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Description of document: National Transportation Safety Board (NTSB) Briefing Document for the Incoming Biden Administration 2020

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National Transportation Safety Board
Attention: FOIA Requester Service Center, CIO-40
490 L'Enfant Plaza, S.W.
Washington, DC 20594-2000
Fax: (240) 752-6257
[NTSB's FOIA Online Submission Website](#)

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**National Transportation Safety Board
Washington, D.C. 20594**

June 9, 2021

Re: National Transportation Safety Board (NTSB)
Freedom of Information Act (FOIA) No. FOIA-2021-00109

This letter responds to your FOIA request for a digital/electronic copy of the transition briefing document(s) prepared by NTSB for the incoming Biden Administration.

Enclosed are 283 pages of responsive records, however, we partially withheld certain information pursuant to the following exemption specified below.

Personal information, notably autopsy information and graphic photos, social security numbers, and any personal identifying information, is withheld pursuant to 5 U.S.C. 552(b)(6), which exempts from disclosure “personnel and medical files and similar files the disclosure of which would constitute a clearly unwarranted invasion of personal privacy,” to include personal addresses, phone numbers, etc. Pursuant to this exemption, I partially redacted 1 page with a direct business phone number.

In several documents enclosed with this letter, I determined the exemption(s) to the FOIA required that I redact a limited amount of material. The redaction is clearly marked, and the applicable exemption(s) are noted at the place of the redaction.

The NTSB has concluded processing your FOIA request. If you are not satisfied with the response to this request, you have the right to appeal this determination under the FOIA. You may administratively appeal by writing to the NTSB, Attn: Ms. Sharon Bryson, Managing Director, 490 L'Enfant Plaza, SW, Washington, D.C. 20594. Your appeal must be postmarked or electronically transmitted within 90 days of the date of the response to your request.

You may contact our FOIA Public Liaison at 202-314-6540, for any further assistance and to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration (NARA) to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows: OGIS, NARA, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001,

National Transportation and Safety Board

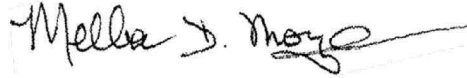
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e-mail at ogis@nara.gov; telephone at 202-741-5770; toll free at 1-877-684-6448; or
facsimile at 202-741-5769.

Sincerely,

A handwritten signature in black ink that reads "Melba D. Moyer". The signature is written in a cursive style with a long horizontal flourish extending to the right.

Melba D. Moyer
FOIA Officer
Office of the Chief Information Officer
National Transportation Safety Board

Enclosure



2019–2020 MWL-Associated Open Safety Recommendations

AS OF APRIL 17, 2020



2019–2020 MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS

If acted upon, these recommendations will save lives and improve transportation safety.

This document provides a listing of 268 NTSB safety recommendations associated with the 2019–2020 NTSB Most Wanted List (MWL) of Transportation Safety Improvements. As of the printing of this updated guide, 44 safety recommendations have been closed and 224 remain open. One recommendation was superseded by a new recommendation, which was added to the MWL for the new total of 268 associated safety recommendations.

The recommendations are grouped by each MWL topic area and include the recommendation number, classification status, and recommendation text. Implementation of NTSB safety recommendations will help prevent accidents, save lives and reduce the number of people injured each year in transportation accidents.

Highlighted in yellow in this document are the “**Focused 46**” safety recommendations that the agency believes can and should be implemented during the two-year MWL cycle.

We continually monitor progress on each recommendation and update its status as warranted. For the most current recommendation status, please visit www.NTSB.gov; under the Safety Advocacy drop-down menu, click Safety Recommendations.

Contents (by MWL topic area)

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National Transportation Safety Board

NTSB Recommendation Status and Assignment Definitions

The status of a recommendation is “Open” until the sufficient action has been achieved to mark it “Closed”. Please see the chart below for a list and explanation of all the recommendation statuses. Status determination is made periodically by the Board.

