collision avoidance, protection of transit vehicle occupants, fatigue management, and event recorders. As part of its Public Transportation Safety Standards Development Program, FTA is continuing further research into the need for mandatory, industry-wide standards, including those for collision avoidance.

[4] https://www.transit.dot.gov/research-innovation/review-and-evaluation-public-transportation-safety-standards-fta-report-no-0103.

2. Ensure the Safe Shipment of Hazardous Materials[5]

What is the issue?

Hazardous materials are on the move at an increased rate. These materials are being moved by rail, highway, and air across the country. In order to avoid incidents, crashes, and environmental damage, we must ensure the safe movement of hazardous materials. It is essential to renew focus on proper emergency response training, adequate resource allocation, and notifications to ensure first responders are prepared to handle hazardous materials in the event of a mishap.

The expanded exposure of lithium batteries use poses a threat to the safe operations of aircrafts. Lithium and Lithium-Ion Batteries (LIB) are lightweight and high energy density power sources making them a favorite choice in Portable Electronic Devices (PEDs), power tools, and other consumer products, creating an enormous demand for their shipment. These factors also contribute to making them an appealing choice to power certain aircraft systems. The expanded movement and use of lithium batteries can pose risks to rail and flight safety.

As lithium battery use has grown, the Federal Aviation Administration (FAA) has recorded an increase in related crashes, incidents, and service difficulty reports. The NTSB recognized the need to address the safety of lithium batteries on airplanes, whether they are carried on board by airline crew and passengers and stored inaccessibly or in cargo compartments, or installed as part of the airplane. The October 15, 2016, FAA ban on traveling by air with a Samsung Galaxy Note 7 further illustrates the continued risks of onboard fires posed by such devices. It can be assumed that almost every passenger on a commercial flight is carrying at least one lithium battery.

According to the Association of American Railroads, in 2009, Class 1 railroads shipped about 9,500 tank cars of crude oil. In 2014, that number increased to nearly 500,000. The recent declines in rail shipments of energy products have been incremental pull-backs after an exponential increase. Crude oil is used to make the gasoline or diesel fuel that powers your car and the fuel oil that heats your home.

The ethanol that is blended with your gasoline is predominantly transported by rail, too; in 2013, more than 300,000 tank cars transported ethanol. Producers often ship crude oil and ethanol in mile-long "unit trains" that travel alongside highways, residences, and sensitive environmental areas. These changes to the North American energy landscape have increased the risk that if such a train derails, one or more tank cars might be punctured, release cargo, and, in some cases, result in ignition. When such a derailment involves a crude oil or ethanol unit train, multiple tank cars might spill their contents, fueling large pool fires.

What can be done?

Although lithium battery fires are rare, the enormous number of lithium batteries in transportation demands action. Numerous government and industry organizations are actively striving to improve lithium battery safety. On April 11 and 12, 2013, the NTSB conducted a

[5] http://www.ntsb.gov/safety/mwl/Pages/mwl7-2016.aspx

public forum on lithium battery safety to call attention to this issue. Since then, the FAA, in conjunction with CAST, an integrated, data-driven strategy to reduce the commercial aviation fatality risk in the United States and promote new government and industry safety initiatives, has established a joint government-industry working group that is developing ways to make lithium battery fires less likely in aviation and to reduce the consequences in case they do occur.

In ground transportation, the US Department of Energy and the NHTSA are focused on the safety of batteries installed in ground vehicles and have conducted or contracted extensive research. Research areas include less volatile chemistries, improved failure detection methods, improved internal protection devices, and safer ways to transport lithium batteries.

Rail tank car replacement, improved railroad operating practices, and robust emergency responses can help solve this problem. All have been painstakingly developed but are far from being fully implemented. Preventing tragedies from train derailments of major flammable liquids will require a systems approach that strives to improve methods for addressing track and equipment flaws to keep trains from derailing, especially in sensitive areas, and preserves tank car integrity if a derailment occurs. Adequate emergency preparedness is also crucial.

Regulators, industry, and emergency responders must aggressively work together to improve flammable liquids transportation safety. Using the same tank cars that carry food products to carry flammable liquids endangers the public and the environment.

DOT Response:

The Department recognizes the potential failures of devices and products using lithium technology as a power source. Recent research conducted by such agencies as FAA demonstrates that lithium batteries subjected to certain conditions can experience a failure including thermal runaway, which can result in smoke and fire, and impair the safe operations of aircrafts.

The Department, FAA, and PHMSA, issued an emergency order to ban all Samsung Galaxy Note7 smartphone devices from air transportation in the United States. The order was issued October 14, 2016, was effective October 15, 2016, and was published by the DOT and FAA in the Federal Register on October 19, 2016 [Pub. L. No. 81 FR 71983]. On August 15, 2016, PHMSA published a final rule entitled, "Hazardous Materials: FAST Act Requirements for Flammable Liquids and Rail Tank Cars," which mandates a revised phase-out schedule for all DOT-111 tank cars used to transport Class 3 flammable liquids e.g. petroleum crude oil. The Department does recognize the timeline may not phase-out the tank cars as quickly as requested by NTSB, but it does set a statutorily-required deadline for the removal of such tank cars used for this service.

Pipeline and Hazardous Materials Safety Administration:

Rail Transport of Flammable Liquids

On August 15, 2016, PHMSA published a final rule entitled, "Hazardous Materials: FAST Act Requirements for Flammable Liquids and Rail Tank Cars" in the Federal Register (Pub. L. No. 81 FR 53935), codifying certain mandates and minimum requirements of the FAST Act of 2015 (Pub. L. No. 114-94) and in Sections 7304, 7305, and 7306. The final rule outlines a revised phase-out schedule for all DOT-111 tank cars used to transport Class 3 flammable liquids:

unrefined petroleum products (e.g. petroleum crude oil), ethanol, and other Class 3 flammable liquids. While the phase-out schedule for DOT-111 tank cars may not be as aggressive as the NTSB desires, the FAST Act requires all tank cars in Class 3 service to come into compliance with the new standards no later than May 1, 2029, but eliminates PHMSA's ability to withdraw, change, or revise the timelines for this phase-out. PHMSA will continue to encourage industry to phase out these tank cars well ahead of the scheduled deadlines.

The August 2016 final rule also codifies additional protection measures to prevent releases. In accordance with the FAST Act in Section 7305, the final rule requires that each tank car built to DOT-117 tank car specifications and each non-jacketed tank car retrofitted to DOT-117R must be equipped with a thermal protection blanket that is at least half an inch thick and meets existing thermal protection standards. The final rule also requires minimum provisions for the protection of top fittings on tank cars retrofitted to DOT-117R, as outlined in Section 7306 of the FAST Act.

Beyond the rulemaking, PHMSA is currently collecting data related to tank car retrofitting and replacements. Section 7308 of the FAST Act also directs PHMSA to collect and report on two data sets related to the retrofitting and replacement of tank cars used in the flammable liquid service fleet. The first data set, PHMSA is directed to collect information on the number of tank cars modified to meet the DOT's retrofit standard (49 CFR § 179.202-13 Retrofit standard requirements (DOT-117R)), the number of tank cars built to meet the DOT-117 standard, and the number of tank cars that have not been modified and that will, or are likely to, transport Class 3 flammable liquids. The second data set concerns future industry capacity projections, requiring PHMSA to conduct a survey of rail tank car facilities to determine statistically valid estimates of the number of tank cars those facilities expect to process to meet the DOT-117R or the DOT-117 demand in a given year. PHMSA has entered into an Interagency Agreement with the Office of the Assistant Secretary for Research and Technology's Bureau of Transportation Statistics (BTS) to assist in these two data collections. PHMSA is working with the rail industry and tank car facilities to develop reporting mechanisms to monitor progress on this requirement, and will provide Congress with an annual written report covering both data sets. In particular, the Association of American Railroads (AAR) has agreed to cooperate and is compiling retrospective data. We believe the transparency of this report will help encourage industry to replace tank cars at a rate ahead of scheduled deadlines.

In addition, PHMSA codified a reporting provision in the May 8, 2015, final rule, "Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains" [80 FR 26643]. Specifically, §174.310(a)(5) requires owners of non-jacketed DOT-111 tank cars in PG I service in High-Hazard Flammable Train (HHFT), who were unable to meet the January 1, 2017, retrofit deadline specified in §173.243(a)(1), to submit a report to DOT by March 1, 2017. DOT will consider further actions as appropriate, as we review submissions. PHMSA and FRA have worked together under the scope of the Rail Safety Advisory Committee (RSAC) to address several hazardous materials rail safety issues. RSAC was established by the FRA to develop new regulatory standards through a collaborative process with all segments of the rail community, working together to fashion mutually satisfactory solutions to safety regulatory issues[6]. Specifically, the RSAC Task No. 15-04 (the Hazardous Materials Issues Working Group, launched in November 2015) outlined suggested revisions to the requirements for transport of hazardous materials by rail. Examples of items addressed include hazardous

[6] More about the history of the RSAC is available at: https://rsac.fra.dot.gov/about.php.

material train car separation requirements (buffer cars); requirements for the provision of electronic; real-time train contain information to emergency responders; and updates of material incorporated by reference into the regulations (e.g. the Association of American Railroad's Manual of Standards and Recommended Practices, Section C, Part III: Specifications for Tank Cars (M-1002)). PHMSA expects to close out the working group and will further explore next steps in 2017.

PHMSA has also carried out actions related to oil spill response planning and emergency response preparedness. PHMSA, in coordination with the FRA, published an NPRM entitled, "Hazardous Materials: Oil Spill Response Plans and Information Sharing for High-Hazard Flammable Trains" in the Federal Register [81 FR 50068] on July 29, 2016. The NPRM proposes changes to modernize and expand the applicability of comprehensive oil spill response plans based on thresholds of liquid petroleum oil that apply to an entire train consist. The NPRM addresses issues related to preparedness and planning for potential train crashes involving the release of flammable liquids—namely energy products. The NPRM proposes:

- Requiring comprehensive oil spill response plans for unit trains of petroleum oil;
- Clarifying and adding new requirements for comprehensive oil spill response plans, including approval of plans by the Federal Railroad Administration (FRA);
- Requiring railroads to share information about HHFTs with State and Tribal Emergency Response Commissions (SERCs and TERCs); and
- Providing an alternative test method for determining the initial boiling point of a flammable liquid.

The proposed changes also address the needs identified by first responders in the Crude Oil Rail Emergency Response Lessons Learned Roundtable Report, and outline requirements to address the challenges identified by an analysis of recent spill events.[7] The proposed changes are also consistent with Section 7302 of the FAST Act, which requires DOT to promulgate regulations requiring railroads to provide advanced notification of HHFT shipments to SERCs for the purposes of emergency response planning. PHMSA's NPRM also expands the notification requirement to include the Tribal Emergency Response Committee (TERCs) or other appropriate State-designated agencies. The comment period for the NPRM closed on September 27, 2016. To date, PHMSA has received approximately 130 comments. PHMSA is currently drafting the final rule.

PHMSA published an Advanced Notice of Proposed Rulemaking (ANPRM) entitled, "Hazardous Materials: FAST Act Requirements for Real-Time Train Consist Information by Rail" on January 19, 2017 (Docket Number PHMSA-2016-0015 (HM-263)). This ANPRM requests comments on the requirements in the FAST Act at Section 7302, which requires DOT to promulgate regulations to require Class I railroads transporting hazardous materials to generate accurate, real-time, and electronic train consist information, including the identity, quantity, and location of hazardous materials on board a train, as well as the point of origin and destination of the train; any emergency response information or resources required by the Secretary and an emergency response point of contact designated by the Class I railroad.

[7] http://www.phmsa.dot.gov/hazmat/osd/emergencyresponse.

Federal Aviation Administration:

On October 14, 2016, the DOT, together with the FAA and PHMSA announced an emergency order to ban all Samsung Galaxy Note 7 smartphone devices from air transportation due to safety concerns with the lithium ion battery contained in the devices. The risks and safety concerns of lithium-ion batteries in aircraft are well documented, and not only for Samsung Galaxy Note 7 devices. A listing of known lithium battery incidents occurring in air travel is maintained by the FAA and can be found at: https://www.faa.gov/about/office_org/headquarters_offices/ash/ash_programs/hazmat/aircarrier_info/media/Battery_incident_chart.pdf.

The FAA anticipates publishing a notice, titled "Risk Associated with Inflight Firefighting using Fire Containment Products." This notice would provide guidance to field offices emphasizing the risk associated with moving a small portable electronic device that is demonstrating signs of a potential thermal runaway. Aviation crewmembers also have an important role in ensuring lithium battery safety and should exercise extreme caution when approaching an electronic device that overheated, smoking, deforming, or is on fire, indicating that thermal runaway has occurred. Firefighting training, as required by § 121.417(b), as well as emergency response procedures required by Title 49, CFR § 172.704 (if required) emphasize the importance of crewmember actions in the event of heat/smoke/fire involving lithium batteries, and Crewmember Emergency Training drills should be consistent with these regulations. Principal Operations Inspectors/Certificate Safety Inspectors will continue to validate that emergency firefighting procedures and training drills are consistent with FAA, International Air Transport Association, Flight Safety Foundation, and International Civil Aviation Organization (ICAO) techniques for lithium battery firefighting techniques. FAA Technical Center research data was also a driving force for an ICAO decision that resulted in the prohibition of lithium metal batteries in cargo on passenger aircraft. The unique chemical and electrical risks of lithium batteries make their proper transportation with informed crewmembers vital to air safety.

Since 2010, the FAA has issued several Safety Alerts for Operators (SAFO) warning of the possible risk posed during the transport of lithium batteries by aircraft. More recently, the FAA provided information to operators in SAFO 16001, Risks of Fire or Explosion when Transporting Lithium Ion or Lithium Metal Batteries as Cargo on Passenger and Cargo Aircraft.

This SAFO supports the recommendation by Boeing and Airbus, as well as the European Aviation Safety Agency and ICAO, to conduct a safety risk assessment to establish whether, or how, the risks associated with the transport of lithium batteries can be managed by operators. Furthermore, in SAFO 16004, New ICAO Regulatory Requirements for Shipping and Transporting Lithium Batteries, FAA generally recognized that the safe transport of hazardous materials by air requires compliance from both shippers and operators. FAA has specifically noted the important role that shippers play in the safe transport of lithium batteries and how operators can enhance safety by recognizing the role their cargo customers have in introducing risk into their system.

Effective April 1, 2016, ICAO enacted provisions to: (1) prohibit the transport of lithium ion cells and batteries as cargo aboard passenger-carrying aircraft, (2) limit lithium ion cells and batteries to a 30 percent state of charge, and (3) limit the number of packages that may be offered under current provisions for small (excepted) cells and batteries to not more than one package

per consignment or over-pack. PHMSA and FAA are considering implementing these ICAO provisions through an interim final rule.

Beyond ICAO FAA, regulatory actions also play a vital role in our efforts to ensure the safe transportation of hazardous materials. In coordination with the FAA, PHMSA has moved forward with several regulatory actions directly relating to the safe transportation of hazardous materials by air. These rulemakings include (in reverse chronological order):

- HM-215N, Final Rule titled, ""Hazardous Materials: Harmonization with International Standards."
- HM-259, Notice of Proposed Rulemaking titled, "Hazardous Materials: Notification of the Pilot-in-Command and Response to Air Related Petitions for Rulemaking"HM-253, Final Rule titled, "Hazardous Materials: Reverse Logistics"
- HM-262, Final Rule titled, "Hazardous Materials: Carriage of Battery-Powered Electronic Smoking Devices in Passenger Baggage."
- HM-233E, Final Rule titled, "Hazardous Materials: Special Permit and Approvals Standard Operating Procedures and Evaluation Process."
- HM-215M, Final Rule titled, "Hazardous Materials: Harmonization with International Standards."

In addition to FAA's work with PHMSA and ICAO to strengthen regulatory requirements, the FAA is actively collaborating with industry through the Commercial Aviation Safety Team (CAST), a data driven, consensus-based approach in analyzing data to develop safety enhancements, which may mitigate the root causes of crashes. This well-established and proven approach to aviation safety issues expected to result in voluntary and cost-effective safety enhancements that stakeholders can implement to prevent the initiation and/or severity of fires associated with hazardous materials onboard aircraft. The FAA co-chairs this multi-year effort and we expect CAST to ratify and begin implementing related recommendations in 2017. Operating on multiple fronts DOT will continue to lead efforts to address the safety risks associated with the air transportation of lithium batteries.

Lithium Battery Safety

PHMSA has been actively engaged with external entities to further lithium battery safety. PHMSA represents the United States on the Society of Automotive Engineers (SAE) G-27 Lithium Battery Packaging Performance Committee (SAE Committee). The SAE Committee was established at the request of ICAO to propose a packaging standard for lithium batteries using high-level performance standards developed during the third Multidisciplinary Lithium Battery Transport Coordination Meeting in Montreal, Canada, held in July 2015.

The SAE Committee provides a forum for the exchange of technical information related to lithium battery packaging for transportation by air and is developing standards for minimum performance packaging requirements to safely ship lithium batteries as cargo on aircraft. The draft-shipping standard will include packaging design, qualification, test procedures, and other related tasks. As stated previously, ICAO enacted provisions to address immediate safety concerns regarding the transport of lithium ion batteries by air.

At the October 2016 ICAO meeting, the Dangerous Goods Panel considered a U.S. working paper that invited comments on establishing segregation requirements for lithium batteries and flammable liquids. Panel members provided diverse feedback on this issue: some suggested expanding the consideration of segregation of lithium batteries beyond current air cargo requirements to segregate lithium batteries from Class 3 flammable liquids, while others noted operational impacts of this proposal. Some impacts include potential unintended consequences, such as concentrating large quantities of lithium batteries in a confined area, as well as the proposal's effect on small aircraft that do not utilize unit load devices. PHMSA will consider the comments and work with both the FAA and the NTSB.

Lithium battery research has been conducted by the Federal Aviation Administration's William J. Hughes Technical Center (FAA Technical Center), the NTSB, and several other, well-respected academic sources on lithium battery hazards. The FAA Technical Center's research found that lithium batteries subject to certain conditions could result in adverse events, such as smoke and fire, which could impair the safe operation of the aircraft. Specifically, they found that in a lithium battery fire, flammable gases could collect, ignite, and ultimately exceed the capabilities of an aircraft's fire suppression system.

Federal Railroad Administration

In partnership with PHMSA, FRA has taken numerous actions to improve and ensure the safe transportation of hazardous materials by rail, particularly Class 3 flammable liquids such as petroleum crude oil.

The DOT, FRA, and PHMSA continue to support the FAST Act requirements to conduct independent evaluations of Electronically Controlled Pneumatic (ECP) brakes under the conditions specified in the FAST Act. The FAST Act mandated DOT engage the National Academy of Sciences to test the effectiveness of ECP brakes and validate DOT's regulatory impact analysis for the "Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains" final rule. Testing is underway, and FRA expects testing will validate the inputs to the modeling and simulations used in the May 2015 *Hazardous Materials: Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains* (80 FR 16644; HM-251). The FAST Act also tasked the Government Accountability Office (GAO) to conduct an independent evaluation of ECP brake systems, pilot program data, and DOT's research and analysis on the costs, benefits, and effects of ECP brake systems. The GAO completed its evaluation, which is available on GAO's (http://www.gao.gov/products/GAO-17-122). While DOT disagreed with several of GAO's findings, we will also use the report to inform the FAST Act required update to the regulatory impact analysis done in support of the final rule. With these actions, DOT continues to address hazardous materials transportation safety as a comprehensive program to reduce risks and mitigate consequences to ensure the safety of transportation employees and the public.