STATUS	STATUS DEFINITION
CEX	Closed–Exceeds Recommended Action: Response by recipient indicates action on the safety recommendation has been completed. The action taken surpasses what the Safety Board envisioned.
CAA	Closed–Acceptable Action: Response by recipient indicates action on the safety recommendation has been completed. The action complies with the safety recommendation.
CAAA	Closed–Acceptable Alternate Action: Response by recipient indicates an alternate course of action has been completed that meets the objective of the safety recommendation.
CUA	Closed–Unacceptable Action: Response by recipient expresses disagreement with the need outlined in the recommendation. There is no further evidence to offer, and the Safety Board concludes that further correspondence on, or discussion of, the matter would not change the recipient’s position. This status can also be used when the timeframe goals outlined in this order have not been met.
CUAN	Closed–Unacceptable Action/No Response Received: No response to the recommendation was ever received.
CR	Closed–Reconsidered: Recipient rejects the safety recommendation and supports this rejection with a rationale with which the Board concurs. Reasons for the “Reconsidered” status would include situations where the recipient is able to convince the Board that the proposed action would not be effective or that it might create other problems. This status is also assigned when the recipient of a recommendation was in compliance before the recommendation was issued or when the recipient was incorrectly chosen and cannot perform the recommended action.
CNLA	Closed–No Longer Applicable: The recommended action has been overtaken by events. For example, if technology and/or regulatory action has eliminated the reason for the recommendation or if a company has gone out of business.
CS	Closed–Superseded: Applied to recommendations held in an open status when a new, more appropriate safety recommendation is issued that includes the necessary elements of the recommendation to be closed.
CAAS, CAAAS, CUAS	Closed–Acceptable/Acceptable Alternate/Unacceptable Action Superseded: Applied to recommendations held in an open status when a new, more appropriate safety recommendation is issued that includes the necessary elements of the recommendation to be closed. The Board determines the Acceptable/Acceptable Alternate/Unacceptable status based on the criteria defined above prior to superseding the recommendation.
OAA	Open–Acceptable Response: Response by recipient indicates a planned action that would comply with the safety recommendation when completed.
OAAR	Open–Acceptable Alternate Response: Response by recipient indicates an alternate plan or implementation program that would satisfy the objective of the safety recommendation when implemented.
OUA	Open–Unacceptable Response: Response by recipient expresses disagreement with the need outlined in the recommendation or attempts to convince the Board (unsuccessfully) that an alternative course of action is acceptable. The Board believes, however, that there is enough supporting evidence to ask the recipient to reconsider its position. This status can also be used when the Board believes that action is not being taken in a timely manner.
ORR	Open–Response Received: Response has been received from recipient, but staff evaluation of the response has not been approved by the Board Members.
OAR	Open–Await Response: When a safety recommendation is issued, the status “Open-Await Response” is automatically assigned.

About the NTSB Most Wanted List

Tens of thousands of people die in transportation accidents and crashes every year—our neighbors, our coworkers, our schoolmates, our family members. But they don’t have to. Most of these deaths are completely preventable. With each accident, we learn lessons about safety gaps and make recommendations that, if acted upon, could close these gaps.

The **MOST WANTED LIST**, the NTSB’s premier advocacy tool, identifies the top safety improvements that can be made across all modes to prevent accidents, minimize injuries, and save lives in the future. These issue areas are ripe for action now; if addressed, they would make a significant impact.

The **MOST WANTED LIST** is our road map from lessons learned to lives saved. We urge lawmakers, industry, and every American to learn more about what they can do to implement and champion these critical safety improvements.

TOGETHER, WE CAN SAVE LIVES

To learn more, visit www.nts.gov/safety/mwl or contact SafetyAdvocacy@NTSB.gov





Eliminate Distractions

Distraction is a growing and life-threatening problem in all modes of transportation. All drivers, pilots, and operators need to eliminate distractions and stay focused on safely operating their vehicle, aircraft, vessel, or train. Pedestrians are equally susceptible to distraction and need to remain aware of their surroundings. **We believe distraction should be addressed through education, legislation, and enforcement.**

RECOMMENDATION NO. STATUS

Aviation

A-13-014 **Open-Acceptable Response**
 TO AIR METHODS CORPORATION: Expand your policy on portable electronic devices to prohibit their nonoperational use during safety-critical ground activities, such as flight planning and preflight inspection, as well as in flight.

Highway

H-03-009 **Open-Acceptable Response**
 TO 34 STATES: Add driver distraction codes, including codes for interactive wireless communication device use, to your traffic accident investigation forms.

H-06-029 **Open-Await Response**
 TO 6 MOTORCOACH INDUSTRY, PUBLIC BUS, AND SCHOOL BUS ASSOCIATIONS AND 3 UNIONS: Develop formal policies prohibiting cellular telephone use by commercial driver's license holders with a passenger-carrying or school bus endorsement, while driving under the authority of that endorsement, except in emergencies.

H-11-039 **Open-Await Response**
 TO THE 50 STATES AND THE DISTRICT OF COLUMBIA: (1) Ban the nonemergency use of portable electronic devices (other than those designed to support the driving task) for all drivers; (2) use the National Highway Traffic Safety Administration model of high visibility enforcement to support these bans; and (3) implement targeted communication campaigns to inform motorists of the new law and enforcement, and to warn them of the dangers associated with the nonemergency use of portable electronic devices while driving.

H-11-047 **Closed-Acceptable Action (03/19/2020)**
 TO CTIA—THE WIRELESS ASSOCIATION AND THE CONSUMER ELECTRONICS ASSOCIATION: Encourage the development of technology features that disable the functions of portable electronic devices within reach of the driver when a vehicle is in motion; these features should include the ability to permit emergency use of the device while the vehicle is in motion and have the capability of identifying occupant seating position so as not to interfere with use of the device by passengers.

H-14-013 **Open-Await Response**
 TO THE FIFTY STATES, THE DISTRICT OF COLUMBIA, AND THE COMMONWEALTH OF PUERTO RICO: Ban the nonemergency use by pilot/escort vehicle drivers of portable electronic devices (other than those designed to support the pilot/escort vehicle driving task), except to communicate hazard-related information to the escorted vehicle.

Marine

M-16-027 **Open-Acceptable Response**
 TO THE UNITED STATES COAST GUARD: Distribute a safety alert on amphibious passenger vehicle operations that addresses the role of risk assessment to mitigate driver distraction, as well as the need to tell passengers to remove seat belts before waterborne operations begin.

M-16-028 **Closed-Exceeds Recommended Action (12/07/2018)**
 TO THE PASSENGER VESSEL ASSOCIATION: Notify all your amphibious passenger vehicle (APV) operator members of the importance of the following: (1) learning the lessons from the Seattle, Washington, and Boston, Massachusetts, crashes; (2) completing proper maintenance and service bulletin repairs; (3) using the pretrip safety orientation to tell passengers of APVs equipped with passenger seat belts to unbuckle their belts before the APV begins any marine operations; (4) conducting a visual inspection to ensure that passengers have unbuckled their seat belts prior to water entry; (5) reducing the risk of driver distraction by having a tour guide conduct each tour; (6) managing risk in tour operations by addressing such factors as driver distraction, route planning, vehicle characteristics, traffic density, and vehicle speed; and (7) conducting operations according to Navigation and Vessel Inspection Circular 1-01 guidance and US Coast Guard safety alerts.

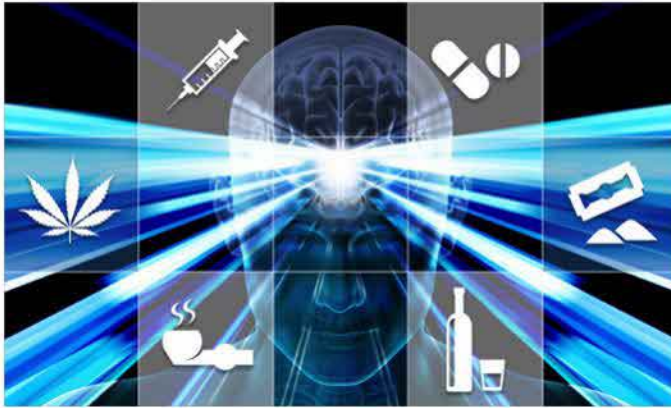
Railroad

R-13-005 **Open-Acceptable Alternate Response**
 TO THE FEDERAL RAILROAD ADMINISTRATION: Identify, and require railroads to use in locomotive cabs, technology-based solutions that detect the presence of signal-emitting portable electronic devices and that inform the railroad management about the detected devices in real time.

R-13-011 **Open-Acceptable Response**
 TO THE CANADIAN NATIONAL RAILWAY COMPANY: Incorporate the use of handheld signal detection devices into your operational efficiency program on the use of portable electronic devices.

R-16-037 **Open-Acceptable Response**
 TO THE NATIONAL RAILROAD PASSENGER CORPORATION (AMTRAK): Incorporate strategies into your initial and recurrent training for operating crewmembers for recognizing and effectively managing multiple concurrent tasks in prolonged, atypical situations to sustain their attention on current and upcoming train operations.