3. Prevent Loss of Control in Flight in General Aviation[8]

What is the issue?

Although commercial airline accidents become relatively rare in the United States, crashes involving inflight loss of Control (LOC-I) in General Aviation (GA), while trending downward, still occur at an unacceptable rate. A bout 48 percent of fatal fixed-wing GA crashes in the United States, between 2008 and 2014, resulted from pilots losing control of their aircraft in flight resulting in 1,194 fatalities.

The most common type of LOC is a stall, including a post-stall spin, which can occur when the pilot allows the aircraft to enter a flight regime outside its normal flight envelope. Stalls may happen because a pilot lacks understanding about how a stall actually relates to exceeding a wing's critical angle of attack (AOA), as opposed to the more common idea that a stall is only related to airspeed. When airplanes are close to the ground, such as in a landing pattern, there is limited time and altitude available to recover from a stall or spin, making these stalls particularly deadly. Although LOC happens in all phases of flight, approach to landing, maneuvering, and initial climb is, statistically, the deadliest phase of flight for LOC crashes.

One notable accident NTSB investigated occurred on November 10, 2015, in Akron, Ohio. Execuflight flight 1526, enroute to Akron Fulton International Airport, was on a non-precision approach and descended below the minimum descent altitude, even though the pilots did not have the runway in sight. When the first officer attempted to arrest the descent, the airplane, a Hawker 700A, entered an aerodynamic stall and crashed into a four-unit apartment building, killing all nine persons on-board. In another crash that occurred on June 12, 2015, in Huggins, Missouri, the pilot and four passengers departed from a grass runway in a Beech A36. After a right turn during the initial climb, the pilot failed to maintain airspeed and exceeded the airplane's critical AOA, which resulted in an aerodynamic stall. The pilot and three of the passengers died in the crash.

GA pilot proficiency requirements are much less rigorous than those of airline pilots. GA pilots are more likely to have longer intervals between training sessions and between flights. They typically only need to complete a flight review, consisting of, at a minimum, 1 hour of ground training and 1 hour of flight training every 24 months. GA pilots almost exclusively maintain and improve their skills and update their knowledge of new technologies on their own. Their conduct of safe flight depends more on individual abilities and judgment than on robust training in emergency situations, potentially leaving them unprepared for situations that can lead to LOC.

What can be done?

In October 2015, NTSB held a forum on "Humans and Hardware: Preventing General Aviation Inflight Loss of Control." The forum addressed some of the common causes of LOC events and suggested potential hardware solutions, including the use of AOA indicators and human solutions, such as increased pilot training to ensure a full understanding of stall phenomena. Future training should also include understanding AOA concepts and how elements such as

[8] http://www.ntsb.gov/safety/mwl/Pages/mwl6-2016.aspx

weight, center of gravity (CG), turbulence, maneuvering loads, and other factors can affect an airplane's stall characteristics. To prevent LOC crashes, pilots should:

- *Understand stall characteristics and warning signs, and be able to apply appropriate recovery techniques before stall onset.*
- *Realize stall characteristics can vary with aircraft loading and are usually worse at aft CG positions.*
- *Be aware that stall can occur at a lower AOA in icing conditions.*
- *Use effective aeronautical decision-making techniques and flight risk assessment tools during both preflight planning and inflight operations.*
- *Manage distractions so that they do not interfere with situational awareness.*
- *Obtain training in emergency response skills so it is more natural to apply those skills in an emergency situation.*
- *Understand and maintain currency in the equipment and airplanes being operated.*
- *Take advantage of available commercial trainer, type club, and transition training opportunities.*
- *Consider installing new technology, such as an AOA indicator, which, when coupled with pilot understanding and training on how best to use it, can assist pilots during critical or high-workload phases of flight.*

The FAA, aviation advocacy groups, type clubs, and manufacturers, including kit manufacturers, are creating and maintaining educational materials and initiatives that include general principles, best practices, and operational specifics related to LOC. For example, the FAA and various industry groups launched the "Fly Safe" national safety campaign to educate the GA community on how to prevent LOC crashes during the flying season. Pilots play the most critical role in preventing LOC; they have both the ultimate responsibility and the ultimate opportunity to reduce these accidents through ongoing education, flight currency, self-assessment, use of available technologies, and vigilant situational awareness in the cockpit. In November 2015, the FAA published an article focusing on Vmc (minimum airspeed at which a twin engine aircraft is controllable with only one engine operational) training and AOA indicators. These resources can be helpful in learning effective LOC countermeasures.
The FAA is also spearheading an outreach effort to raise awareness of the inherent risks when flying in certain weather conditions.

DOT Response:

The FAA is involved in a number of activities that will continue to reduce GA crashes related to the loss of aircraft control. Through the General Aviation Joint Steering Committee (GAJSC), which is comprised of government and industry safety experts, safety enhancements that prevent LOC events are identified, pursued, and implemented. To improve pilot knowledge of this important issue outreach and guidance efforts such as the "Fly Safe" national safety campaign is carried out. FAA is also spearheading outreach efforts to raise awareness about risks inherent in certain weather conditions through initiatives such as "Got Weather?"

Federal Aviation Administration:

The collective GA community has grown to be the largest and most diverse in the world, with more than 220,000 aircraft, including amateur-built aircraft, rotorcraft, balloons, and highly sophisticated turbojets. However, this growth has not come without costs. Reducing GA fatalities by 10 percent over a 10-year period (2009-2018) continues to be a top priority of the FAA. We all agree that this number is still too high. The FAA continues to reduce GA crashes by using a primarily non-regulatory, proactive, and data-driven strategy to get results, which is similar to the strategy the FAA uses in commercial aviation through the Commercial Aviation Safety Team (CAST).

LOC—mainly aerodynamic stalls—accounts for the largest number of GA fatal crashes. A LOC crash involves an unintended departure of an aircraft from controlled flight. LOC can happen because the aircraft enters a flight regime that is outside its normal flight envelope and may quickly develop into a stall or spin. It can introduce an element of surprise for the pilot. LOC happens in all phases of flight and can happen anywhere and at any time.

Identify Risks through Data

FAA and aviation industry are working together to develop data to identify risks, pinpoint trends through root cause analysis, develop safety strategies, and develop a means to identify future at-risk pilots through performance history indicators. The FAA is working closely with GA manufactures to modify the Minimum Safe Altitude Warning (MSAW) software to apply the MSAW parameters for the flight plan destination airport to touchdown, rather than automatically reassigning the flight to another airport based on an observed (and possibly incorrect) trajectory.

Comprised of both government and industry safety experts, GAJSC is an effective partnership that adopted the goal of a continuous reduction in the risk of fatal GA crashes. GAJSC membership represents pilots, operators, aircraft manufacturers, training organizations and academia, as well as others; the scope of operations included in the work of the GAJSC is very broad. It approaches FAA's safety goals through a CAST-like process of a data driven, consensus-based approach in analyzing safety data to develop specific interventions that may mitigate the root causes of crashes. This work is aided by a GAJSC developed incident-based risk reduction methodology that uses precursors to focus on risk prediction by identifying anomalies and trends. This government-industry forum works to identify the root causes of GA crashes, and develops interventions aimed at addressing those causes.

The FAA found that LOC–Inflight (LOC-I) was by far the leading cause of death in GA crashes. To mitigate the risks of LOC–I crashes, the GAJSC chartered two LOC working groups to examine LOC-I during (1) approach and landing; and (2) all other phases of flight. The working groups devised critical Safety Enhancements (SEs) designed to greatly reduce crash risk and ultimately save lives. The SEs cover a variety of solutions involving training, best practices, risk-based flight reviews, proactive programs such as Flight Data Monitoring, aeromedicine, and technology. The GAJSC, a safety working group developed by FAA to lower the rate of fatal events, has completed 20 of the 39 SEs developed thus far, and all of the completed SEs are directed toward mitigating LOC crashes,10 of the 39 total SEs developed to date are directed at

System Component Failure – Power plant (SCF-PP) crashes. The FAA's joint effort with GAJSC is working toward the goal of one fatal crash per 100,000 hours by 2018.

Based on almost a decade of trust and confidence, the Aviation Safety Information Analysis and Sharing (ASIAS) program allows industry and government members to share sensitive safety information in a protected environment. Digital and text-mining tools have been developed that enable a fusion of flight crew safety reports, aircraft digital flight data recorder parameters, high definition terrain databases, weather data, and radar track data. The final product generates awareness and causal understanding of emerging safety threats never before possible, including risks that could be LOC precursors.

Educating General Aviation Pilots

In June 2016, the joint FAA and industry-developed Airman Certification Standards (ACS) replaced the FAA Practical Test Standards for the Remote and Private certificate as well as the Instrument ratings. The FAA and industry partners determined the need for a systematic approach that would provide clear standards for aeronautical knowledge, specific behaviors for risk management, and aeronautical decision making for GA pilots. The format of the ACS ensures that the individual using the standards for training, teaching, or testing, will be better prepared for certification purposes and operational safety.

The FAA is engaged in a coordinated outreach campaign to the GA community on LOC-related topics. Comprised of nearly 100 FAA employees and 2,500-trained volunteer representatives, the FAA Safety Team (FAASTeam), FAA's GA educational outreach arm, sponsors an average of 250 local safety seminars or webinars each month. On average, these events attract 26,000 airmen per month. The FAASTeam also engages airmen by sending them safety information via email. The FAASTeam sends an average of 3 million email messages to airmen each month. These initiatives target the GA community and cover topics of particular interest to these pilots, including LOC prevention. Additionally, there are many private industry initiatives available such as the Aircraft Owners and Pilots Association (AOPA) and Experimental Aircraft Association (EAA) that are working to reduce GA related crashes through public outreach campaigns and workshops.

FAA is also developing an educational program titled "First Flight Considerations" for its FAASTeam Program Managers. This program will discuss the potential for LOC in Experimental and Experimental Amateur Built aircraft due to power loss and lack of experience in the aircraft. This program will also assist with the preparation for a first flight by developing a flight test plan to prevent crashes.

FAA developed a series of videos that address upset recovery and prevention. These videos emphasize prevention through sound operating practices and provide meaningful advice to aid pilots who find themselves in an unusual flight attitude. When combined with the previously mentioned resources, these videos offer an important safety resource for pilots and represent a valuable teaching aid for flight instructors.

Addressing LOC through Regulation and Official Guidance

The FAA worked with industry leaders and various civil aviation authorities to develop a performance-based approach to airworthiness standards for airplanes under 14 CFR Part 23 (Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes). The rule recognizes consensus-based compliance methods for specific designs and technologies. It also adds new certification standards to address GA crashes.

The FAA is taking action to publish several guidance documents addressing LOC crashes. We anticipate updating Advisory Circular (AC) 61-83G, Nationally Scheduled FAA-Approved, Industry Conducted Flight Instructor Refresher Course (FIRC), originally published on September 30, 2011. The AC would add LOC as a required core topic of instruction. A revision of this AC was posted for public comment and FAA is currently considering next steps. FIRC-provider courses that are approved under the updated AC would require an LOC element as part of the curriculum. The FAA also anticipates updating AC 61-98B, Currency Requirements and Guidance for the Flight Review and Instrument Proficiency Check, originally published on April 30, 2012. This update would introduce a chapter titled "Reducing General Aviation Accidents" with a focus on LOC. The AC encourages pilots to train on manual flight following automation failure, and provides strategies to avoid reliance on automation.

Other FAA Activities

FAA is working through established internationally recognized forums to address LOC crashes. For example, as a leader and participant within the United States Helicopter Safety Team (USHST), FAA has championed numerous safety-enhancing initiatives. In 2016, the USHST completed a comprehensive analysis of U.S. fatal helicopter crashes occurring from 2009 to 2013. Half of the 104 fatal crashes analyzed stemmed from three types of crashes: LOC, unintended flight into instrument meteorological conditions (IMC), and Low-altitude operations.

In order to reduce fatal helicopter crashes by 20 percent by 2020, the USHST is focusing its immediate attention on some of the following areas:

- Enhancing outreach efforts to specific helicopter industry segments that will deliver targeted advice relevant to that segment's unique operations, with special emphasis on personal/private flying, commercial operations, aerial agricultural application, and emergency medical services;
- Concentrating its efforts in the safety areas involving personal protection equipment, aircraft certification standards, aeronautical decision-making, and safety risk management; and
- Enhancing instrument proficiency in helicopter pilots while stressing the importance of conservative aeronautical decision-making, personal minimums, meaningful preflight inspections, and adequate flight planning.

The FAA is also working with manufacturers to build stall resistance into aircraft designs using improved aerodynamics, limited pitch control capability, and AOA indicators to better inform the pilot. This work has contributed to the production of autopilots that provide automatic limiting to help prevent LOC incidents and crashes. In coordination with the National Aeronautics and Space Administration (NASA), FAA conducted research and published results

with academia and industry on design assurances and new methods for certifying autopilots, novel displays that enhance pilot situational awareness, and conducted a workshop with these partners to develop a roadmap for certifying technologies to prevent LOC-I.

Weather

The FAA spearheaded an outreach effort to raise awareness about the risks inherent in certain weather conditions. It is critical that pilots and operators review all weather and updates on their intended flight path. Ignoring weather changes can lead to a pilot or operator flying into unknown conditions and could result in such events as LOC. The plan includes leveraging weather data collected by the NTSB, as well as data collected from the GAJSC dashboard, showing how many GA pilots encounter level-5 extreme weather. The first phase was delivered at the National Air Traffic Controllers Association (NATCA) Communicating for Safety Conference in March 2016. This was an orchestrated effort across multiple organizations to help provide a solution to high visibility weather concerns regarding GA and ATC services.

While the GAJSC has produced several SEs related to weather as part of their work on LOC-I, FAA and industry partners continue to promote the "Got Weather?" safety campaign message to help GA pilots prepare for potential weather challenges. We continue to distribute information and host seminars at major GA events, including Oshkosh, Sun 'n Fun, and the Great Alaska Aviation Gathering. Additional information about this campaign is available at http://www.faa.gov/about/initiatives/got_weather/.

On October 20, 2015, the Graphical Turbulence Guidance version 3.0 added low level (below 10,000 feet) and mountain wave turbulence to the existing capability of clear air turbulence, and extended the forecast time from 12 to 18 hours[9]. Ceiling and Visibility (C&V) Analysis-Alaska (CVA-AK) is a rapidly-updated display of C&V conditions across Alaska at or near instrumented and non-instrumented airfields and along data-sparse routes between airfields including treacherous and heavily-traveled mountain passes. CVA-AK exploits data fusion techniques using surface weather observations, numerical weather prediction models, and data derived from satellites and Alaskan weather cameras. An initial experimental product for further research and development is expected in 2017.

Helicopter Emergency Medical Services (HEMS) provide transportation of critically ill and injured patients. Because of the time-critical nature of their mission and the often-remote crash scene destination without weather reporting services, HEMS operators are especially vulnerable to weather hazards. The HEMS tool, rather than a weather product, is an interactive display that aggregates a number of existing weather products into a single, quick-glance, automated display. The 2015 transition to operations at the National Weather Service's (NWS) Aviation Weather Center moved the tool to www.aviationweather.gov. This brought improvements in product monitoring and availability, and added more core functionality and support for mobile devices. Future HEMS enhancements will improve the analyses and forecasts of instrument meteorological conditions (IMC).

[9] http://aviationweather.gov/turbulence/gtg.

The Weather Technology in the Cockpit (WTIC) program is focused on GA preparedness and awareness to aid in decision-making prior to a weather-related LOC event. The WTIC program has addressed weather knowledge gaps in the pilot written examination, causal factors associated with the high rate of GA weather-related crashes where pilots flew into weather that resulted in LOS, and funded research on the feasibility of providing advance notification to the pilot of adverse weather along their intended flight path or destination. The program also developed a Weather Information Latency Demonstrator (WILD) to provide pilots with immersive skills-based training to improve their understanding of the limitations of the weather information in the cockpit. Additionally, the WTIC program has been assessing methods of notifying pilots of adverse weather conditions that result in consistent pilot decisions without being distracting. The WTIC program performed a demonstration using an Active Reminder (AR). The AR provided a statistically significant improvement by reducing the number of flights into the adverse weather condition (convection and visibility).

More than three-quarters of Alaskan communities depend on aviation for access to everyday necessities. Clear weather is essential for safe operations in this part of the country. The FAA finished installing 221 weather cameras in Alaska to provide pilots with real-time, visual weather information to help pilots determine when and where it is safe to fly. The program includes a recently updated website that enhances the navigational planning on an interactive map with easily accessible images and other weather data products. The pictures from this network of cameras are critical in helping pilots operating in Alaska to make better safety decisions. The program results in the added benefit of saving fuel by greatly reducing situations where pilots take off and have to return due to bad weather.

The FAA's Aviation Weather Research Program (AWRP) is developing enhancements to weather diagnosis and forecast products including the Icing Product for Alaska-Forecast (IPA-F), a gridded product depicting icing probability, severity, and super-cooled large droplet potential, specifically for the Alaska region. It is envisioned that IPA-F will be used by NWS Alaska aviation meteorologists to identify areas of inflight aircraft icing, and by the Alaska aviation community in general, which includes a significant GA component. IPA-F quality assessment activities were completed and a Technical Review Panel held on August 25, 2016, and a quality assessment of a separate diagnosis of current icing conditions (IPA-Diagnosis) will be completed in the summer of 2017 for transition to the National Weather Service (NWS) with the goal of an operational product in 2018. The FAA is also sponsoring research to provide real-time C&V information to pilots in Alaska.

Beyond Alaska specific research, FAA and NWS are also conducting C&V research to improve cloud and visibility information and to provide a consistent national common operating picture. This research will be used in producing aviation weather products that include ceiling and visibility, such as Aviation Terminal Forecasts (TAFs), Airmen's Meteorological Information (AIRMETs), and the National Digital Forecast Database (NDFD) official gridded forecast. The C&V research focuses on the integration of C&V improvements into the HEMS tool, the refinement and testing of national C&V grids and techniques for NWS forecasters that will be used by GA operators, improvements to the 0-2 hour C&V forecast in the Localized Aviation Model Output Statistics (MOS) Product, and improvements to C&V analyses in the form of the Real Time Mesoscale Analysis. Additionally, upgrades to the Rapid Refresh (RAP) and High

Resolution Rapid Refresh (HRRR) weather prediction models that were developed with FAA research funding and oversight were implemented into operations by NOAA on August 23, 2016. The RAP and the HRRR are the underlying basis for many of the aviation forecasts of clouds, visibility, icing, turbulence, and convective weather used by the GA community.

4. Improve Rail Transit Safety Oversight[10]

What is the issue?

Every day, millions of people commute by rail to or from work, home, or other destinations. Yet, safety oversight of rail transit is unreliable and inconsistent in some cases, increasing the risk of a crash. Rail transit crashes continue to cause injuries and deaths. For example, we saw the devastating results of two Chicago Transit Authority (CTA) crashes in recent years. On March 24, 2014, CTA train No. 141 collided with the bumping post near the end of the center pocket track at O'Hare Station. The lead car rode over the bumping post and went up an escalator at the end of the track. Thirty-three injured passengers and the train operator were taken to the hospital. On September 30, 2013, a set of unoccupied CTA passenger cars collided with CTA passenger train No. 10 at the Harlem-Congress passenger station in Forest Park, Illinois, at about 24 miles per hour. As in the O'Hare crash, 33 passengers and the train operator were taken to local hospitals and later released.

The NTSB has investigated a number of relevant Washington Area Metropolitan Transit Authority (WMATA) Metrorail accidents. For example, on June 22, 2009, in Washington, D.C., two WMATA Metrorail trains collided near the Fort Totten station, killing nine people and injuring 52. In another WMATA accident, on January 12, 2015, a Metrorail train stopped after encountering heavy smoke originating from electrical arcing near the third rail south of the L'Enfant Plaza Station in Washington, D.C. Ninety-two people were injured in the accident and one passenger died. Following the L'Enfant Plaza accident, NTSB urgently recommended that WMATA Metrorail oversight be moved from the Tri-State Oversight Committee (TOC) to direct federal oversight under the Federal Railroad Administration (FRA). However, the Fixing America's Surface Transportation (FAST) Act placed this issue under the FTA.

The FTA relies on the TOC, whereas FRA directly oversees safety and has the power to inspect and enforce Federal rules. In several of its audits of WMATA, FTA acknowledged (before the L'Enfant Plaza investigation) the TOC was not capable of exercising oversight over WMATA's Metrorail system, thereby compromising safety. In 2013, FTA notified the TOC that it did not meet the requirements of the Moving Ahead for Progress in the 21st Century Act, and it did not receive certification as a state safety oversight agency (SSOA).

What can be done?

According to the American Public Transportation Association, mass transit is growing faster than the population and faster than highway travel. Metropolitan areas such as Washington, DC; New York City; and Chicago are especially dependent on rail transit. That's why it is critically important that rail transit systems be constantly monitored and improved to maintain and enhance safety, to catch and correct the small problems before they become big ones, and to provide extra layers of protection against disasters.

Rail transit must be subject to competent oversight bodies that have standards and rules (and the power to enforce those rules). Although each rail transit system has unique equipment, operating environments, and challenges, all need strong safety oversight. Creating and enforcing safety standards and accountability in rail safety oversight will compel transit

[10] https://www.ntsb.gov/safety/mwl/Pages/mwl7-2017-18.aspx

agencies to address safety issues and increase system maintenance. These standards and regulations will help increase rail transit agencies' organizational safety culture.
The Metrorail smoke event at L'Enfant Plaza put a national spotlight on one SSOA's inability to oversee transit safety, and on the fact that corrective action was not taken in time, despite warnings from FTA. It also brought into question the strength of rail transit oversight nationwide. Rail transit passengers deserve strong safety oversight, whether they are in Washington, D.C., Chicago, San Francisco, New York, Atlanta, or any of the dozens of other American cities with rail transit systems.

DOT Response:

The Department is confident in FTA's ability to temporarily maintain oversight responsibility over the Washington Area Metropolitan Transit Authority (WMATA). FTA maintains a high level of expertise in oversight and safety of our nation's public transportation transit systems, which includes WMATA. FTA continues to establish and implement safety policy and regulations pursuant to the Moving Ahead for Progress in the 21st Century Act (MAP-21), Public Law No. 112-141)[11] and the Fixing America's Surface Transportation Act (FAST Act).

FTA's rail safety oversight program is unique compared to other modes within DOT. States, with congressional authorization, conduct day-to-day safety oversight of rail transit systems. FTA regulates the State Safety Oversight (SSO) programs and issues certifications for those programs based on Federal standards. In March 2016, FTA published a final rule implementing MAP-21 requirements, which improve state safety oversight of rail transit systems. The statutory requirements and rule significantly strengthen the ability of States to prevent and mitigate accidents and incidents on public transportation systems. Importantly, the rule establishes enhanced minimum standards for SSO, including requirements for SSO agencies (SSOA) to have the necessary enforcement authority, legal independence, financial, and human resources for overseeing the number, size, and complexity of the rail transit agencies within their jurisdictions. States subject to the rule must have an approved and certified State SSO Program no later than April 15, 2019. If a State fails to meet the certification deadline, FTA may not obligate any Chapter 53 funds to any FTA recipients within the entire State.

The FAST Act reinforced the Public Transportation Safety Program created by MAP-21 and enhanced FTA's direct safety oversight authority. Importantly, the FAST Act amplified FTA's authority to assume "temporary" Federal oversight of a rail transit system where the SSOA is inadequate to ensure the enforcement of Federal regulations or is incapable of providing adequate safety oversight consistent with the prevention of substantial risk of death or personal injury. In October 2015, FTA assumed direct, temporary State safety oversight of WMATA, in lieu of responsibilities from the Tri-State Oversight Committee, which FTA determined lacks adequate enforcement authority. As of May 1, 2017, FTA had conducted 481 inspections, identifying 2,704 defects and directing 1,200 remedial actions. FTA is exercising its statutory authority and using enforcement tools provided by Congress to ensure WMATA is addressing systemic safety deficiencies. On February 10, 2017, FTA announced it is withholding of $8.9 million in FY 17 section 5307 Urbanized Area formula funds from transit agencies in Maryland,

[11] https://www.gpo.gov/fdsys/pkg/PLAW-112publ141/pdf/PLAW-112publ141.pdf

Virginia, and D.C. including about $4.5 million for WMATA, due to the failure of the three jurisdictions to establish a compliant SSO Program. Since then, Maryland, Virginia, and D.C. have enacted legislation to create a new, compliant SSO Program. FTA will continue to provide effective safety oversight until the new SSOA is capable of performing its oversight responsibilities. When a new SSOA has been created, funded, and staffed, DOT and FTA will work with the new organization's leadership and the three jurisdictions to ensure a successful safety oversight transition.

Federal Transit Administration:

In 2012, MAP-21authorized a fundamentally new role for FTA: enhanced oversight of the safety of public transportation, which includes rail transit, bus, paratransit, and certain other forms of public transportation. The Public Transportation Safety Program provides FTA with a number of oversight and enforcement tools to ensure compliance with regulations and standards, including the authority to:

1. Conduct investigations, inspections, audits, examinations and testing of equipment, facilities, rolling stock and transit operations
2. Make reports, issue subpoenas and take depositions, require the production of documents, and prescribe recordkeeping and reporting requirements
3. Require more frequent SSOA oversight
4. Withhold FTA grant funds from a recipient
5. Require a recipient to use of FTA funds to correct safety deficiencies
6. Issue directives
7. Impose restrictions and prohibitions on transit operations

FTA has made significant progress in establishing the policy and regulatory framework to support the safety authority granted by Congress. FTA has issued a number of regulations, guidance and safety advisories, and other initiatives currently are underway:

- On JanuaryAugust 11, 2016, FTA issued a final rule to set substantive and procedural rules for FTA's administration of the Public Transportation Safety Program mandated by 49 U.S.C. § 5329 (Safety Program rule). *See* 81 FR 53046. The Safety Program rule formally adopts the Safety Management Systems (SMS) approach as the foundation for FTA's approach to safety oversight, and all future safety policy and rulemaking; sets the procedures whereby FTA will conduct inspections, investigations, audits, examinations, and testing of facilities, equipment, rolling stock, and the operations of public transportation systems, on its own initiative; and sets the procedures where FTA may take enforcement actions against public transportation systems, States, and SSOAs, including the issuance of directives or advisories, directing the use of Federal financial assistance, and withholding Federal financial assistance. The final rule became effective on September 12, 2016.

- On March 16, 2016, FTA issued a final rule that transforms and strengthens State safety oversight (SSO) of rail fixed guideway public transportation systems, in accordance with the mandate at 49 U.S.C. § 5329(e). *See* Pub L. No 81 FR 14229. This rule requires financial and legal independence for SSOAs, strong enforcement authority for the SSOAs, and

adequate human and financial resources to oversee the number and complexity of rail fixed guideway systems under the jurisdiction of an SSOA. The new rule at 49 CFR Part 674 replaces the SSO rule at 49 CFR Part 659, which had been in place for 20 years. Under the new SSO rule, FTA approves or disapproves a State's SSO program through a certification process, and FTA evaluates the effectiveness of SSOAs through annual reports and triennial audits. The certification process functions hand-in-hand with the new program of Federal financial assistance for SSOAs conducting safety oversight of rail transit. This rule became effective on April 15, 2016, and SSOAs have three years, until April 15, 2019, to meet the certification requirements.

- On January 18, 2017, the FTA published the first edition of the National Public Transportation Safety Plan (National Safety Plan first authorized) to guide the nationwide effort to manage safety risks across the public transportation industry. In accordance with the mandate at 49 U.S.C. § 5329(b), the document communicates FTA's strategic approach to safety performance, with safety performance measures for all modes of public transportation and voluntary minimum safety standards for rail transit vehicles used in revenue operations (not otherwise regulated by another Federal agency) and for safety operations. The National Safety Plan describes how FTA will collect and disseminate safety performance data, and based on that data, set national goals for improving the industry's safety performance. The National Safety Plan is based on the principles and methods of SMS in that it focuses on a formal, top-down, organization-wide approach to managing safety risks and ensuring the effectiveness of a public transportation agency's safety risk mitigations.

- On February 27, 2015, FTA issued *interim provisions* for the Public Transportation Safety Training Certification (Training Certification) program, mandated by 49 U.S.C. § 5329(c), which took effect on May 28, 2015. *See* 80 FR 10619. These *interim provisions* set a mandatory curriculum and training requirements for Federal and State personnel who conduct safety audits and examinations of rail transit systems, and transit agency employees who are directly responsible for safety oversight, for the purpose of enhancing their technical proficiencies. On December 3, 2015, the FTA issued a Notice of Proposed Rulemaking (NPRM) proposing to adopt the *interim provisions* as the initial regulatory training requirements for industry personnel responsible for safety oversight of public transportation systems, with additional requirements for recordkeeping and compliance. FTA received and reviewed all comments on the NPRM and anticipates issuing a final rule in the coming months.

- On February 5, 2016, the FTA issued an NPRM for Public Transportation Agency Safety Plans (Agency Safety Plans) to require all operators of public transportation that receive FTA grant funds to develop and carry out Agency Safety Plans based on the principles and methods of SMS. *See* 81 FR 6344. As mandated by 49 U.S.C. § 5329(d), the rules for Agency Safety Plans would require transit agencies to set performance targets based on the safety performance criteria under the National Safety Plan. Additionally, under the Agency Safety Plans rulemaking, every public transportation agency would have to establish a process and timeline for annual review and revisions to its plan, as necessary or appropriate. FTA has reviewed all public comments received on the NPRM and anticipates issuing a final

rule in the coming months.

- Since 2013, FTA has issued a number of Safety Advisories on safety issues of critical importance, including unintended train movements, right-of-way worker protection, verification of rail vehicle safe stopping distances in terminal stations, stop signal overruns, and contract rail (third rail) system hazards.

- Following from the information it received from transit agencies in response to its Safety Advisory on stop signal overruns, on January 17, 2017, FTA published a proposed General Directive on stop signal overruns on rail fixed guideway public transportation systems. *See* 82 FR 4964. FTA is reviewing public comments received on this proposed General Directive.

5. End Alcohol and Other Drug Impairment in Transportation[12]

What is the issue?

As the use of over-the-counter (OTC) medications, prescription drugs, and illicit substances increases in the United States population, so does our concern about transportation [safety].

U.S. railroads transported 565 million passengers and 14.2 million carloads of freight in 2015. Rail workers rank among the most heavily drug-tested employees across all industry sectors; they are drug screened before being hired, randomly tested on the job, and tested following accidents. About 8 percent of workers involved in rail accidents so far in 2016 have tested positive for drug use, including marijuana, cocaine, ecstasy, benzodiazepine, OxyContin, and morphine. That number is the highest since FRA began keeping records in 1987, and three times greater than it was 10 years [ago].

In a 2016 American Automobile Association (AAA) Foundation for Traffic Safety report, an estimated 14.0 percent of all drivers drove with a blood alcohol concentration (BAC) close to or over the legal limit in the previous year, and 4.6 percent of drivers, drove within an hour of using marijuana. According to NHTSA, alcohol impaired driving fatalities (in which at least one driver had a BAC of .08 g/dL or greater) increased by 3.2 percent, from 9,943 in 2014 to 10,265 in 2015.
Contrary to common assumptions, impairment is not just a highway problem; we see impairment-related accidents in all modes of transportation. In aviation, most fatal crashes involving drug use occur during GA operations. A 2014 NTSB report entitled "Drug Use Trends in Aviation: Assessing the Risk of Pilot Impairment," showed increasing trends in pilots' use of all drugs, potentially impairing drugs, drugs used to treat potentially impairing conditions, controlled substances, and illicit drugs. Although evidence of illicit drug use was found only in a small number of cases, the percentage of pilots testing positive for marijuana use increased during the 10- year study period. The 2014 study showed that the prevalence of potentially impairing drugs in fatally injured accident pilots increased from an average of 11 percent during the period from 1990 to 1997 to an average of 23 percent during the period from 2008 to 2012. During the same time period, positive marijuana results increased from 1.6 percent to 3.0 percent. The most commonly found impairing substance in fatal crashes was diphenhydramine, a sedating antihistamine found in OTC [medications].

What can be done?

When it comes to alcohol use, we know that impairment begins well before a person's BAC reaches 0.08 percent, the current limit in the United States at which a driver is presumed to be impaired. In fact, by the time BAC reaches that level, the risk of a fatal crash has more than doubled. That is why NTSB believes states should lower legal BAC levels to 0.05 percent—or lower. Although impairment from alcohol begins with the first drink, many drivers, pilots, and rail operators do not realize that even low levels of alcohol can degrade skills and increase accident risk.

[12] http://www.ntsb.gov/safety/mwl/Pages/mwl8-2016.aspx

Certain countermeasures have been shown to reduce the rate of alcohol-impaired driving and alcohol-related crashes, including stronger impaired driving laws and increased use of high-visibility enforcement, such as sobriety checkpoints. Other countermeasures are needed to ensure that people who are caught driving while impaired (DWI) do not do so again. For example, requiring ignition interlocks for all alcohol impaired-driving offenders can ensure that vehicles will not start if the driver has been drinking. For repeat offenders, DWI courts (modeled after drug courts) provide a tailored approach that involves treatment and supervision. Emerging in-vehicle technology such as the Driver Alcohol Detection System for Safety, which will use touch-based or breath-based systems to detect driver alcohol use, may one day ensure no drivers operate impaired.

Unfortunately, for most drugs, the relationship between the amount consumed and crash risk is still not well understood. We need more and better data to understand the scope of the problem and the effectiveness of countermeasures. States should increase the collection, documentation, and reporting of driver breath and blood test results for alcohol and drugs following crashes.

Although many drivers recognize the impairment potential of illicit drugs, they may not appreciate the potentially impairing effects of prescribed or OTC medications, especially in combination. Drivers should discuss their transportation activities with their doctors before taking a medication and should clarify the impairing effects of any medical conditions they have. Then, a driver's medical conditions and medications need to be monitored.

The NTSB believes part of the solution is to ensure drug and alcohol testing has been required by all modes of transportation for employees. The NTSB recognized the efforts made to develop and implement regulations though despite these efforts, much more needs to be done to ensure that employers create and maintain drug and alcohol-free workplaces, and that employees have incentives to arrive and remain drug- and alcohol-free throughout their work shifts.

DOT Response:

Alcohol is one of many impairing drugs, and it continues to contribute to a majority of transportation fatalities. Marijuana decriminalization, increasing use of dangerous synthetic drugs, and a dramatic rise in over-the-counter and prescription medication use and abuse mean that impaired vehicle operation has become a more complex problem than ever. Every transportation death caused by alcohol or other drug impairment is preventable. To end the epidemic of impairment in transportation, we must pass and enforce laws and educate the public. FAA regulations have prohibited drug use by aviation safety-sensitive employees since drug testing was established in 1988 and alcohol testing since 1994.

In 2016, FMCSA published the Commercial Driver's License Drug and Alcohol Clearinghouse final rule, which establishes a database under the Agency's administration that will contain drug and alcohol test result information for the holders of commercial driver's licenses. The rule was mandated by MAP-21 and requires FMCSA-regulated motor carrier employers, Medical Review Officers, Substance Abuse Professionals, and consortia/third party administrators supporting DOT drug and alcohol testing programs to report verified positive, adulterated, and substituted drug test results, positive alcohol test results, test refusals, and negative return-to-duty test results to the Clearinghouse In addition, FRA published a final rule which will expand the scope of its drug and alcohol regulation (49 CFR parts 219) to include non-covered service employees.

Office of the Secretary of Transportation:

The DOT regulations require drug and alcohol testing for safety-sensitive employees in the transportation industry. In accordance with the Omnibus Transportation Employee Testing Act of 1991, DOT relies on the Department of Health and Human Services (HHS) regarding the science of drug testing, including the drugs for which we test.

HHS and therefore DOT, is limited to testing for Schedule I and Schedule II drugs only, as defined by the Controlled Substances Act (CSA). Currently, DOT tests for marijuana, cocaine, amphetamine, methamphetamine, MDMA, MDA, MDEA, codeine, morphine, heroin, and PCP.

The misuse and abuse of these synthetic opiates has been an ongoing concern in the general population as well as in transportation safety. The recommendation to add the four synthetic opiates to the Federal drug testing panel was made by HHS' Drug Testing Advisory Board and recent drug abuse data and trends published by the Centers for Disease Control and Prevention (CDC) ; the National Survey on Drug Use and Health; and the Drug Abuse Warning Network support this action. Following clearance of the final rule, DOT intends to issue a Notice of Proposed Rulemaking that will add the same four synthetic opiates to its drug-testing panel. Adding these drugs will allow DOT to detect a broader range of potentially impairing drugs and thereby enhance the safety of the transportation industry and the public.

Safety-sensitive employees in the transportation industry have the opportunity to provide a legitimate medical explanation if they have a DOT positive drug test result. Although the safety-sensitive employee may have a legitimate medical explanation for using the drug, a Medical Review Officer, who is a licensed physician, must make a determination as to whether use of the medication is likely to pose a significant safety risk. Medical Review Officers also make determinations as to whether the reported uses of Schedule III-IV drugs or over-the-counter medications pose a significant safety risk. The Medical Review Officer is required by DOT regulation to report significant safety risks to the employer, the Medical Examiner, a Substance Abuse Professional, the respective DOT Agency, or NTSB in the course of a crash investigation.

According to the CSA, marijuana is a Schedule I drug, which the CSA defines as a drug with no currently accepted medical use and a high potential for abuse. In 2010, DOT published a notice to Medical Review Officers to remind them not to accept the use of "medical" marijuana as a legitimate medical explanation from a safety-sensitive employee in the transportation industry. In 2012, DOT published a notice to Medical Review Officers reminding them not to accept the use of "recreational" marijuana as a legitimate medical explanation for a positive test result. The DOT has taken additional steps to educate Medical Review Officers about this and other drug program requirements at each quarterly meeting and training session of the American Association of Medical Review Officers.