R-17-022 **Closed-Acceptable Action (02/19/2020)**
 TO AMTRAK (NATIONAL RAILROAD PASSENGER CORPORATION): Revise its train dispatcher rules so that potentially distracting activities, such as making personal telephone calls, are not allowed while dispatchers are on duty and responsible for safe train operations.



End Alcohol and Other Drug Impairment in Transportation

Impairment is a contributing factor in far too many transportation accidents across all modes, with alcohol impairment as a leading cause of highway crashes. **We want to continue to see states adopt per se BAC limits of 0.05 percent or below, as well as broaden their use of other effective countermeasures, like ignition interlock devices and high-visibility enforcement.** Impairment in transportation is not limited to just alcohol; it also includes impairment by other drugs—legal or illicit. **We want a national drug testing standard for passenger vehicles and stronger screening and toxicology testing in commercial transportation.**

RECOMMENDATION NO.

STATUS

Aviation

A-07-043 **Closed–Acceptable Action (04/1/2020)**

TO THE FEDERAL AVIATION ADMINISTRATION: Require that all airmen clinically diagnosed with substance dependence (including dependence on alcohol), as defined in Title 14 *Code of Federal Regulations* 67.107(a)(4)(ii), 67.207(a)(5)(i), and 67.307(a)(4)(ii), who are medically certified by the FAA subsequent to such diagnosis, are followed under guidelines for special issuance of medical certificates for the period that they hold such certificates.

A-14-092 **Closed–Acceptable Action (03/10/2020)**

TO THE FEDERAL AVIATION ADMINISTRATION: Develop, publicize, and periodically update information to educate pilots about the potentially impairing drugs identified in your toxicology test results of fatally injured pilots, and make pilots aware of less impairing alternative drugs if they are available.

A-14-095 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Conduct a study to assess the prevalence of over-the-counter, prescription, and illicit drug use among flying pilots not involved in accidents, and compare those results with findings from pilots who have died from aviation accidents to assess the safety risks of using those drugs while flying.

Highway

H-09-018 **Closed–Acceptable Action (02/01/2017)**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Establish a regulatory requirement within Title 49 *Code of Federal Regulations* 382.405 that provides the National Transportation Safety Board, in the exercise of its statutory authority, access to all positive drug and alcohol test results and refusal determinations that are conducted under the U.S. Department of Transportation testing requirements.

H-12-032 **Open–Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop and disseminate to the 50 states, the Commonwealth of Puerto Rico, and the District of Columbia blood alcohol concentration testing and reporting guidelines based on the 2012 report, *State Blood Alcohol Concentration Testing and Reporting for Drivers Involved in Fatal Crashes: Current Practices, Results, and Strategies, 1997–2009*.

H-12-033 **Open–Acceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop and disseminate to appropriate state officials a common standard of practice for drug toxicology testing, including (1) the circumstances under which tests should be conducted, (2) a minimum set of drugs for which to test, and (3) cutoff values for reporting the results.

H-12-034 **Open–Await Response**

TO THE 45 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA, WHICH HAVE LOW REPORTING RATES FOR BAC TESTING: Increase your collection, documentation, and reporting of blood alcohol concentration (BAC) test results by taking the following actions, as needed, to improve testing and reporting rates: (1) enact legislation, (2) issue regulations, and (3) improve procedures used by law enforcement agencies or testing facilities.

H-12-035 **Open–Await Response**

TO THE 45 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA, WHICH HAVE LOW REPORTING RATES FOR BAC TESTING: Once the National Highway Traffic Safety Administration has developed the blood alcohol concentration (BAC) testing and reporting guidelines recommended in Safety Recommendation H-12-32, incorporate the guidelines into a statewide action plan to achieve BAC reporting rates of at least 80 percent of fatally injured drivers and at least 60 percent of drivers who survived fatal crashes.

H-12-036 **Open–Await Response**

TO THE 50 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA: Require law enforcement agencies to collect place of last drink (POLD) data as part of any arrest or accident investigation involving an alcohol-impaired driver.

H-12-037 **Open–Await Response**

TO THE INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE AND THE NATIONAL SHERIFFS' ASSOCIATION: Inform your members of the value of collecting place of last drink (POLD) data as part of any arrest or accident investigation involving an alcohol-impaired driver.