The Secretary's Office of Drug and Alcohol Policy and Compliance and DOT Agencies participate in several industry conferences, including the Drug and Alcohol Testing Industry Association; the Substance Abuse Program Administrator's Association; the American Association of Medical Review Officers; and FTA Conference. Collectively, these conferences provide outreach and education about DOT drug and alcohol testing requirements to more than

2,500 participants annually. At each of these conferences, we present a refresher about the 2010 and 2012 marijuana statements to audiences that include employers, organized labor, Medical Review Officers, and others involved in drug testing.

Although DOT has no authority over company (non-DOT) drug and alcohol testing, DOT educates transportation employers that they may have their own separate and distinct programs and policies that address testing for additional drugs. The Secretary's Office of Drug and Alcohol Policy and Compliance encourages companies to consider conducting their own company based drug and alcohol testing in accordance with their own state and local laws.

The DOT's regulatory requirements, education, and outreach regarding drug and alcohol programs serve to promote the safety and security of the traveling public.

Federal Aviation Administration:

FAA regulations have prohibited drug use by aviation safety-sensitive employees since drug testing was established in 1988 and alcohol testing since 1994. The drug and alcohol testing regulations (14 CFR part 120) require regulated employers to test applicants for prohibited drugs before hiring them into a safety-sensitive position; conduct random drug and alcohol testing after hiring a safety-sensitive employee; conduct reasonable cause and suspicion testing when there are indications or signs of possible drug use or alcohol abuse; conduct post-crash testing; and conduct return-to-duty and follow-up testing of safety-sensitive employees who have successfully been rehabilitated after a drug or alcohol violation and return to work.

The drug and alcohol testing regulations are enforced by highly trained FAA inspectors who inspect regulated employers on an ongoing basis. Under the FAA's Compliance Philosophy, we are able to build on the Safety Management System principles and enhance safety performance of individual and organizational certificate holders, while continuing to ensure compliance with the regulations and educate the industry. The FAA collects testing, inspection and other program data from regulated employers to analyze the effectiveness of drug and alcohol testing.

To promote understanding and voluntary compliance with the drug and alcohol testing regulations, FAA maintains an informative website containing educational material and guidance for aviation employers, pilots, and other safety-sensitive employees. The website includes Frequently Asked Questions for employers, an educational video series for everyone, as well as a wide range of other resources. One of the primary goals of the FAA's Compliance Philosophy is to help educate and raise awareness among regulated employers and employees. Most recently, we published specific Questions and Answers for safety-sensitive employees, and several posters for an employer to use to remind employees of the risks and repercussions of misusing alcohol while performing their duties outside of the United States. All of the information on our website is updated continuously based on input and questions from the industry, trends in noncompliance identified by inspections, changes in regulations or policy, and other feedback.

The FAA meets annually with industry associations, such as Airlines for America and the Regional Airlines Association, to discuss identified trends of regulatory non-compliance and to address concerns and emerging issues. The FAA also annually participates in conferences for

the Drug and Alcohol Testing Industry Association as well as the Substance Abuse Program Administrator's Association. This outreach serves to educate the industry about the importance of effective workplace drug and alcohol programs, which ultimately contributes to the safety of the traveling public.

The FAA provides the opportunity for pilots who self-identify that they are struggling with substance abuse and/or dependence to obtain treatment through a Human Intervention Motivation Study (HIMS) program. Treatment is monitored by an Aviation Medical Examiner and through the FAA's special issuance for medical certificates provision. HIMS has been in existence for over 40 years and has returned more than 5,400 pilots back to the cockpit after each pilot's successful completion of the program.

The FAA takes substance abuse and alcohol misuse very seriously. Our regulations, educational resources, and strong inspection program provide a powerful deterrent against the illicit use of drugs and misuse of alcohol by safety-sensitive employees in the commercial aviation industry. To date, our program has identified and removed over 55,000 safety-sensitive employees from the aviation industries for drug and alcohol violations.

Federal Motor Carrier Safety Administration:

The FMCSA is committed to ensuring that only safe commercial drivers and motor carriers are allowed to operate on our roads. The FMCSA improves truck and bus safety through education, regulation, enforcement, research, and innovative technology.

In FY 2016, 983 violations for use or possession of drugs or alcohol were cited against Commercial Motor Vehicle (CMV) drivers as a result of inspection activity. Of these violations, 681 were drug related while 302 were alcohol related. The FMCSA will continue targeting non-compliant carriers through field oversight efforts such as investigations, safety audits, and inspections to make certain that unsafe commercial drivers are removed from the Nation's highways. In addition, during the first two weeks of May 2016, FMCSA conducted a National Drug and Alcohol Strike Force. The Strike Force identified and investigated 353 drivers that resulted in 179 driver enforcement cases, and 100 driver disqualification letters informing these individuals that they are no longer qualified to operate a CMV on the public roads until they complete the required DOT Substance Abuse Professional Return-to Duty process. A total of 119 motor carrier reviews were conducted as a result of the Strike Force, resulting in 74 enforcement cases against non-compliant motor carriers.

The FMCSA published the Commercial Driver's License Drug and Alcohol Clearinghouse final rule on December 5, 2016. The rule establishes a database under the Agency's administration that will contain drug and alcohol test result information for the holders of commercial driver's licenses. The final rule, mandated by Section 32402 of MAP-21, requires FMCSA-regulated motor carrier employers, Medical Review Officers, Substance Abuse Professionals, and consortia/third party administrators supporting DOT drug and alcohol testing programs to report verified positive, adulterated, and substituted drug test results, positive alcohol test results, test refusals, and negative return-to-duty test results to the Clearinghouse. The rule also requires employers to report actual knowledge violations to the Clearinghouse. The rule establishes the

terms of access to the database, including the conditions under which information would be submitted, accessed, maintained, updated, removed, and released to prospective employers, current employers, and other authorized entities. With respect to State access, the rule establishes the chief commercial driver's license official from each State will be granted access to information in the Clearinghouse. The rule will also grant access to NTSB during investigations. The FMCSA has published a news release and created a webpage dedicated to the Clearinghouse that includes, among other things, Frequently Asked Questions and an informational slide show.

The medical examiners are responsible for issuing medical certificates for interstate truck and bus drivers. The new form would ensure the medical examiners fully understand the reasons the medications have been prescribed by the treating clinician and it would ensure that there are no disqualifying medical conditions, underlying medical conditions, or prescribed medications that could adversely affect the driver's ability to safely operate CMV on the Nation's highways.

Federal Railroad Administration:

As NTSB noted, on June 10, 2016, FRA published a final rule which will for the first time expand the scope of its drug and alcohol regulation (49 CFR Part 219) to include non-covered service employees [81 FR 37984]. When the rule becomes effective on June 12, 2017, over 30,000 Maintenance of Way (MOW) employees will become subject to part 219's prohibitions, testing, and return to duty requirements. In early 2017, FRA will hold a series of training courses to familiarize MOW employees and the railroad industry with the newly expanded and amended part 219.

On July 7, 2015, FRA added Tramadol, a prescription drug with potentially impairing effects, to its standard post-crash test panel [80 FR 38654]. In 2014, the Drug Enforcement Agency placed Tramadol in the Controlled Substances Act as a Schedule IV drug and FRA made a decision to test for it due to its potential for abuse and threat to public health. FRA will also revise its compliance manual and make available on its website an online course which will address the best practices for using prescription drugs and the risks of taking certain commonly used drugs of concern. In addition, in 2016, FRA held several roundtables encouraging railroads to expand the scope of their independent testing programs to add more prescription and synthetic drugs and to cover mechanical employees.

Part 219 has always contained voluntary referral and co-worker report policies, which encourage an employee who may have a substance abuse problem to self-refer or be referred by a concerned co-worker for treatment. The final rule also authorizes individuals other than co-workers, such as family members and labor representatives, to refer an employee for treatment. The FRA frequently conducts training on the effective use of these programs, which are unique to FRA. The FRA will emphasize the importance of referral programs and mark-off policies in its training courses next year.

Federal Transit Administration:

To improve awareness of the potentially impairing side effects of alcohol and certain prescription and over-the-counter drugs, FTA has developed a toolkit and classroom training with suggested materials designed to educate transit providers on how to work with their safety sensitive employees on the effects of alcohol misuse and drug abuse as well as talking points and information on commonly used drugs and appropriate restrictions. The prescription over-the-counter toolkit, training and pamphlets educate employers on how their safety sensitive employees can discuss with their personal physicians their job duties, and the potential impact their over-the-counter or prescription drug will have on public safety.

Annually, FTA hosts a National Conference with over 500 transit provider participants. Each year, several workshops are conducted related to alcohol impairment and misuse. In addition, the Audit Compliance Program has addressed emerging issues identified in the transit industry through the production of videos, laminated decision cards, toolkits, and guidance documents specifically targeting these identified emerging issues.

National Highway Traffic Safety Administration:

Annually, NHTSA organizes nationwide initiatives with law enforcement to reduce impaired driving, with concentrated efforts during the December holidays.

Since 2008, NHTSA and the Automotive Coalition for Traffic Safety (ACTS) have collaborated on Driver Alcohol Detection System for Safety (DADSS) research. The technology is aimed at preventing drivers who are over the legal limit from starting their cars, and is intended to be deployed with a non-regulatory, market-driven approach. NHTSA is encouraging State participation. In 2016, the State of Virginia was the first to join the program, committing about $5 million per year to deployment and consumer education. Other States are expected to join over the coming years. While significant technology challenges still need to be overcome in order to bring the DADSS technology to production-ready status, the potential benefits of the technology are compelling. For more information, please visit DADSS.org.

NHTSA has also been working on reducing the drug impaired driving problem through a multifaceted approach that includes data collection to provide a better understanding of the nature and scope of the drug impaired driving problem, the development and dissemination of tools for law enforcement, prosecutors and judges. A Study on the National Roadside Survey of Alcohol and Drug Use by Drivers was required as a Report to Congress under the FAST Act. NHTSA anticipates that the report will be submitted to Congress in early summer 2017.

NHTSA's behavioral research seeks to shed light on a number of questions relating to alcohol, drugs and driving. In particular, NHTSA looks at prevalence of alcohol and other drugs among drivers, impairment, crash risk, and strategies to eliminate alcohol- and drug-impaired driving. Recently, NHTSA has completed and published important studies in this area, which can be found at https://www.nhtsa.gov/behavioral-research.

To assist law enforcement officers to identify and arrest drug-impaired drivers, NHTSA has developed several training programs that include the Standardized Field Sobriety Test (SFST), the Advanced Roadside Impaired Driving Enforcement (ARIDE) program which is available as

an instructor led program and as an online course of instruction, and the Drug Evaluation and Classification Program (DEC), managed by the International Association of Chiefs of Police (IACP), that provides more intensive training in recognizing the signs and symptoms of drug use and results in officers being certified as Drug Recognition Experts (DREs). To assist criminal justice professionals in prosecuting and adjudicating drug-impaired driving cases, NHTSA has developed training for prosecutors and educational programs for judges.

Pipeline and Hazardous Materials Safety Administration:

PHMSA continues to support the Secretary's Office of Drug and Alcohol and Compliance by emphasizing both DOT and PHMSA policies and guidance, coordinating with other modes in the agency, implementing an active inspection and enforcement program, and continuing to educate the regulated community on drug and alcohol issues. Of particular interest are the agency's marijuana statements from 2010 and 2012 emphasizing that the legalization of marijuana for medical and/or recreational use in some states does not negate DOT regulations prohibiting the use of marijuana.

6. Reduce Fatigue-Related Accidents[13]

Fatigue can be just as deadly in transportation as alcohol and drug impairment, and fatigued drivers and operators regularly cause accidents. Finding and treating fatigue-related medical issues and knowing the fatiguing effects of medications are part of the solution.

Whether driving a vehicle, piloting a ship, or flying professionally for an airline, transportation vehicle operators need to have enough off-duty time to obtain sufficient sleep. Sleep experts say most adults need between seven and nine hours of sleep each night for optimum performance, health, and safety. But even when an individual has enough time to get rest, medical conditions, living environment, and personal choices can affect one's ability to obtain quality sleep. Ultimately, fatigue-related crashes can be prevented if pilots, drivers, commercial vehicle operators, and safety-critical personnel get adequate rest.

The consequences of fatigue on human performance can be subtle. Fatigue is both a symptom of poor sleep and health management and an enabler of risky behavior, such as poor judgment and decision making, slowed reaction times, and loss of situational awareness and control. Fatigue degrades a person's ability to stay awake, alert, and attentive to the demands of controlling their vehicle safely. Drivers may not recognize the effects of fatigue until it is too late. The traveling public can unknowingly and unwillingly be placed at risk because a fatigued operator cannot safely execute his or her duty.

According to NHTSA from 2009 to 2013, more than 72,000 police-reported crashes involved drowsy drivers, and resulted in more than 41,000 injuries and more than 800 deaths. Another study conducted in 2014 by the AAA Foundation for Traffic Safety estimated that as many as one in five fatal crashes involve drowsy driving. Additionally, a recent AAA survey found that more than 31 percent of highway vehicle drivers admitted driving while so tired that they had trouble keeping their eyes open.
Over the years, the NTSB has investigated too many transportation accidents in which fatigue was a probable cause or a contributing factor. Nearly 20 percent of the 182 major National Transportation Safety Board investigations completed between January 1, 2001, and December 31, 2012, identified fatigue as a probable cause, contributing factor, or a finding.

What can be done?

We must acknowledge that fatigue is a manageable threat to transportation safety that can be mitigated through reasonable measures based on company practices and individual responsibility. We must draw attention to the medical conditions that may affect sleep quality, such as Obstructive Sleep Apnea (OSA), insomnia, and restless legs syndrome. We must also draw attention to company best practices that allow operators to schedule adequate off-duty time for rest and to report, treat, and to track health conditions that affect the quality of their sleep.

The NTSB has issued more than 200 safety recommendations addressing fatigue-related problems across all modes of transportation. Addressing the problem of human fatigue in

[13] https://www.ntsb.gov/safety/mwl/Pages/mwl1-2017-18.aspx

transportation requires a comprehensive approach that focuses on research, education and training, technology, treatment of sleep disorders, hours-of-service regulations, and on- and off-duty scheduling policies and practices.

Companies must establish fatigue risk management programs and continually monitor their success to reduce risks for personnel performing safety-critical tasks. Fatigue risk management programs take a comprehensive, tailored approach to address the problem of fatigue within an industry or workplace. Such programs include policies or practices to address scheduling, attendance, education, medical screening and treatment, personal responsibility during non-work periods, task/workload issues, rest environments, commuting, and napping.

The best countermeasures to combat fatigue depend on the task at hand, work–rest schedules, and sleep opportunities. Data on the habits of workers in different modes of transportation, along with the results of existing fatigue management programs and research into possible alternatives, will allow for a better analysis to determine the best fatigue countermeasures to employ in every situation.

Additional development and implementation of in-vehicle technologies that reduce fatigue related accidents can also improve safety. For example, starting in December 2017, FMCSA will require commercial truck and bus drivers to use electronic logging devices to record time on and off duty, which will improve compliance with hours-of-service rules and reduce the risk of fatigue-related CMV. This is a step in the right direction.

Ultimately, fatigue-related accidents can be avoided with a combination of science-based regulations, comprehensive fatigue risk management programs, and individual responsibility.

DOT Response:

The Department agrees with NTSB that fatigue is a serious safety issue. The Department reduces the risk of fatigue related events through research, training, education, Hours of Service requirements, and rulemakings. There are new requirements to address OSA for pilots, along with scheduling policies and practices aimed at reducing fatigue. FAA has developed additional guidance to address fatigue risk through an Advisory Circular for Maintenance Fatigue Risk Management, which includes human factors research available for maintenance functions and personnel. FMCSA published the Electronic Logging Devices and Hours of Service (HOS) Supporting Documents final rule in December 2015. The rule requires most CMV drivers who are required to maintain Records of Duty Status (RODS) to use Electronic Logging Devices (ELD) by the end of 2017.

FRA is drafting a proposed regulation to meet the Rail Safety Improvement Act of 2008 (RSIA), a statutory mandate requiring a railroad to include a Fatigue Management Plan (FMP) in its safety risk reduction program. The FTA tasked its Transit Advisory Committee for Safety (TRACS) to conduct the research and analysis which would build strengthen safety standards and develop specific recommendations for establishing a Fatigue Management Program for the Bus and Rail Transit Industry, based on the principles of Safety Management Systems (SMS).

The PHMSA is utilizing the Integrated Inspection (II) screening process to inspect for indications of operator fatigue and identifying practices and conditions that can lead to it.

Federal Aviation Administration:

The FAA has developed a comprehensive approach to combat fatigue in the aviation industry, focusing on efforts in rulemaking, research, education and training, treatment of sleep disorders, hours-of-service regulations, and on- and off-duty scheduling policies and practices.

Research

The FAA has supported significant fatigue-related research—

- We have sponsored a multi-year research project examining maintenance fatigue and risk management. As a result of this project, we now have a 2-hour computer-based training on fatigue and fatigue risk management, administered through www.FAASafety.gov. Based on our records, we conservatively estimate that more than 100,000 aviators have completed this training.
- We are conducting a formal sleep study of aviation maintenance technicians, to examine issues related to fatigue risk, a topic we have not studied since 1999. Findings from this study will be used to develop a risk-based decision model for aviation organizations to use while planning personnel needs within their work structure. Following development of the model, a formalized process will assist users in transitioning from fatigue awareness training to applying knowledge to the maintenance environment.
- We completed a large-scale baseline fatigue study, which includes a fatigue baseline assessment for Air Traffic Control (ATC) and Technical Operations (TO) employees. This study directly led to the implementation of fatigue controls and mitigations in those work environments.
- FAA's Functional Genomics Research Team is in the process of discovering biomarkers (e.g., genes that respond to stressors such as fatigue, alcohol, or hypoxia) to facilitate the identification of said stressors such as those resulting from sleep deprivation.

In November 2016, we updated the guidance material in FAA Order 8900.1 and Advisory Circular (AC) 120-72, Maintenance Resource Management Training, to include the latest human factors information and research. This update includes the addition of an AC for Aircraft Maintenance Fatigue Risk Management.

Education and Training

The FAA developed and delivered training and other educational materials on fatigue issues for our employees and the aviation community at large.

Beginning in January 2016, we expanded the Aviation Medical Examiner (AME) Refresher Seminar to include the full spectrum of sleep disorders in our lecture on Obstructive Sleep Apnea (OSA). Through guidance in Title 14 of the CFR (14CFR) Part 121 Operating Requirements: Domestic, Flag, and Supplemental Operations, Part 135 Operating Requirements: Commuter and

On Demand Operations and Rules Governing Persons on Board Such Aircraft, and Part 91 General Operating and Flight Rules the aviation industry is encouraged to adopt and implement a comprehensive maintenance human factors training program. The FAA Regulatory Guidance Library includes several documents addressing these programs. The FAA currently accepts these programs through an extensive evaluation process, which includes the requirement to review a fatigue management program.

In 2016, we provided training to FAA Aviation Safety Inspectors on fatigue assessment and countermeasures, in addition to providing training to industry and supporting a fatigue awareness campaign, including the publication and distribution of extensive signage for maintenance organizations.

All members of the ATC and TO workforces have been trained in fatigue awareness and countermeasures. Once training was completed Civil Aerospace Medical Institute (CAMI) conducted pre- and post-tests, and determined a 25 percent improvement in knowledge resulting from the training. We provide additional information and resources, including videos, presentations and training aids, on our website.[14]

The FAA has also been involved in fatigue issues at an international level. We were a leading participant in the ICAO Flight Operations Panel, which developed a new publication, Fatigue Management Guide for General Aviation (GA) Operators. This guide explains how sleep deprivation affects elements of pilot performance, and suggests fatigue reduction and mitigation strategies.

Obstructive Sleep Apnea (OSA)

As noted by NTSB, FAA is now requiring OSA screening for all pilots presenting for their medical examinations. The FAA's ATO Fatigue Risk Management Team has been working with employees to collaboratively identify fatigue hazards and manage associated safety risk in air traffic operations. As previously mentioned a large-scale baseline fatigue study completed for ATC, Flight Standards Services (AFS), and TO specialists, and data collected from this study yielded recommendations, which would mitigate risks, associated with OSA and have led to new controls and mitigations in the ATC and TO work environments.

- Because OSA is more common in workers with certain shifts, in 2014 and 2015 we made changes to FAA Order 7210.3, Facility Operation and Administration, to enhance single-person midnight coordination procedures and limit certain shift types, including consecutive midnight shifts, 10-hour midnight shifts, and early day shifts prior to midnight shifts;
- In 2015, we limited total scheduled duty time for TO employees to no more than 14 hours and now require at least 9 hours off between scheduled duty periods;
- We created the 'Fully Charged' culture change initiative designed to provide the field with information to help them better manage fatigue both on and off the job; and

[14] https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/cami/

- We published 11 Fatigue Risk Management Bulletins on specific topics identified as potential fatigue hazards.

Risk Management for Maintenance Employees

The FAA developed additional guidance material in AC 120-MFRM (Maintenance Fatigue Risk Management) to include the latest human factors information available for maintenance functions and personnel. This Advisory Circular (AC) was published in November 2016.

To ensure ongoing identification, review, and mitigation of emerging fatigue hazards in the National Air Space (NAS), the ATO Fatigue Risk Management Team (FRMT) collaborates with air traffic and technical operation labor organizations via the ATO Fatigue Safety Steering Committee (FSSC). The ATO FRMT continues to meet in person with the ATO FSSC on a quarterly basis to review fatigue-related events and Voluntary Safety Reporting Program (VSRP) data. These teams work collaboratively to identify fatigue-related topics for briefing during the monthly Partnership for Safety webinars and to ensure work schedule compliance updates are made to the FAA Job Order (JO) 7210.3Z, Facility Operation and Administration.

Planned activities in Fiscal Year (FY) 2017 focus on identifying residual work schedule fatigue hazards not currently addressed in the FAA Order JO 7210.3Z and recommending additional work schedule related controls to address these hazards.

In 2016, we issued AC 120-115, Maintainer Fatigue Risk Management. This AC is aligned with scientific evidence and international standards in other industries. Although a rest and duty rule is not currently being pursued, the issue of fatigue will be identified and addressed under the Safety Management System (SMS) final rule that requires full compliance by the end of FY18.

Rulemaking

The FAA is engaged in the Applying the Flight, Duty, and Rest Requirements to Ferry Flights that Follow Domestic, Flag, or Supplemental All-Cargo Operations (FAA Reauthorization) rulemaking project. The proposed rule would require a flight crew member who accepts an additional assignment for flying under Part 91 from the air carrier, or from any other air carrier conducting operations under 14 CFR Part 121 or 135, to apply the period of the additional assignment towards any duty period or flight time limitations applicable to the flight crew member. Additionally, the FAA initiated the Applying the Flight, Duty, and Rest Rules of 14 CFR Part 135 to Tail-End Ferry Operations. The proposed rule would require a flight crew member who is employed by an air carrier conducting operations under part 135, and who accepts an additional assignment for flying under 14 CFR Part 91 from the air carrier or from any other air carrier conducting operations under 14 CFR Part 121 or 135, to apply the period of the additional assignment toward any limitation applicable to the flight crew flight crew member relating to duty periods or flight times under 14 CFR Part 135.

Federal Motor Carrier Safety Administration:

On December 16, 2015, FMCSA published the Electronic Logging Devices and Hours of Service (HOS) Supporting Documents final rule in the Federal Register. The rule requires most CMV drivers to keep RODS to use Electronic Logging Devices (ELD) by December 18, 2017. The requirements for ELDs will improve compliance with the HOS rules, thereby reducing the risk of fatigue-related CMV crashes attributable to violations of the rules.

Specifically, the rule: (1) requires new technical specifications for ELDs that address statutory requirements; (2) mandates most drivers currently required to keep RODS to use ELD; (3) clarifies supporting document requirements so that motor carriers and drivers can comply efficiently with HOS regulations; and, (4) adopts both procedural and technical provisions aimed at ensuring that ELDs are not used inappropriately against CMV drivers.

Prior to the completion of the ELD rulemaking, the Agency worked with its Canadian partners to develop the North American Fatigue Management Program (NAFMP). The NAFMP is designed to address the issue of driver fatigue with a comprehensive approach that includes:

- Information on how to develop a corporate culture that facilitates reduced driver fatigue;
- Fatigue management education for drivers, drivers' families, carrier executives and
- managers, shippers/receivers, and dispatchers;
- Information on sleep disorders screening and treatment;
- Driver and trip scheduling information; and,
- Information on Fatigue Management Technologies[15]

The FMCSA, in collaboration with FRA and OST, issued the ANPRM "Evaluation of Safety-Sensitive Personnel for Moderate-to-Severe Obstructive Sleep Apnea." The purpose of the ANPRM was to gather information from interested parties on whether to take regulatory action on sleep apnea and, if so, how to construct the most effective and efficient regulation to address the potential safety risks associated with Obstructive Sleep Apnea (OSA).
The FMCSA funded research to better understand driver fatigue issues and provide expert direction and support for future agency research and methodologies. The Committee on National Statistics, a component of the National Academy of Sciences (NAS)/National Research Council (NRC) conducted a panel study to identify optimal research and statistical methodologies to better understand driver fatigue.

This study assessed the large amounts of data already generated by onboard electronic monitoring systems and naturalistic driving studies. NAS informed FMCSA of the panel's findings, conclusions, and recommendations, and published the final report, Commercial Motor Vehicle Driver Fatigue, Long-Term Health, and Highway Safety: Research Needs, in March 2016. A key recommendation of the report is for FMCSA to carry out a research program on driver fatigue management and training. Specifically, the report recommends that the research program should include:

[15] (http://www.nafmp.com/en/).

- Evaluating the effectiveness of the NAFMP in educating truck and bus drivers on how to modify their behavior to remedy various potential sources of fatigue;
- Determining how effective the NAFMP training modules are in meeting the needs of drivers' employers, including fleet managers, safety and risk managers, dispatchers, driver trainers and other corporate officials (e.g., those conducting carrier-sponsored employee health and wellness programs);
- Evaluating any new education programs regarding sleep apnea that FMCSA has or plans to develop; and,
- Examining possibilities for the development and evaluation of incentive based-based programs for improving health and fitness, including regular coaching, assessment and support.

The FMCSA is reviewing the full findings and recommendations of the final report to determine the best course forward for further research related to fatigue management.

Federal Railroad Administration:

In response to the Rail Safety Improvement Act of 2008 (RSIA),[16]and based on input from a Railroad Safety Advisory Committee (RSAC) working group, FRA is drafting a proposed regulation requiring a railroad to include a fatigue management plan (FMP) in its safety risk reduction program. Proposed elements considered in these FMPs will include: (1) employee education and training; (2) opportunities for identification, diagnosis, and treatment of medical conditions that may affect alertness and fatigue, including sleep disorders; (3) scheduling practices for employees; and (4) other alertness strategies. After the final rule is issued, FRA will provide railroads with guidance documents to assist them in establishing their FMPs.

As part of its long-term research emphasis into fatigue in the railroad industry, FRA employs bio mathematical models to examine the schedules of railroad employees involved in human factor-related crashes. In addition, FRA has used railroad data to validate two models in current use and to calibrate the models with one another. The report and its discussion on validation and calibration can be found at http://www.fra.dot.gov/eLib/.
In February 2016, FRA relaunched the website, "The Railroaders' Guide to Healthy Sleep"[17]; the website now includes updated content, enhanced features, and mobile optimization. New promotional materials and fact sheets are forthcoming. The implementation team is working with FRA's Office of Public Affairs to increase the website's visibility in the industry and encourage more traffic to the website.

The FRA issued Safety Advisory 2016-03 on December 2, 2016, to stress to passenger and commuter railroads the importance of taking action to help mitigate human factor crashes [Pub. L. No. 81 FR 85649]. This Advisory recommends railroads and employees take certain actions to prevent work-related errors and on-the-job crashes because of sleep disorders, including OSA.

[16] https://www.fra.dot.gov/Page/P0395
[17] www.railroadersleep.org

Federal Transit Administration:

The FTA recognizes the importance of developing uniform standards for fatigue management, training, and certification of personnel who develop work schedules for employees. FTA tasked its Transit Advisory Committee for Safety (TRACS) to conduct the research and analysis necessary to lay a foundation for standards on these subjects, and to develop specific recommendations for establishing a Fatigue Management Program for the Bus and Rail Transit Industry[18], based on the principles of Safety Management Systems (SMS). FTA has implemented several programs and projects because of the recommendations from TRACS. For example, FTA is developing an Accident Investigation Program that will include the evaluation of whether human factors and fatigue may have contributed to an accident or incident.

The FTA has prepared a Review and Evaluation of the Public Transportation Safety Standards Report in accordance with Section 3020 of the FAST Act.[19] It presents the findings of FTA's review of transit safety standards and protocols, including those related to fatigue management, hours of service, and medical fitness for duty. Due to significant limitations of the safety-related data that is reported to the National Transit Database and limited or nonexistent data from all other collection sources, FTA was unable to assess the efficacy of the standards identified in its review and evaluation. Accordingly, the report includes a comprehensive set of recommendations directed at supporting. FTA's collection of data, a risk-based analysis of the safety performance of transit modes, and the identification of transit safety issues, including those related to operator fatigue, which may be mitigated through the issuance of standards. The FTA's training curriculum also includes courses on sleep apnea awareness and fatigue management, including a fatigue management toolbox.

National Highway Traffic Safety Administration

Drowsy driving is a dangerous behavior that leads to thousands of deaths and injuries every year. The NHTSA crash data for 2015 indicate that as many as 72,000 crashes involved driver fatigue and these crashes resulted in 41,000 injuries and more than 800 deaths. Other estimates that account for underreporting indicate that as many as 6,000 traffic deaths per year involve a drowsy driver.

The NHTSA seeks to reduce these preventable crashes through vehicle and behavioral research, education, information and technology. The agency is enhancing the science surrounding drowsy driving by: improving measurement and problem identification by working with law enforcement; analyzing new data sources and methodological approaches; developing educational strategies; and exploring the potential of in-vehicle technologies and environmental countermeasures. The NHTSA is developing new awareness messages to alert drivers to the risks of drowsy driving and provide advice on prevention.

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[18] https://www.transit.dot.gov/research-innovation/review-and-evaluation-public-transportation-safety-standards-fta-report-no-0103. https://www.transit.dot.gov/research-innovation/review-and-evaluation-public-transportation-safety-standards-fta-report-no-0103.

[19] https://www.transit.dot.gov/research-innovation/review-and-evaluation-public-transportation-safety-standards-fta-report-no-0103. https://www.transit.dot.gov/research-innovation/review-and-evaluation-public-transportation-safety-standards-fta-report-no-0103.

The NHTSA also recently released Asleep at The Wheel: A National Compendium of Efforts to Eliminate Drowsy Driving. This document highlights research and programs that are occurring across Federal, State, industry, academia, and advocacy groups to address drowsy driving. The report can be found at the following link:
https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/12723-drowsy_driving_asleep_at_the_wheel_031917_v4b_tag.pdf

7. Require Medical Fitness for Duty[20]

What is the issue?

Safety-critical personnel, such as commercial pilots, with poorly managed medical conditions or who are taking impairing medications while operating a plane endanger the traveling public. Requiring proper screening for medical fitness for duty can identify potentially impairing conditions and prevent the accidents that lead to these and other tragic outcomes. In July 2002, a FedEx Boeing 727 flew into the ground while approaching the Tallahassee, Florida, airport. The flying pilot had a severe color vision deficiency that made it difficult for him to correctly identify the color of the airport's precision approach path indicator lights, which were warning that the airplane was too low.

Medical conditions and treatments that may impair transportation professionals should be identified and appropriately managed to mitigate transportation safety hazards. In addition, although it has long been known that untreated and undiagnosed medical conditions pose a safety risk to the traveling public, medical certification requirements for safety-critical personnel vary across transportation modes. The aviation medical certification is the most comprehensive fitness evaluation system, but a certificate does not give a pilot a free pass for the duration of the certificate. It is incumbent upon pilots to recognize when they are not fit to fly and remove themselves from the schedule until they are healthy. Additionally, pilots are increasingly testing positive for over-the-counter (OTC) sedating medications. It is essential that pilots understand the effects of OTC medications and, for those medications with sedating or impairing side effect, follow FAA guidance or talk with their medical professionals to determine when they are medically fit to return to flying.

In July 2000, in Jackson, Tennessee, a truck-tractor semitrailer, traveling at an estimated speed of 65 mph in a 55-mph work zone, collided with a Tennessee Highway Patrol vehicle that was part of a moving work zone, killing the patrolman inside. The NTSB found that the truck driver had been diagnosed with obstructive sleep apnea in 1997, one month after colliding with another police vehicle and seriously injuring two officers. The truck driver had a DOT medical examination in 1999, but hid his history of obstructive sleep apnea from his medical examiner. Operating a commercial vehicle requires skill, constant vigilance, and physical stamina. Because the job can be challenging, it's important that drivers adopt a healthy lifestyle and inform their DOT medical examiner of health conditions that may affect their ability to drive safely. Some medical conditions, especially when left untreated, may endanger both the driver and the traveling public. At the same time, the health professionals certified to examine commercial drivers must have the proper background, training, and tools to ensure that all commercial drivers are screened effectively. FMCSA now requires training and certification for health care providers who perform medical examinations; however, there is no mechanism to ensure the recommended guidelines are followed. FMCSA still allows health care providers without prescription authority (for example, chiropractors and physical therapists) to certify drivers. Additionally, the FMCSA needs to improve its ability to incorporate the latest medical and treatment information into guidelines for its certified medical examiners. For example,

[20] http://www.ntsb.gov/safety/mwl/Pages/mwl9-2016.aspx

although we have found obstructive sleep apnea to be a factor in several of our crash investigations, the FMCSA still lacks a complete screening process for this condition.

When safety-critical personnel, such as rail operators, have medical conditions or use medications that impair their ability to safely operate rail equipment, passengers, crew, and even people near the rail can be seriously injured or killed. Requiring medical fitness for duty can identify potentially impairing conditions and medication and can prevent accidents with tragic outcomes. In two train accidents—one in 1996 in Secaucus, New Jersey, and one in 2012 in Goodwell, Oklahoma—engineers lacked the ability to see and interpret wayside signals due to deficient color vision. In 2013, in the Bronx, New York, an engineer operated his train at 82 mph into a curve with a speed restriction of 30 mph. The train derailed, killing four and injuring 61.

At the time of the accident, the engineer was impaired by undiagnosed sleep apnea. A week following the accident, his condition was diagnosed and subsequently successfully treated, but it was already too late. Medical conditions and treatments that may impair transportation professionals must be identified and appropriately managed to mitigate transportation safety hazards. Additionally, although it has long been recognized that untreated and undiagnosed medical conditions pose a safety risk to the traveling public, medical certification for safety-critical personnel varies across transportation modes. For instance, the US Coast Guard requires commercial ship captains to get comprehensive medical exams at regular intervals, but relies on mariners to self-report medical conditions and medication use. The aviation medical certification system may be the most robust, but pilots are increasingly testing positive for over-the-counter sedating medications. For railroad engineers, federally mandated medical certifications are renewed every 3 years, but cover only vision and hearing standards. Moreover, many impairing medical conditions and medications are never asked about and operators are not examined for them. Additionally, although we have found that obstructive sleep apnea was a factor in multiple accidents, the Federal Railroad Administration does not mandate a comprehensive screening process for this condition.

What can be done?

Operating complex machines requires the full cognitive and physical capabilities of the operators, maintenance personnel, and others performing safety-critical functions. Ensuring these individuals comply with requirements to report to work medically fit for duty is essential.

The NTSB has recommended a comprehensive medical certification system for safety-critical transportation personnel that include these features:

- *The applicant's complete medical history, taken at prescribed intervals, that includes medications, conditions, and treatments as well as a physical examination;*
- *Specific historical questions and physical examination procedures to identify applicants at high risk for sleep disorders;*
- *Identification of specific conditions, treatments, and medications that initially disqualify applicants for duty, with certification contingent on further testing (specific to each condition);*

- *Explicit and uniform processes and criteria for determining when the applicant has a treated, but otherwise disqualifying, condition;*
- *Certificates that are good only for a limited time for applicants with conditions that are currently stable but known to be likely to deteriorate, to ensure appropriate retesting;*
- *A review system for medical examiners' work products with the information and capacity to identify and correct errors and substandard performance;*
- *The capacity to prevent applicants who have been deferred or denied certification from finding another provider who will certify them;*
- *A process for dealing with conditions that could impair safety and are diagnosed between certification exams; and*
- *Guidance for medical providers that should be used when the provider believes a medical condition disqualifies an individual for duty*.

The FMCSA needs to improve its ability to incorporate the latest medical and treatment information into guidelines for its certified medical examiners. For example, although we have found obstructive sleep apnea to be a factor in several of our crash investigations, the FMCSA still lacks a complete screening process for this condition. The NTSB has recommended a comprehensive medical certification system for safety-critical transportation personnel including these features:

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- *Certificates that are good only for a limited time for applicants with conditions that are currently stable but known to be likely to deteriorate, to ensure appropriate retesting*
- *Medical examiners who: — are licensed or registered to perform examinations and prescribe medication in a given state; — are specifically trained and certified to perform medical certification exams; and — have ready access to information regarding disqualifying conditions that require further evaluation.*
- *A review system for medical examiners' work products with the information and capacity to identify and correct errors and substandard performance;*
- *The capacity to prevent applicants who have been deferred or denied certification from finding another provider who will certify them;*
- *A process for dealing with conditions that could impair safety and are diagnosed between certification exams; and*
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to ensure these individuals comply with requirements to report to work medically fit for duty. The NTSB has made recommendations for a comprehensive medical certification system for safety critical transportation personnel that includes these features:

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- *A review system for medical examiners' work products with the information and capacity to identify and correct errors and substandard performance;*
- *The capacity to prevent applicants who have been deferred or denied certification from finding another provider who will certify them;*
- *A process for dealing with conditions that could impair safety and are diagnosed between certification exams; and*
- *Guidance for medical providers that should be used when the provider believes a medical condition disqualifies an individual for duty.*

DOT Response:

The Department believes safety-critical personnel, such as commercial pilots, interstate CMV drivers, locomotive engineers, and drivers of public transit vehicles with poorly managed medical conditions or who are taking impairing medications while operating in transportation endanger the traveling public. Requiring proper screening for medical fitness for duty can identify potentially impairing conditions and prevent crashes.