H-12-043 **Open–Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Work with the Automotive Coalition for Traffic Safety, to accelerate widespread implementation of Driver Alcohol Detection System for Safety (DADSS) technology by (1) defining usability testing that will guide driver interface design and (2) implementing a communication program that will direct driver education and promote public acceptance.

H-12-045 **Open–Await Response**
TO 33 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA: Enact laws to require the use of alcohol ignition interlock devices for all individuals convicted of driving while intoxicated (DWI) offenses.

H-12-048 **Open–Acceptable Response**
TO THE AUTOMOTIVE COALITION FOR TRAFFIC SAFETY: Work with the National Highway Traffic Safety Administration to accelerate widespread implementation of Driver Alcohol Detection System for Safety (DADSS) technology by (1) defining usability testing that will guide driver interface design and (2) implementing a communication program that will direct driver education and promote public acceptance.

H-13-001 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Seek legislative authority to award incentive grants for states to establish a per se blood alcohol concentration (BAC) limit of 0.05 or lower for all drivers who are not already required to adhere to lower BAC limits.

H-13-005 **Open–Await Response**
TO THE 50 U.S. STATES AND THE COMMONWEALTH OF PUERTO RICO AND THE DISTRICT OF COLUMBIA: Establish a per se blood alcohol concentration (BAC) limit of 0.05 or lower for all drivers who are not already required to adhere to lower BAC limits.

H-13-006 **Open–Await Response**
TO THE 50 STATES, THE COMMONWEALTH OF PUERTO RICO AND THE DISTRICT OF COLUMBIA: Include in your impaired driving prevention plan or highway safety plan provisions for conducting high-visibility enforcement of impaired driving laws using passive alcohol-sensing technology during law enforcement contacts, such as routine traffic stops, saturation patrols, sobriety checkpoints, and accident scene responses.

H-13-007 **Open–Await Response**
TO THE 50 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA: Include in your impaired driving prevention plan or highway safety plan elements to target repeat offenders and reduce driving while intoxicated (DWI) recidivism; such elements should include measures to improve compliance with alcohol ignition interlock requirements; the plan should also provide a mechanism for regularly assessing the success of these efforts. [This recommendation supersedes Safety Recommendation H-00-26.]

H-13-008 **Open–Await Response**
TO THE 50 STATES, THE COMMONWEALTH OF PUERTO RICO, AND THE DISTRICT OF COLUMBIA: Take the following steps to move toward zero deaths from impaired driving: (1) set specific and measurable targets for reducing impaired driving fatalities and injuries, (2) list these targets in your impaired driving prevention plan or highway safety plan, and (3) provide a mechanism for regularly assessing the success of implemented countermeasures and determining whether the targets have been met.

H-13-009 **Open–Await Response**
TO THE 41 STATES THAT HAVE ADMINISTRATIVE LICENSE SUSPENSION OR REVOCATION LAWS AND THE DISTRICT OF COLUMBIA: Incorporate into your administrative license suspension or revocation laws a requirement that drivers arrested for driving while intoxicated (DWI) use an alcohol ignition interlock on their vehicle for a period of time before obtaining full license reinstatement.

H-13-010 **Open–Await Response**
TO THE 10 STATES THAT DO NOT HAVE ADMINISTRATIVE LICENSE SUSPENSION OR REVOCATION LAWS AND THE COMMONWEALTH OF PUERTO RICO: Establish administrative license suspension or revocation laws that require drivers arrested for driving while intoxicated (DWI) to use an alcohol ignition interlock on their vehicle for a period of time before obtaining full license reinstatement.

H-15-038 **Open–Acceptable Alternate Response**
TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Determine the prevalence of commercial motor vehicle driver use of impairing substances, particularly synthetic cannabinoids, and develop a plan to reduce the use of such substances.

H-15-039 **Open–Unacceptable Response**
TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Work with motor carrier industry stakeholders to develop a plan to aid motor carriers in addressing commercial motor vehicle driver use of impairing substances, particularly those not covered under current drug-testing regulations such as by promoting best practices by carriers, expanding impairment detection training and authority, and developing performance-based methods of evaluation.

H-15-043 **Open–Await Response**
TO AMERICAN BUS ASSOCIATION, AMERICAN TRUCKING ASSOCIATIONS, COMMERCIAL VEHICLE SAFETY ALLIANCE, OWNER-OPERATOR INDEPENDENT DRIVERS ASSOCIATION, UNITED MOTORCOACH ASSOCIATION: Inform your members about the dangers of driver use of synthetic drugs and encourage them to take steps to prevent drivers from using these substances.