The FAA strongly believes medical conditions and treatments that may impair transportation professionals should be identified and appropriately managed to mitigate transportation safety hazards. The FMCSA continues to execute a regulation, with a 2014 compliance date, requiring all interstate CMV drivers to receive a Medical Examination Certificate (MEC) from qualified professionals listed on FMCSA's National Registry of Certified Medical Examiners. The FTA tasked TRACS to develop recommendations on the key elements that should comprise an SMS approach to a fatigue management program and identify the major organizational and behavioral

challenges that may be faced in addressing transit employee fatigue, leveraging lessons learned from other modal organizations in implementing their strategies.

Federal Aviation Administration:

The aviation medical certification is the most comprehensive pilot fitness evaluation system, yet a certificate does not give a pilot free authorization to fly for the duration of the certificate if there is an adverse medical diagnosis. It is incumbent upon pilots to recognize when they are not fit to fly and remove themselves from the schedule until they are healthy. Additionally, pilots are increasingly testing positive for Over-The-Counter (OTC) sedating medications. The FAA believes it is essential pilots understand the effects of OTC medications and, for those medications with sedating or impairing side effects, follow FAA guidance or talk with their medical professionals to determine when they are medically fit fly.

On July 15, 2016, legislation was passed requiring FAA to amend its third class medical certificate requirements for pilots conducting certain types of operations. The FAA's final rule, Alternative *Pilot Physical Examination and Education Requirements*[21], enables an alternative qualification to the third-class medical certificate. Third class medical certificates are for non-commercial private pilots. The rule will generally allow pilots to fly without a medical certificate if they have: (1) a driver's license; (2) held a medical certificate within the past ten years; (3) completed a medical education course; and (4) been physically examined by a state-licensed physician. The FAA will work diligently to ensure this reform improves general aviation safety.

Pilot Mental Fitness

The entire medical certification process attempts to assess the ongoing risk of chronic or recurrent medical conditions using the best clinical and aerospace medicine information available. The decision to not grant a medical certificate also takes into consideration a concern that the risk of sudden or subtle incapacitation exceeds an acceptable level and the individual is not fit to fly on a long-term basis. Less than one percent of airmen are denied medical certificates and a part of a pilot's medical certification is mental fitness. The FAA is working with commercial airlines and pilot unions to improve mental health evaluations, and encourage voluntary reporting of pilot mental health issues.

Certain medical conditions, such as a psychosis, bipolar disorder, and severe personality disorder automatically disqualify a pilot from obtaining an FAA medical certificate and prohibit them from flying. However, many pilots have conditions that are treatable. Several U.S. airlines already have reporting and monitoring programs that provide pilots with a path to report their condition, be treated for it, and return to the cockpit once FAA has determined through a thorough evaluation it is safe to do so. The FAA addresses the medical certificates of those pilots on a case-by-case basis.
In January 2016, FAA began enhanced training for Aviation Medical Examiners so they can increase their knowledge on mental health and enhance their ability to identify warning signs. Airlines and unions will expand the use of pilot mental health assistance programs. These

[21] https://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/standards/

programs will be incorporated in the airlines' SMS for identifying risk. FAA will also work with airlines over the next year as they develop programs to reduce the stigma around mental health issues by increasing awareness and promoting resources to help resolve mental health problems. FAA also expects to issue guidance to airlines to promote best practices about pilot support programs for mental health issues, and plans to ask the Aerospace Medical Association to consider addressing the issue of professional reporting responsibilities on a national basis and to present resolutions to the American Medical Association. Currently, reporting requirements vary by state, and by licensing and specialty boards.

The Aviation Rulemaking Committee (ARC), comprised of the aviation community, FAA, and medical experts, has made several recommendations about pilot medical fitness in a study based on the Malaysia Flight 370 and Germanwings Flight 9525 crashes. The recommendations from the ARC include various concepts to encourage pilots to work with treating physicians to effectively manage their physical and mental health. The study recommended that evaluations regarding medical fitness for flight should be made by a doctor who has great knowledge of the pilot's comprehensive medical state. Moreover, the study recommended a new educational component to enable pilots to interface with their medical practitioner regarding health issues, and to better assess how certain conditions and medications impact pilot performance. The FAA will be considering how to address the ARCs study in 2017.

Medical Priorities

The FAA continuously works with the aviation and medical communities to maintain medical certification standards to keep our skies safe. The FAA's top medical priorities are described below.

- Evaluation of trends in missed diagnoses during medical certification processes based on forensic toxicology data;
- Evaluation of diabetes, including insulin-dependent pilots to determine effectiveness of current medical certification processes;
- Assessment of pilots with waivers for glaucoma to determine glaucoma's characteristics, involvement in specific crashes, and associations with all-cause crash risk;
- Evaluation of the impact of advanced prosthetic devices as it relates to the medical certification process;
- Assessment of the characteristics and outcomes for Statement of Demonstrated Ability type aeromedical waivers;
- Assessment of fatal crashes to determine reporting accuracy of medical certification applications and provide insight on possible corrective measures; and
- Evaluation of the introduction of new medical conditions for which AMEs can issue a medical certificate.

Federal Motor Carrier Safety Administration:

The FMCSA is committed to ensuring that only physically qualified commercial drivers operate on our Nation's roadways. As of May 21, 2014, all interstate CMV drivers are required to receive a Medical Examination Certificate (MEC) from qualified professionals listed on FMCSA's National Registry of Certified Medical Examiners. To become certified, qualified medical examiners must be trained and tested on FMCSA's driver physical qualification standards. The medical examiner certification requirement makes our roads safer by ensuring the examiners qualifying drivers know the minimum Federal physical qualifications.
The FMCSA recognizes NTSB's concern that a brief training program for certifying medical examiners (MEs) cannot replace formal courses in pharmacology or experience prescribing medications. However, per 49 CFR 390.103, a person is eligible to receive medical examiner certification if the person is:

1. Licensed, certified, or registered in accordance with applicable State laws and regulations to perform physical examinations. The applicant must be an advanced practice nurse, doctor of chiropractic, doctor of medicine, doctor of osteopathy, physician assistant, or other medical professional authorized by applicable State laws and regulations to perform physical examinations;
2. Completes a training program that meets the requirements of § 390.105; and
3. Passes the medical examiner certification test provided by FMCSA and administered by a testing organization that meets the requirements of § 390.107 and that has electronically forwarded to FMCSA the applicant's completed test and application information no more than three years after completion of the training program required by paragraph (a)(2) of this section.

The FMCSA believes the data related to medical examinations conducted to date by the certified medical examiners clearly documents their knowledge of the physical qualifications required of CMV drivers. The fact that nearly 40 percent of the drivers examined receive less than the standard 2-year medical certification demonstrates the MEs knowledge of physical conditions that affect driver performance. An additional benefit of the National Registry is that drivers who previously received medical certifications from less qualified MEs are now receiving treatment for medical conditions that were either ignored or undetected, resulting in overall improvement of the health of the driver population.

Federal Railroad Administration:

The FRA continues activities that further address railroad employees' medical fitness for duty. In addition, FRA issued an interim interpretation on November 24, 2015, clarifying its locomotive engineer and conductor qualification and certification regulations with respect to vision standards and testing Pub. L. No. 80 FR 73122. The interpretation addresses further evaluation of persons who do not meet the regulatory vision threshold. It provides best practices for designing valid, reliable, and comparable vision field tests for assessing whether persons who do not meet those thresholds can perform safely as locomotive engineers and conductors. The FRA is reviewing comments on its interpretation and will respond to them and finalize the interpretation.

Federal Transit Administration:

FTA tasked TRACS to conduct the research and analysis on fatigue management. Specifically, FTA tasked TRACS to develop recommendations on the key elements that should comprise an SMS approach to a fatigue management program and identify the major organizational and behavioral challenges that may be faced in addressing transit employee fatigue, leveraging lessons learned from other modal organizations in implementing their strategies.

8. Eliminate Distractions[22]

What is the issue?

Since 2003, NTSB has found distraction from PEDs to be a cause or contributing factor in several highway crashes. The accelerating frequency of these crashes and dangerous habits we've discovered in many crashes since 2002. In 2011, NTSB issued a recommendation calling for a nationwide ban on the use of PEDs while driving. Whereas previous recommendations addressed specific populations, the 2011 recommendation applied to all drivers.

The removal of distractions from critical workplace environments also applies to the cockpit. Nonessential conversation was an early form of internally-generated (self) distraction in the cockpit, and accident history shows it can severely interfere with pilots' ability to complete tasks and maintain situational awareness. One tragic example is the 2006 wrong runway takeoff accident in Lexington, Kentucky, in which the crew's conversation during taxi contributed to their loss of positional awareness

The increasing prevalence of PEDs has only expanded the potential ways a pilot can be distracted; however, the consequence remains the same—a loss of situational awareness with potentially catastrophic consequences. For example, in 2014, we investigated a GA crash in which the pilot was distracted by updating a Facebook post.

What can be done?

Because people have limited attention and many transportation tasks are multidimensional and complex, reducing the distractions that pilots and operators voluntarily bring into the task environment can maximize the attention resources. For safety critical operations, distraction must be managed—even engineered—to ensure safe operations. Aviation has long recognized the need for "sterile cockpit" procedures that restrict activities and conversations to the task at hand. In 1981, the Federal Aviation Administration (FAA) introduced the "sterile cockpit rule" (Title 14 Code of Federal Regulations Part 121.542), which prohibits distracting personal activities during critical phases of flight, including all ground operations involving taxi, take-off, and landing, and flight operations below 10,000 feet (except cruise). This rule strictly prohibits the flight crew from engaging in specific distracting activities. We have also asked for a ban on PED use on the flight deck, and in 2014 the FAA issued its final rule on the Prohibition on Personal Use of Electronic Devices on the Flight Deck, publishing guidance encouraging the aviation industry to expand procedure manuals and training programs to include other personnel in the prohibition of PEDs in the operational environment. This is a start, and flight operations conducted under Parts 135 and 91 would benefit from similar action. In the meantime, pilots and other aviation personnel (such as mechanics and ramp workers) can take action on their own to reduce or eliminate distractions that they bring into their task environment by establishing their own sterile cockpit procedures, keeping phones off and out of the task environment, and doing their best to focus on the task at hand until it is safely completed.

[22] https://www.ntsb.gov/safety/mwl/Pages/mwl8-2017-18.aspx

Distraction is a growing and life-threatening problem in all modes of transportation. To reduce crashes, injuries, and deaths, drivers and other operators must completely disconnect from an increasing variety of deadly distractions, whether they be visual, manual, cognitive, or auditory. We know that focusing on or thinking about anything other than the task at hand impairs performance and can lead to tragic consequences. Increased use of portable electronic devices (PEDs) among the public has made distractions even more prevalent. Since 2003, we have found distraction stemming from PEDs to be a cause or contributing factor in several highway crashes. Given the accelerating frequency of these accidents, and the trends and dangerous habits we've discovered in many crashes since 2002, the NTSB issued our boldest recommendation yet in December of 2011, calling for a nationwide ban on the use of PEDs while driving. Whereas previous recommendations addressed specific populations, our 2011 recommendation applied to all drivers. We remain very concerned about the growing number of highway crashes that involve driver distraction, particularly by PEDs, which is why we've kept this issue on our Most Wanted List for the past 4 years. More than 35,000 people were killed on the nation's highways in 2015, and it is estimated that about 1 in 10 of those deaths occurred in a crash involving distracted driving. The National Highway Traffic Safety Administration reports that fatalities in distraction affected crashes increased by 8.8 percent from 2014 to 2015.

The AAA Foundation for Traffic Safety reports that cognitive distraction is roughly equal whether a driver is using a hands-free or handheld cell phone. In 2013, the foundation reported that more than two in three drivers said that they talked on a cell phone while driving within the past 30 days, more than one in three drivers admitted to reading a text message or e mail while driving, and more than one in four drivers admitted to typing or sending a text or e-mail. A 2015 report by State Farm revealed a new staggering trend: nearly 30 percent of drivers surveyed admitted to accessing the Internet while driving. That compares to just 13 percent who admitted to surfing the Web while driving in 2009. The problem of distracted driving is real and life threatening. Driving that is distracted by any wireless device use is a serious safety risk, and not just for distracted drivers, but for everyone on the road. Although drivers contend with many other distractions, electronic communication devices are particularly concerning because drivers spend more time on these devices than on other distracting activities. The NTSB anticipates that distracted driving will continue to be a significant problem until regulators, industry, and the public embrace distraction-free transportation.

Every auxiliary task impairs our ability to process a primary task. For safety-critical operations, distraction must be managed—even engineered—to ensure safe operations. A cultural change is needed for drivers to understand that their safety depends on disconnecting from deadly distractions. In regulated transportation, the strict rules that minimize the threat of distraction must be embraced by every operator on every trip, and where the NTSB discover that distraction can be eliminated, reduced, or mitigated, regulators should act to do so. The first step toward removing deadly distractions is to disconnect from non-mission-critical information. For decades, the aviation field has recognized the need for "sterile cockpit" procedures that restrict activities and conversations to the task at hand. But all modes of transportation need to rise to today's distraction challenges. That's why, in December 2012, NTSB called for a driver ban of all PEDs. The NTSB believes it is critical that the railroad industry, including freight, passenger, and transit systems, implement ways to detect PEDs and provide railroad crews distraction-avoidance training immediately. These interventions will help ensure the safety of crewmembers

and the public, and these safety mitigations warrant action by railroad regulators. The NTSB believes that regulators are capable of developing comprehensive safety requirements involving PED detection, distraction-avoidance training, and safety oversight, to mitigate the risks of operator distractions.

In the NTSB investigation of the May 12, 2015, Amtrak 188 passenger train derailment in Philadelphia, The NTSB determined that the train engineer lost attentional focus due to the emergent workload demands of a wayside emergency, entered a curve at high speed, and derailed the train, killing eight people and injuring nearly 200. This accident is just the latest example of the potential catastrophic consequences of human distraction. As a result of the NTSB investigation, the NTSB reiterated several previous recommendations issued to the FRA regarding distraction, training, and the use of technology to help curb the dangers of operator distraction. Public education continues to be important for reaching operators and safety-critical personnel about the dangers of distractions. However, the NTSB wants strong regulations and employer policies to help reduce accidents/crashes, injuries, and fatalities caused by the deadly distractions. Likewise, NTSB needs to continue to build our technical understanding of distraction arising from auxiliary tasks in regulated transportation, especially as regards new vehicle technologies that require real-time operator attention. Advances in these areas will support regulatory efforts and lead NTSB toward a cultural norm that encourages and supports operators remaining disconnected from deadly distractions.

DOT Response:

The rise of Portable Electronic Devices (PED) use amongst the public and transportation employees has made distractions more prevalent and a heightened safety risk during the operation of vehicles, trains, and planes. The Department continues to better understand and mitigate the safety risks associated with distractions through research, education and outreach, and enforcement. FAA in a publication on the use of electronic devices on the flight deck provided information related to PED prohibition for flight crewmembers, and encouraged the aviation industry to expand procedure manuals and training programs to include other industry employees in the prohibition of PEDs. FMCSA held Operation Safe Driver Week in October of 2016 with stakeholders to advocate against distracted driving, and completed two research projects related to secondary task activity distractions and measuring the impact of distracted driving on CMV operators. FRA is working with research partners, rail labor, and rail companies on regulatory, voluntary, and research efforts to reduce PED distractions.

FRA is near completion on a research project on mitigating distraction through sustained attention training, developed outreach materials, and is working on an NPRM requiring inward- and outward-facing image recording devices that could capture non-compliance with prohibitions on the use of PEDs while operating trains as required by the FAST ACT. FTA developed an E-Learning course on "Curbing Transit Employee Distracted Driving. NHTSA continues research efforts related to distracted driving data and appropriate driver distraction guidelines, and recently completed a distracted driving High Visibility Enforcement demonstration project in 2015. PHMSA forbids motor carriers transporting bulk quantities of hazardous materials from texting or talking on a hand-held mobile phone while driving.

Federal Aviation Administration:

FAA began to specifically prohibit personal use of electronic devices on the flight deck, effective April 14, 2014, for Part 121 air carriers. Section 121.542 (as amended) provides the framework to ensure that certain non-essential activities do not contribute to the challenge of task management on the flight deck or a loss of situational awareness due to attention to non-essential tasks. The use of personal wireless communication devices or laptop computers for personal use while at a duty station on the flight deck while the aircraft is being operated is strictly prohibited.

On April 19, 2016, FAA issued AC 90-48D, Pilot's Role in Collision Avoidance, for the purpose of alerting all pilots to the potential hazards of mid-air collisions and near midair collisions, and to emphasize basic problem areas related to the human causal factors where improvements in pilot education, operating practices, procedures, and improved scanning techniques are needed to reduce midair conflicts.

To complement § 121.542, FAA issued InFO 14006, Prohibition on Personal Use of Electronic Devices on the Flight Deck, on May 20, 2014. InFO 14006 provides information not only to Part 121 air carriers regarding the prohibition on personal use of electronic devices on the flight deck, but also encourages directors of safety and training managers for all operators under Parts 135, 125, and 91K to include operating procedures in their manuals and crewmember training programs prohibiting flight crew members from using such devices for personal use during aircraft operation.

The flight crew is strictly prohibited from engaging in specific distracting activities. In 1981, FAA introduced the "Sterile Cockpit Rule" (§ 121.542) that prohibits distracting personal activities during critical phases of flight, which includes all ground operations involving taxi, take off, and landing, and flight operations below 10,000 feet, except cruise.

The "Turn Off Tune In" program is a collaborative proactive initiative launched in 2013 by FAA and NATCA to eliminate distractions in the operational workplace. The program's mission is to uphold the safety of the NAS through continued awareness and education regarding the safety impact of distractions through a communications campaign that significantly changed the culture in the operating environment regarding electronic distractions to address this risk before there is a safety issue.

"Turn Off Tune In" has increased awareness about distractions, and given our workforce a platform for sharing best practices developed in local facilities, such as installing charging stations for cellphones outside the control room and engaging with peers who need mentoring regarding this issue. As a result of the huge global popularity of this program, FAA and NATCA were awarded a joint trademark for "Turn Off Tune In" in 2016 to encourage a continuity of messaging for this important initiative and was the first ever-joint FAA/Union trademark.

Federal Motor Carrier Safety Administration:

During Operation Safe Driver Week held in October 2016, FMCSA, the Commercial Vehicle Safety Alliance (CVSA), and many other stakeholders called on all drivers to reduce distracted driving and save lives. Nearly 3,000 law enforcement officials at locations collected data across the United States and Canada. There were also numerous outreach events throughout the week at high schools, State capitals, State fairs, truck rodeos, sporting events and other locations. During the 2016 Operation Safe Driver Week, 20,648 CMV and passenger vehicle traffic enforcement contacts were made. Operation Safe Driver continues to target problem behaviors by all drivers. The use of a handheld phone ranked fifth at 2.4 percent among the top warnings and citations issued to CMV drivers (as a percentage of total CMV warnings and citations).

The FMCSA will continue to enforce its regulations, provide tools to enhance safe driving practices, and build upon its programs and the national momentum DOT has spearheaded for the last several years to curb these dangerous behaviors. More information on FMCSA and distracted driving can be found on FMCSA's website at http://www.fmcsa.dot.gov/rules-regulations/topics/distracted-driving/overview.aspx.