H-16-008 **Open–Unacceptable Response**
TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Disseminate information to motor carriers about using hair testing as a method of detecting the use of controlled substances, under the appropriate circumstances.

H-18-035 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Examine the influence of alcohol and other drug use on motorcycle rider crash risk compared to that of passenger vehicle drivers, and develop guidelines to assist states in implementing evidence-based strategies and countermeasures to more effectively address substance-impaired motorcycle rider crashes.

H-18-056 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop and disseminate best practices, identify model specifications, and create a conforming products list for oral fluid drug screening devices.

H-18-057 **Open–Acceptable Response**
TO THE NATIONAL TRAFFIC SAFETY ADMINISTRATION: Evaluate best practices and countermeasures found to be the most effective in reducing fatalities, injuries, and crashes involving drug-impaired drivers and provide additional guidance to the states on drug-impaired driving in *Countermeasures That Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices*.

End Alcohol and Other Drug Impairment in Transportation – *continued*

H-18-060 **Open–Await Response**

TO THE STATE OF TEXAS: Conduct an executive-level review of your impaired driving program and implement data-driven strategies that result in a downward trend in the number of fatalities, injuries, and crashes involving alcohol- and other drug-impaired drivers.

H-18-061 **Open–Unacceptable Response**

TO THE TEXAS DEPARTMENT OF TRANSPORTATION: Promote the importance of attending drug-impaired driving enforcement training and increase training access to meet the demands of local and state law enforcement.

Intermodal

I-14-001 **Open–Acceptable Response**

TO THE FIFTY STATES, THE DISTRICT OF COLUMBIA, AND THE COMMONWEALTH OF PUERTO RICO: Include in all state guidelines regarding prescribing controlled substances for pain a recommendation that health care providers discuss with patients the effect their medical condition and medication use may have on their ability to safely operate a vehicle in any mode of transportation.

I-14-002 **Open–Acceptable Response**

TO THE FIFTY STATES, THE DISTRICT OF COLUMBIA, AND THE COMMONWEALTH OF PUERTO RICO: Use existing newsletters or other routine forms of communication with licensed health care providers and pharmacists to highlight the importance of routinely discussing with patients the effect their diagnosed medical conditions or recommended drugs may have on their ability to safely operate a vehicle in any mode of transportation.

Marine

M-12-008 **Open–Acceptable Response**

TO THE UNITED STATES COAST GUARD: Align your standards for postaccident toxicological testing of Coast Guard military personnel with the requirements specified in Title 46 *Code of Federal Regulations* 4.06-3.

M-12-009 **Open–Acceptable Response**

TO THE UNITED STATES COAST GUARD: Align your standards for postaccident toxicological testing of Coast Guard civilian personnel, seeking appropriate legislative authority if necessary, with the requirements specified in Title 46 *Code of Federal Regulations* 4.06-3.

M-12-010 **Open–Acceptable Response**

TO THE UNITED STATES COAST GUARD: Disseminate guidance within the Coast Guard so that commanding officers have unambiguous instruction detailing the requirements for timely drug and alcohol testing of Coast Guard military and civilian personnel whose work performance may be linked to a serious marine incident.

Railroad

R-00-002 **Open–Acceptable Alternate Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop, then periodically publish, an easy-to-understand source of information for train operating crewmembers on the hazards of using specific medications when performing their duties.

R-00-003 **Open–Acceptable Alternate Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Establish and implement an educational program targeting train operating crewmembers that, at a minimum, ensures that all crewmembers are aware of the source of information described in R-00-2 regarding the hazards of using specific medications when performing their duties.

R-00-004 **Closed–Acceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Establish, in coordination with the U.S. Dept. of Transportation, the Federal Motor Carrier Safety Administration, the Federal Transit Administration, and the U.S. Coast Guard, comprehensive toxicological testing requirements for an appropriate sample of fatal highway, railroad, transit, and marine accidents to ensure the identification of the role played by common prescription and over-the-counter medications. Review and analyze the results of such testing at intervals not to exceed every 5 years.

R-01-017 **Closed–Acceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Modify Title 49 *Code of Federal Regulations* 219.201(b) as necessary to ensure that the exemption from mandatory postaccident drug and alcohol testing for those involved in highway-rail grade crossing accidents does not apply to any railroad signal, maintenance, and other employees whose actions at or near a grade crossing involved in an accident may have contributed to the occurrence or severity of the accident.