Federal Railroad Administration:

The FRA is working with its research partners, rail labor, and rail management on regulatory, voluntary, and research efforts to reduce Personal Electronic Device (PED) distractions for safety-critical rail employees. For example, FRA recently added an eLearning section on attention and distraction to its website that is tailored to locomotive engineers and conductors, as well as to dispatchers and yard supervisors.[23] The website emphasizes what attention is, why it matters, and how to manage it effectively to avoid distractions and resulting consequences. The website also addresses the use of PEDs when prohibited. Importantly, there is a video about distraction relating the firsthand experience of two operators who lived through a rail incident. This video provides different perspectives of a near-fatal incident that occurred because of distraction.

In addition, FRA's research report on mitigating distraction through sustained attention training is in the final editing process. The FRA conducted this research with the National Transportation Systems Center (Volpe) and FRA's Cab Technology Integration Lab simulator.

The FRA is preparing an NPRM that would require inward- and outward-facing image recording devices, which the FAST Act requires in all passenger trains. The NPRM would provide railroads with an effective method of determining employee compliance with prohibitions on the use of distracting electronic devices while operating trains, and act as a deterrent to prevent such violations from occurring.

[23] http://www.fra.dot.gov/Page/P0872

Federal Transit Administration:

The FTA funded and developed an E-Learning course titled, "Curbing Transit Employee Distracted Driving." The course is designed to raise awareness of distracted driving with the purpose of reducing the risk of distracted driving by public transportation professionals. To date, 13,706 transit employees have completed the course. Elements of the course include definition of the term "distracted," risks of driving while distracted, typical distractions, prevention tips, applicable regulations, laws, and company policies pertaining to the use of wireless devices.

National Highway Traffic Safety Administration:

In 2015, 10 percent of the 35,092 traffic fatalities involved one or more distracted drivers, and these distraction-affected crashes resulted in 3,477 fatalities, an 8.8 percent increase from the 3,197 fatalities in 2014. 2. Of the 5.6 million non-fatal, police-reported crashes in 2014 (the most recent year for which detailed distraction-affected crash data is available), 16 percent were distraction-affected crashes, and resulted in 424,000 people injured. Because distracted driving can be hard to measure for fatal incidents, due to underreporting, there is a strong likelihood there is some level of underreporting on distraction-affected fatal crashes.

The NHTSA and DOT have praised efforts by States and other local authorities to discourage hand-held use of portable devices while driving. NHTSA, in conjunction with industry, local governments, and various public interest groups, has also taken numerous steps to educate the public about the dangers of distracted driving.

In April 2010, NHTSA called for the development of voluntary guidelines addressing driver distraction caused by in-vehicle systems and portable devices. The first phase of the voluntary, non-binding Driver Distraction Guidelines (Phase 1 Guidelines), released in 2013, cover visual-manual interfaces of electronic devices installed in vehicles as Original Equipment (OE).

In December 2016, NHTSA released the proposed Phase 2[24] guidelines for public comment to help address driver distraction caused by mobile and other electronic devices in vehicles. The proposed, voluntary guidelines are designed to encourage portable and aftermarket electronic device developers to design products that, when used while driving, reduce the potential for driver distraction through features such as pairing, where a portable device is linked to a vehicle's infotainment system, and Driver Mode, which is a simplified user interface.

Pipeline and Hazardous Materials Safety Administration

In 2013, PHMSA issued a final rule (78 FR 58923) forbidding motor carriers transporting quantities of hazardous materials requiring placarding from texting or using hand-held mobile telephones while driving. These provisions are found in 49 CFR 177.804(b).

[24] https://www.nhtsa.gov/press-releases/us-dot-proposes-guidelines-address-driver-distraction-caused-mobile-devices-vehicles

9. Strengthen Occupant Protection[25]

What is the issue?

The NTSB has investigated many crashes in which improved occupant protection systems (seat belts, child restraints, and the traveling compartment or vehicle body) could have reduced injuries and saved lives. With regard to train accidents, the NTSB believes many fatal occupant ejections may have been prevented with improved railcar crashworthiness, including better window retention. Additionally, our investigations have revealed that better evacuation procedures could have minimized injuries and prevented deaths. Additionally, NTSB investigations have revealed better evacuation procedures could have minimized injuries and prevented deaths.

in May 2015, an Amtrak train derailed in Philadelphia, Pennsylvania, after proceeding through a 50-mph turn at 106 mph. Of the 245 passengers, 8 were killed and 185 were transported to nearby hospitals. During the crash, the train's passenger car windows did not remain intact, resulting in ejections, injuries, and fatalities.

Larger passenger-carrying vehicles, such as school buses, motor coaches, and rail passenger cars, use a design philosophy called compartmentalization, which features seats that are closely spaced, high backed, well-padded, and designed to absorb energy during a crash. However, compartmentalization may not protect passengers in severe side-impact crashes and high-speed rollovers, such as this Amtrak crash. Including pre-trip passenger procedure briefings could have minimized injuries and prevented deaths..

In commercial aviation, lack of restraints has led to tragic consequences, such as in the crash of Asiana flight 214 in San Francisco in 2013. Although 99 percent of passengers survived the Asiana crash, two of the three fatally injured passengers were ejected from the airplane because they were unrestrained.

Further, children under age 2 are not required to be restrained in their own seat on an airplane. Although it is required to secure our luggage and even small items, such as electronic devices and beverages, during take-off and landing, FAA exempts the most vulnerable passengers—children under age 2—allowing them to travel unrestrained on an adult's lap. Additionally, in all areas of aviation, including general aviation and rotorcraft, we have found that inadequate evacuation procedures have placed crew and passengers at unnecessary risk following an accident. In March 2015, Delta Air Lines flight 1086 departed the runway while landing at LaGuardia Airport in New York and contacted the airport perimeter fence, coming to rest with the airplane's nose on an embankment next to Flushing Bay. The airplane was substantially damaged, resulting in loss of the interphone and public address system as a means of flight crew and passenger communication. As a result, the flight attendants left their assigned emergency exit locations and could not immediately open their exits for evacuation. This significantly delayed evacuation, which could have led to serious injury.

Unfortunately, attendant training did not address alternative methods of communicating during an emergency situation when interphone and public address systems fail.

[25] http://www.ntsb.gov/safety/mwl/Pages/mwl4-2016.aspx

More than 50 percent of vehicle occupants killed were unrestrained, despite the fact that restraint use has been required in passenger cars in most states for more than 20 years. The NTSB has investigated many crashes in which improved occupant protection systems (seat belts, child restraints, and other vehicle design features) could have reduced injuries and saved lives.

Some of NTSB's recent investigations have also highlighted the importance of proper seat belt use and readily accessible and identifiable evacuation routes on larger passenger vehicles, such as school buses, motor coaches, and other commercial vehicles. For example, in 2014, a group of softball players was traveling home from a tournament on a 32-passenger medium-size bus equipped with seat belts. Their bus was struck by a truck-tractor on Interstate 35 near Davis, Oklahoma, and four unrestrained passengers were ejected from the bus and died. None of the injured passengers on the bus was wearing a seat belt.
The NTSB has also seen occupant ejections from school buses that might have been prevented if compartments were better designed to keeps windows in place (and, therefore, passengers inside the vehicle).

What can be done?

To minimize deaths and injuries, NTSB need to see increased use of existing restraint systems and better design and implementation of occupant protection systems that preserve survivable space and ensure ease of evacuation.

In the air, all occupants are best protected when using a restraint, regardless of the aircraft type. GA pilots and passengers should use shoulder restraints whenever possible, and small children should be secured in appropriately sized restraints, just as they are in passenger cars. Holding an infant in a lap during flight is not a sufficient safety measure; rather, car seats approved for use on aircraft ensure maximum safety for children, especially during take-off and landing. Education campaigns about the benefits of seat belt and child restraint use enhance user knowledge about these issues and encourage proper use in all vehicles.

In addition, there needs to be improved implementation of evacuation procedures. It is critical that commercial flight and cabin crews have proper training and procedures to conduct timely and professional evacuations when conditions warrant. NTSB has a long history of investigating accidents involving inadequate evacuation communication, coordination, and decision-making, and we have made numerous safety recommendations, including requests for joint evacuation exercises for flight and cabin crews, to resolve these issues. A multidisciplinary effort focusing on analyzing airplane evacuations and identifying ways to improve flight and cabin crewmember performance could be an effective way to resolve recurring evacuation-related issues.

For children, the correct use of a child restraint system can mean the difference between life and death. When used correctly, child safety seats can reduce fatal injury by 71 percent for infants (under 12 months of age) and by 54 percent for toddlers (1 to 4 years old). Properly worn lap/shoulder seat belts reduce the risk of fatal injury to occupants ages 5 and older in passenger cars by about 45 percent.

To increase seat belt and child restraint use in motor vehicles, NTSB request a three-pronged approach: legislation, enforcement, and education. Strong occupant restraint laws are critical. Although the daytime seat belt use rate for front seat occupants in the United States is 87 percent, seat belt use is significantly lower in states without primary enforcement laws and for laws addressing passengers seated in the rear seats. Primary enforcement sends a message to motorists that seat belt use is an important safety issue for all seating positions within a vehicle. Education campaigns about the benefits of seat belt and child restraint use enhance understanding of these issues and encourage proper use in all vehicles. For larger passenger vehicles, pre-trip briefings and training on the proper use of available restraints and evacuation routes are vital

Safety improvements have been made to better protect occupants of rail passenger cars from injury and death but, as NTSB saw in the Amtrak 188 accident, more still needs to be done. To minimize deaths and injuries in all modes of transportation, occupant protection systems need be better designed to preserve survivable space and ensure ease of evacuation. When Amtrak 188 derailed, passenger car windows became dislodged and some passengers were ejected and killed. Additionally, when the cars overturned, passengers were thrown from their seats and struck by loose objects, resulting in severe injuries. Our investigators determined that current safety standards for rail passenger cars are inadequate. Had windows in Amtrak 188 remained in place, the ejected passengers would likely have remained inside the train and survived. Further, had loose objects and passengers been contained, many passengers would have avoided most serious injuries.

All public transportation agencies should adopt existing voluntary standards that address crashworthiness and strengthen occupant protection for train passengers and crews. Protecting passengers and crews from injury requires keeping railcars' windows intact and maintaining their structural integrity during a crash. Regulators and manufacturers can make a difference by incorporating design elements that optimize crashworthiness and enhance ease of evacuation in an emergency.

DOT Response:

The Department is committed to occupant protection measures including; seat belts, child restraints, and the development of guidance, standards, and regulations intended to keep occupants safe during their expected travel. The FAA published guidance regarding accommodation of Child Safety Restraint System (CRS). Both FAA and NHTSA agreed on a single performance standard satisfying both aviation and highway safety requirements for CRS. The new final rule published by NHTSA mandate that a lap and shoulder seat belt, 3-point restraint system, be provided for each passenger seating position in all new over-the-road buses and new buses other than over-the-road buses. FRA is conducting research on window glazing systems and passenger equipment sidewall structures, and developed proposed regulations for alternative crashworthiness standards for passenger equipment.

FTA has reviewed the efficacy of crashworthiness standards from the American Society of Mechanical Engineers (ASME) as part of Review and Evaluation of Public Transportation Safety Standards Report. The NHTSA's National Occupant Protection Use Survey (NOPUS), which

provides nationwide probability-based observed data on seat belt use in the United States, shows daytime belt use reached 90.1 percent, a statistically significant increase from 2015. The NHTSA credits state legislators for enacting laws and strong enforcement of those laws, especially during the annual national Click It or Ticket campaign. Seat belts saved nearly 14,000 lives during 2015 alone and an estimated 345,000 lives since 1975.

Federal Aviation Administration:

The FAA has long-standing regulations regarding the protection of passengers in commercial and private aircraft, based on the operation of the aircraft. The most recent commercial aircraft crash involving passengers and the use of seat belts was the Asiana flight 214 crash. According to NTSB report, 99 percent of the passengers survived the crash and two of the three fatally injured passengers were ejected from the airplane due to being unrestrained. We are continuously addressing new issues as they arise.

Securing the Flying Public

On September 30, 2015, FAA published the Disclosure of Seat Dimensions to Facilitate Use of CRS on Airplanes During Passenger-Carrying Operations Final Rule, which requires air carriers conducting domestic, flag, and supplemental operations to make available on their "Flying with Children" website information enabling passengers to determine which CRSs can be used on airplanes in these operations. Specifically, this final rule requires air carriers to make available on their websites the width of the narrowest and widest passenger seats in each class of service for each make, model, and series of airplane used in passenger-carrying operations.

As part of this rule, FAA also published guidance clarifying regulations regarding accommodation of a CRS, updating cross-references to certification requirements regarding the approval of materials, parts, processes, and appliances, and providing information and practices regarding the use of CRSs on aircraft. Additionally, FAA and NHTSA have agreed upon a single government performance standard that will satisfy both aviation and highway safety requirements for CRSs.

To accommodate evolving cabin designs, FAA is conducting research on non-traditional seating orientation to identify significant injury mechanisms when the body is loaded laterally. So far, this research resulted in the identification of further safety risks that led FAA to issue a special condition on April 28, 2015, to address seats installed at certain angles. Furthermore, the FAA's Biodynamics Research Team assessed head and neck injury potential during aircraft longitudinal impacts.

Commercial Space Flight

In close coordination with the National Aeronautical Space Administration (NASA), industry, and other key stakeholders over the past three years, FAA issued Recommended Practices for Human Space Flight Occupant Safety in August 2014. These recommended practices are based on the data gathered and lessons learned from more than 100 years of aviation and over 50 years of human space flight. Although industry is not required to follow the identified practices, the

recommendations provide a framework that space vehicle developers and operators may find useful in the preparation of industry consensus standards, and may facilitate ongoing safety discussions between government, industry, and academia.

Federal Motor Carrier Safety Administration:

On June 7, 2016, FMCSA published a final rule that revises the FMCSRs to require passengers in the cab of property-carrying CMV to use the seat belt assembly whenever the vehicles are operated on public roads in interstate commerce. Data analysis of non-driver occupant deaths in large trucks show higher survival rates for those wearing seat belts; in 2013, 24.6 percent of non-driver occupants involved in fatal crashes who were not wearing a lap and or shoulder belt were killed, while only 4.9% of non-driver occupants of large trucks who were wearing seat belts incurred fatal injuries. Most unrestrained non-driver occupants were totally or partially ejected from the truck. FMCSA believes that some of these fatalities could have been prevented if this regulation had been in place.

NHTSA published a final rule updating Section 571.208 of Title 49, CFR (i.e., Federal Motor Vehicle Safety Standard (FMVSS) No. 208, Occupant Crash Protection). NHTSA revised FMVSS No. 208 to mandate that a lap and shoulder seat belt (3-point restraint system) be provided for each passenger seating position in (a) all new over-the-road buses; and (b) new buses other than over-the-road buses with a Gross Vehicle Weight Rating (GVWR) greater than 11,793 kilograms (26,000 pounds). The FMCSA has updated most of the materials available on its website related to motor coach safety features to include information concerning three-point restraint systems on motor coaches.

FMCSA amended the Basic Plan for Motor-coach Passenger Safety Awareness (Basic Plan), in an August 26, 2016 Federal Register Notice, by adding the use of seat belts to the previously issued pre-trip safety information for passenger carriers. The Basic Plan also includes encourages motor coach operators to use videos to disseminate safety information to passengers. FMCSA is also considering further steps related to providing passengers with pre-trip safety information, and anticipates reaching out to stakeholders on the subject. The FMCSA will continue to encourage passenger carriers to voluntarily provide safety-related information such as seat belt usage and evacuation routes, to passengers, and seek technological solutions to delivering safety information to passengers, without requiring the driver to present pre-trip safety briefings.

Federal Railroad Administration:

FRA published an NPRM formalizing its first set of proposed updates to its Passenger Equipment Safety Standards, particularly with regard to crashworthiness and occupant protection. This rulemaking is the first of two rules under consideration that are intended to update and enhance regulations governing passenger equipment safety, including the adoption of criteria for facilitating the use of contemporary technology such as crash energy management (CEM) that will provide additional options for railroads and suppliers to effectively protect passengers in a collision (such as additional design options that are available to rolling stock manufacturers, and thus, their customers). The NPRM would establish standards for

Tier III high-speed trainsets (for operations at speeds between 125 mph and 220 mph in a dedicated right-of-way), and Tier I passenger (for operations up to 125 mph in a shared right-of-way) equipment designed to alternative crashworthiness standards.

In both cases, the technical criteria for compliance demonstration are derived from established international standards and significant research and testing by industry and FRA over the past 30 years. The proposed regulations would give industry greater flexibility to use contemporary design techniques and more fully apply emerging technology, including CEM, without requiring FRA to waive compliance with equipment requirements. FRA expects this flexibility will result in passenger equipment designs incorporating novel approaches to safety improvement that will help address NTSB's occupant protection concerns.

FRA is performing research on window glazing systems to provide performance data on glazing retention and passenger containment. As part of this research, FRA will conduct an engineering evaluation of existing and potential designs and design methodologies for window glazing systems, and investigate the application of practical testing metrics and methodologies to assess and quantify containment capabilities. Based on this research, FRA plans to assess the relative effectiveness of design methodologies that enhance containment capabilities and improve the ability of the glazing system to provide emergency egress and rescue access in a way that does not compromise safety and continues its intended purpose as a window. The FRA will then be able to determine whether regulatory changes are reasonable and practical.

On December 2, 2014, NTSB issued Recommendation R-14-74, recommending that FRA develop certain performance requirements to "ensure that windows (e.g., glazing, gaskets, and any retention hardware) are retained in the window opening structure during an accident" to prevent occupant ejection. The NTSB issued this Recommendation after the December 1, 2013, Metro-North Railroad (Metro-North) crash, which resulted in four fatalities. The FRA is taking steps to address this recommendation.

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incorporating novel approaches to safety improvement that will help address NTSB's occupant protection concerns.

Federal Transit Administration:

The FTA encourages all public transportation agencies to adopt existing voluntary standards that address crashworthiness and strengthen occupant protection. On February 5, 2016, FTA announced the availability of its proposed National Public Transportation Safety Plan ("National Safety Plan")[26]. As part of the National Safety Plan, FTA strongly encourages all rail fixed guideway public transportation agencies to voluntarily comply with two sets of consensus-based railcar crashworthiness standards issued by ASME:

- The Safety Standard for Structural Requirements for Heavy Rail Vehicles (ASME RT-1 2008)
- The Safety Standard for Structural Requirements for Light Rail Vehicles (ASME RT-1 2009[27])

In addition, FTA is reviewing the efficacy of these ASME standards for crashworthiness as part of Review and Evaluation of Public Transportation Safety Standards Report. Once completed, FTA will consult with the transit industry and the public on the need to establish minimum Federal standards for the crashworthiness of rail transit vehicles.

National Highway Traffic Safety Administration:

In 2016, seat belt use in the United States reached its highest level since the Federal government began regular National surveys in 1994. The new data – drawn from a large-scale observational study conducted by NHTSA in June 2016, shows daytime seat belt use (drivers and right-front passengers of passenger vehicles from 7 a.m. to 6 p.m.) reached 90.1 percent, a statistically significant increase from 88.5 percent in 2015. This result is from the National Occupant Protection Use Survey (NOPUS), the only survey that provides nationwide probability-based observed data on seat belt use in the United States. The NOPUS also provides data on other types of restraints, such as child restraints and motorcycle helmets, and driver electronic device use (see Seat Belt Use in 2016-Overall Results - https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812351).

Seat belts saved nearly 14,000 lives during 2015 alone and an estimated 345,000 lives since 1975. The NHTSA credits State legislators for enacting strong laws and our Nation's police officers for strong enforcement of those laws, especially during the annual national "Click It or Ticket" campaign has saved an estimated 13,941 lives – the national seat belt use rate is 90.1 percent, making the campaign effective and successful. Also important was the agency's

[26] Proposed National Public Transportation Safety Plan. Federal Transit Administration, http://www.fta.dot.gov/documents/National_Public_Transportation_Safety_Plan.pdf

[27] Safety Standards for Structural Requirements of Heavy and Light Rail Transit Vehicles. American Society of Mechanical Engineers. http://files.asme.org/Catalog/Codes/PrintBook/28205.pdf

decades-long focus on the issue, including the renowned "Vince and Larry" crash test dummy public service campaign of the 80s and 90s. This progress is the result of persistent effort by a wide range of safety partners, including the U.S. Congress which provided resources including incentive grants and support for enforcement, State highway safety officials who mobilized and organized State enforcement and education campaigns, and many others including public health organizations which raised awareness, and the auto and insurance industries which supported seat belt advocacy efforts.

Seat belt use continues to be higher in the States with primary belt use laws. Thirty-four States, the District of Columbia, American Samoa, Guam, the Northern Mariana Islands, Puerto Rico, and the Virgin Islands have primary seat belt laws for front seat occupants, while 15 States have secondary laws.

Additionally, NHTSA continues to promote the incorporation of enhanced seat belt reminder systems into light-duty motor vehicles. These technologies further encourage seat belt use by the traveling public, and their inclusion by automotive manufacturers has contributed to high levels of seat belt use. NHTSA will continue to work with the automotive industry to strengthen occupant protection.

10. Expand Use of Recorders to Enhance Transportation Safety[28]

What is the issue?

Recorders—data, audio/voice, and video—capture and store critical information that can help investigators determine the cause of plane and helicopter accidents and companies and operators take proactive steps to prevent accidents. Yet, some aircraft, especially general aviation and rotorcraft, are still not equipped with these critical technologies, even though recorders are readily available, easily installed, and largely affordable. A flight data recorder (also known as a "black box") can record technical information about a flight and its operation before, during, and after an accident. Audio/voice recorders, such as cockpit voice recorders, capture crew discussions and transportation-related noises. Image/video event recorders provide video of the crew immediately before, during, and after an event. Although NTSB has used recorder data to determine the cause of accidents and to develop recommendations to help prevent future accidents, some questions can only be answered through the data provided by an image recorder.

These devices help investigators and operators fill in the gaps when data and voice/audio recordings can't tell the story. For example, although NTSB has obtained recorded cockpit audio and extensive parametric data during our investigation of the SpaceShipTwo accident, our investigators were only able to determine the true cause of the accident from video that showed the copilot prematurely moving the feather lock handle. Recorders not only help with determining the cause of a crash or accident, but, perhaps more importantly, they also help companies and operators establish effective safety management strategies. Data from recorders can be used to adjust procedures and enhance crew training to prevent accidents from happening in the first place. Although some operators have implemented—or are in the process of implementing—recorder programs and systems, many are slow to do so without regulatory requirements.

Various types of recorders can be useful. Event data recorders (EDRs) capture critical vehicle information about the vehicle and occupants for a brief period of time (seconds, not minutes) before, during, and after a crash. EDRs may record a wide range of data elements, such as whether the brakes were applied, vehicle speed at the time of impact, steering angle, and whether seat belts were being used at the time of the crash. Image/video event recorders—both inward- and forward-facing—show the driver immediately before, during, and after an event. NTSB routinely use recorder data after an accident to determine what went wrong, how the vehicle occupants died or were injured, and the safety devices and systems employed. NTSB has seen many cases, however, in which a lack of data hampered us from understanding the true cause of the crash.

For example, in a crash involving a motorcoach and FedEx truck-tractor in Orland, California, in April 2014, the vehicles were not equipped with crash-hardened recorders, and NTSB was not able to determine why the driver of the FedEx truck crossed the median and struck the bus, killing 10 people. Inward-facing video and vehicle information, such as brake and throttle input,

[28] http://www.ntsb.gov/safety/mwl/Pages/mwl10-2016.aspx

could have given us the information NTSB needed; however, NTSB was ultimately forced to conclude that the crash occurred "for reasons that could not be established from available information." Recorders not only help investigators determine the cause of a crash, but, perhaps more importantly, they help companies and operators establish effective safety management strategies. Data from recorders can be used to adjust procedures and enhance crew training to prevent crashes from happening in the first place. Although some operators have implemented or are in the process of implementing recorder programs and systems, many are slow to do so without regulatory requirements.

What can be done?

The NTSB urges aircraft owners and operators to install crash-resistant data, audio/voice, and image recorders, if not already required. Recorders are readily available and can be easily installed in such a way as to "survive" a crash and provide investigators with useful information.
Regulators should require recorder use and ensure a consistent, comprehensive approach to the timely identification of important safety issues. Additionally, regulations should work to remove barriers for industry and encourage voluntary recorder implementation.

NTSB has recommended image recorders for more than 16 years. Although there may be technical solutions other than image recorders that can capture instrument readings displayed to the flight crew, those solutions do not also capture crew actions. The aircraft involved in the Air France (May 2009) and UPS (August 2013) crashes, for example, were equipped with recorders that greatly exceeded the minimum parameter requirements. However, in these accidents, critical information about the cockpit environment conditions (for example, crew actions and visibility), instrument indications available to crewmembers, and aircraft system degradation was not available to investigators.

The International Civil Aviation Organization (ICAO) recently proposed revisions to the carriage requirements of flight recorders that are currently being reviewed by state signatories to ICAO. These actions are not yet complete and, although the Federal Aviation Administration (FAA) is participating in ICAO's activities, it should more proactively encourage these efforts, particularly in the United States. The FAA should also encourage voluntary implementation of an alternative data recovery method for those aircraft capable of such technology.

Although NTSB has addressed many of their concerns to the FAA, companies and operators should not wait for regulators to mandate that they take action. They should proactively procure recorder technology to improve the operational and safety oversight of their aircraft, and then routinely review recorded information in structured programs. For example, the Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations Final Rule, which was published on February 21, 2014, requires operators to equip helicopter air ambulances with flight data monitoring (FDM) systems and encourages operators to gather and analyze this information to improve safety in their day-today operations. This rule should also require helicopter air ambulance operators to establish the recommended FDM program. The benefits of recorders are many, and both regulators and operators should do more to see that these technologies— in all their forms—are installed and used to improve aviation safety.

Crash-resistant event data and image recorders are readily available, increasingly affordable, and easily installed in vehicles. Regulators should require their use and mandate that companies incorporate the data from these systems into their safety management programs. Additionally, regulators and industry should work to remove barriers for companies seeking to install event recorders and encourage voluntary implementation.

In keeping with NTSB's long history of advocating technology to record crash data in highway transportation, NTSB encourages NHTSA to develop standards and require the use of EDRs in heavy vehicles (with gross vehicle weight ratings over 10,000 pounds), including motorcoaches, school buses, and truck tractor units. The lack of standards and requirements for heavy vehicle EDRs allows essential crash data to go unrecorded, impeding improvements in highway safety.

Additionally, the Federal Motor Carrier Safety Administration should require all heavy commercial vehicles to be equipped with video event recorders that capture data in connection with the driver and the outside environment, including the roadway, in the event of a crash or sudden deceleration event. The device should create recordings that are easily accessible for review when conducting efficiency testing and system-wide performance monitoring programs. Motor carriers should be required to review and use video event recorder information in conjunction with other performance data to verify that driver actions are in accordance with company and regulatory safety rules and procedures.

The NTSB believes video recorders are often the best way to determine what happened in a crash. For example, on March 3, 2015, the NTSB released a study, "Commercial Vehicle Onboard Video Systems," that discussed two recent crashes where continuous video systems were installed on commercial vehicles and proved to be extremely useful.

Companies and operators should not wait for regulators to take action, but should proactively procure recorder technology to improve the operational and safety oversight of their fleets. Additionally, fleet management groups and associations should encourage their members to ensure that onboard vehicle video systems provide a view of the driver, each occupant seating location, and the area forward of the vehicle, and should feature an optimized frame rate and low-light recording capability. Even technology manufacturers have a role in addressing this issue. They should develop written guidance for initial installation and long-term maintenance of onboard video systems, and publish that guidance on their websites and in future owner's manuals. Although some headway has been made in using data and audio recorders to improve transportation safety, more work must be done by regulators, operators, fleet associations, and vehicle manufacturers to ensure recorders are installed, properly used, and incorporated into safety management programs.

Crash-resistant data, audio/voice, and image recorders are readily available and can be easily installed in trains. Regulators should require their use and ensure a consistent, comprehensive approach to the timely identification of important safety issues. Additionally, regulators should work to remove barriers for industry and encourage voluntary implementation.

The FRA and FTA are making some progress in expanding recorder use to enhance safety, and the FRA plans to mandate installation of inward- and outward-facing recording devices in the controlling locomotive cab and cab car operating compartments. However, NTSB recommends that all locomotive cabs be equipped with both audio and video. The NTSB also recommends equipping some light rail vehicles with recorders.

The FTA has recognized the value of event recorders in accident reconstruction and in working with industry to develop standards. It is considering surveying members of the rail transit industry to evaluate event recorder availability and adaptability to various modes of transit. Regardless of regulation, NTSB urge all railroads to use recorded information for operational and safety oversight.

Operators should not wait for regulators to take action, but should proactively procure recorder technology to improve the operational and safety oversight of their trains. In all controlling locomotive cabs and cab car operating compartments, railroads should install crash- and fire-protected inward- and outward-facing audio and image recorders that can verify that train crew actions are in accordance with essential safety rules and procedures, as well as to monitor train operating conditions. The devices should have a minimum 12-hour, continuous recording capability and should provide recordings that are easily accessible for investigators and management to review in the event of an accident or for system-wide performance monitoring. The safety of our railroads and the passengers and cargo they carry can be enhanced by the data that only recorders can provide. Industry and regulators should work to ensure such systems are installed in all trains.

DOT Response:

The Department agrees with NTSB that the use of recorders could provide additional insights on incidents to inform DOT's safety activities; however, due to privacy, security, and cost considerations each OA must carefully consider the most appropriate implementation of recorder technology. The DOT activities related to event recording include rulemaking, guidance, and collaboration with stakeholders. The FAA published a Final Rule on rotorcraft flight recorders, works with program partners to detect emerging hazards using flight recorder data, provides Cockpit Voice Recorder (CVR) guidance to industry, and is considering technology to enable the recording of aircraft displays in coordination with ICAO. FTA encourages rail transit agencies to make enhancements during vehicle retrofits and overhauls, and recommends that public transportation agencies include event data recorders that comply with Rail Transit Vehicle Event Recorders Standards. Finally, FRA is preparing a NPRM requiring intercity passenger and commuter rail carriers to install inward- and outward-facing image recording devices.

Federal Aviation Administration:

The FAA does not intend to mandate the equipage of cockpit image recorders at this time due to privacy and security considerations, as well as the cost that equipage and maintenance would pose for aircraft owners and operators when balanced with benefit to the public. However, FAA and the international community are considering alternative technology to enable recording of aircraft displays to provide crash investigators an accurate picture of the information displayed to

flight crews. While image recordings are undoubtedly of value to crash investigators, they present a very real privacy concern within the commercial pilot community. Accidental or unauthorized release of image recordings may have devastating effects on family members of flight deck crew members involved in crashes, and could involve extensive legal implications concerning many aviation industry organizations.

The FAA also has an obligation to put forward rules that are both clearly in the public interest and economically justified. While the cost of some image recording systems is low in comparison to parametric digital flight data recorders, they still represent a major investment for owners of aircraft operating under Part 91 General Operating and Flight Rules. FAA does not possess any data justifying the cost burden that would be placed on owners and operators by mandating equipping GA aircraft with image recorders. However, during the September-October 2015 meeting of ICAO's Flight Recorder working group, representatives from both the FAA and the Board expressed support for discussion of technology recording inputs taken directly from aircraft displays. This technology would provide investigators with a clear picture of the information presented to flight crews without the associated privacy and legal concerns of image recorders. The FAA currently plans to continue discussion with the working group that could lead to proposal of new ICAO Standards and Recommended Practices (SARPs).

Furthermore, FAA is in the process of developing policy related to crash site location and retrieval of flight data. Once ICAO finalizes proposed revisions to Annex 6 SARPs intended to enable the concept of operations for a proposed Global Aeronautical Distress and Safety System, FAA will be able to determine standards for a performance-based policy taking into account current aircraft equipage, operator capabilities and risk mitigations, and technologies available both currently and in the near future. This policy will consider a "whole system/operation" approach combining overall aircraft and ground systems, acceptance of risk based on specific operations and in-place mitigations, benefits to the public, and the economic burden placed on aircraft owners and operators.

Rotorcraft Flight Recorders

On February 21, 2014, FAA published the Helicopter Air Ambulance, Commercial Helicopter, and Part 91 Helicopter Operations Final Rule, which addresses operations for helicopter air ambulances, commercial helicopters, and GA helicopters. This final rule addresses the Board's suggestion to equip helicopter emergency medical service rotorcraft with flight recorders by establishing requirements that helicopter air ambulances be equipped with a flight data monitoring system to promote operational safety and provide critical information to investigators in the event of an crash. This final rule also revises requirements for equipment, pilot testing, and alternate airports for commercial helicopter operations intended to increase safety by providing certificate holders and pilots with additional tools and procedures to help prevent crashes.

Cockpit Voice Recorder (CVR) Policies and Installation Guidance

The FAA provides CVR guidance through two different means: Technical Standard Orders (TSOs) and Advisory Circulars (ACs). TSOs document the design requirements for devices intended for installation and use aboard aircraft, but TSO approval does not give authority to install that device. Installation guidance is contained in ACs, which give installers and operators acceptable means of compliance for installation.

Although FAA reviewed existing CVR policies and installation guidance addressing the quality of the inflight portion of audio data and found TSO guidance to be appropriate, we determined that the guidance contained in AC 25.1457-1A, CVR Installations, dated November 11, 1969, needs to be updated. We are currently developing a new AC to provide installation guidance addressing installed performance in actual operation. Finally, FAA extended the retention parameters of Enroute audio, written, and recorded data from 15 days to 45 days, effective June 1, 2016, through the FAA Notice 7210.894. The 45-day retention standard is now uniform between all of FAA's Terminal and Enroute ATC facilities.

Federal Motor Carrier Safety Administration:

On December 16, 2015, FMCSA published the Electronic Logging Devices and Hours of Service Supporting Documents final rule in the Federal Register. The rule requires most CMV drivers who are required to keep RODS to use ELDs by December 18, 2017. The requirements for ELDs will improve compliance with the HOS rules. Specifically, the rule (1) requires new technical specifications for ELDs that address statutory requirements; (2) mandates most drivers currently required to keep RODS to use ELDs; (3) clarifies supporting document requirements so that motor carriers and drivers can comply efficiently with HOS regulations; and (4) adopts both procedural and technical provisions aimed at ensuring that ELDs are not used inappropriately against CMV drivers.

Additionally, FMCSA tasked the National Surface Transportation Safety Center for Excellence at Virginia Tech to develop a manual for use by fleet management personnel prior to implementing onboard safety monitoring (OSM) technology, or by carriers that have implemented an OSM device but are having problems achieving results. The guidance document was completed on March 3, 2015, but was held pending publication of the final rule.

49 CFR 393.60(e) (1) prohibited the obstruction of the driver's field of view by devices mounted at the top of the windshield. Antennas, transponders and similar devices (devices) could not be mounted more than 152 mm (6 inches) below the upper edge of the windshield. These devices were required to be located outside the area swept by the windshield wipers and outside the driver's sight lines to the road and highway signs and signals.
In addition to the above, FMCSA published a Federal Register notice on April 20, 2016, requesting comments and input regarding the development of a *Beyond Compliance* program, as required under FAST Act § 5222, that would:

- Identify new safety technologies and safety management practices that the Agency wants to incentivize for early adoption;

- Determine the incentives for voluntary adoption; and
- Monitor ongoing compliance of early adoption.

FMCSA is in the process of evaluating (1) comments received in response to the notice, and (2) recommendations from the Motor Carrier Safety Advisory Committee (MCSAC), on the potential benefits and feasibility of a *Beyond Compliance* program. The MCSAC specifically included video event recorders as a potential safety technology for inclusion in a *Beyond Compliance* program. The FMSCA recently completed a field operational test (FOT) for onboard monitoring system (OBMS), *Performance Assessment of an Onboard Monitoring System for Commercial Motor Vehicle Drivers: A Field Operational Test*, which is available on DOT's website at http://ntl.bts.gov/lib/60000/60500/60504/15-019-OBMS_FOT_FINAL-508C.pdf. The objective of the FOT was to determine whether onboard monitoring could reduce at-risk behavior among commercial drivers and improve driver safety performance. Results of the FOT suggest that the OBMS did improve driver performance and safety for the four fleets examined, in most cases; however, additional research is necessary.

Federal Railroad Administration:

The FRA is drafting an NPRM that would require intercity passenger and commuter railroads to install inward- and outward-facing image recording devices in all controlling locomotives of passenger trains, which would meet the FAST Act provision requirement to install recording devices on passenger trains. In preparing the NPRM, FRA is considering relevant NTSB safety recommendations, FRA's RSAC working group efforts, and recent FRA investigations of crashes and other railroad safety violations. Prior to enactment of the FAST Act, FRA tasked the RSAC to work on locomotive recording devices and announced that it would publish an NPRM addressing the topic. Some railroads either have begun installing inward-facing cameras or announced that they will begin such installation, including the four largest U.S. freight railroads (Union Pacific Railroad, BNSF Railway, CSX Transportation, and Norfolk Southern Railway). Amtrak is installing inward-facing cameras on certain locomotives in service on the Northeast Corridor. In addition, Metro-North and Long Island Rail Road, the two busiest U.S. commuter railroads by weekday ridership, announced they would begin installing inward- and outward-facing cameras on their locomotives over the next 2 to 3 years.

Federal Transit Administration:

FTA recognizes the value of event data recorders for purposes of crash reconstruction and has worked with the transit industry stakeholders to develop voluntary, consensus-based standards for rail transit vehicles. FTA is also currently working with the Center for Urban Transportation Research to review all industry standards related to event recorders, and determines whether to develop a mandatory, industry-wide standard on the use of event recorders. FTA encourages rail transit agencies to make enhancements during vehicle retrofits and overhauls, and recommends that public transportation agencies include event data recorders that comply with Rail Transit Vehicle Event Recorders Standards or equivalent, to the extent practicable.

Conclusion

The U.S. Department of Transportation's top priority is safety. Through strong leadership, regulations, inspections, enforcement, stakeholder collaboration, guidance, financial assistance, training, education, and outreach the Department uses its role as the world's leader in transportation safety to reduce fatalities, injuries, and crashes that occur in transportation. As highlighted in this report the Department is actively pursuing and improving safety initiatives in the areas identified in the NTSB's 2017-2018 Most Wanted List. Continuous safety improvements are never a completed activity, and DOT welcomes the opportunity to continue the dialogue on safety with NTSB, Congress, safety stakeholders, and the public.