R-08-007 **Open–Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Revise the definition of covered employee under Title 49 *Code of Federal Regulations* Part 219 for purposes of Congressionally mandated alcohol and controlled substances testing programs to encompass all employees and agents performing safety-sensitive functions, as described in Title 49 *Code of Federal Regulations* 209.301 and 209.303.

R-10-005 **Open–Unacceptable Response**

TO THE FEDERAL TRANSIT ADMINISTRATION: Seek authority similar to Federal Railroad Administration regulations (Title 49 *Code of Federal Regulations* 219.207) to require that transit agencies obtain toxicological specimens from covered transit employees and contractors who are fatally injured as a result of an on-duty accident.

R-13-021 **Open–Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop medical certification regulations for employees in safety-sensitive positions that include, at a minimum, (1) a complete medical history that includes specific screening for sleep disorders, a review of current medications, and a thorough physical examination, (2) standardization of testing protocols across the industry, and (3) centralized oversight of certification decisions for employees who fail initial testing; and consider requiring that medical examinations be performed by those with specific training and certification in evaluating medication use and health issues related to occupational safety on railroads. [This recommendation supersedes Safety Recommendations R-02-24 through -26.]



Ensure the Safe Transportation of Hazardous Materials

More than 2 million miles of pipeline deliver 24 percent of the natural gas and 39 percent of the total oil consumed in the United States, yet only 16 percent of U.S. rail tank cars carrying flammable liquids meet the improved safety specifications for DOT-117/DOT-117R cars. As infrastructure ages, the risk to the public from pipeline ruptures also grows, and older, more dangerous tank cars continue to carry flammable liquids. **We are calling on the railroad industry to meet existing federal deadlines for replacing or retrofitting rail tank cars, and on the pipeline industry to conduct adequate risk assessments. Failure to meet safety standards by—or ahead of—deadlines places communities near railroads or above pipelines at an unacceptable risk.**

RECOMMENDATION NO.

STATUS

Pipeline

P-10-004 **Open—Acceptable Response**
 TO THE PACIFIC GAS AND ELECTRIC COMPANY: If you are unable to comply with Safety Recommendations P-10-2 (Urgent) and P-10-3 (Urgent) to accurately determine the maximum allowable operating pressure of Pacific Gas and Electric Company natural gas transmission lines in class 3 and class 4 locations and class 1 and class 2 high consequence areas that have not had a maximum allowable operating pressure established through prior hydrostatic testing, determine the maximum allowable operating pressure with a spike test followed by a hydrostatic pressure test.

P-10-006 **Open—Acceptable Response**
 TO THE CALIFORNIA PUBLIC UTILITIES COMMISSION: If such a document and records search cannot be satisfactorily completed, provide oversight to any spike and hydrostatic tests that Pacific Gas and Electric Company is required to perform according to Safety Recommendation (P-10-4).

P-11-010 **Open—Acceptable Response**
 TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Require that all operators of natural gas transmission and distribution pipelines equip their supervisory control and data acquisition systems with tools to assist in recognizing and pinpointing the location of leaks, including line breaks; such tools could include a real-time leak detection system and appropriately spaced flow and pressure transmitters along covered transmission lines.

P-11-011 **Open—Acceptable Response**
 TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Amend Title 49 *Code of Federal Regulations* 192.935(c) to directly require that automatic shutoff valves or remote control valves in high consequence areas and in class 3 and 4 locations be installed and spaced at intervals that consider the factors listed in that regulation.

P-11-014 **Closed—Acceptable Alternate Action (01/23/2020)**
 TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Amend Title 49 *Code of Federal Regulations* 192.619 to delete the grandfather clause and require that all gas transmission pipelines constructed before 1970 be subjected to a hydrostatic pressure test that incorporates a spike test.

P-11-015 **Closed—Acceptable Action (01/23/2020)**
 TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Amend Title 49 *Code of Federal Regulations* Part 192 of the federal pipeline safety regulations so that manufacturing- and construction-related defects can only be considered stable if a gas pipeline has been subjected to a postconstruction hydrostatic pressure test of at least 1.25 times the maximum allowable operating pressure.

P-11-023 **Open—Acceptable Response**
 TO THE CALIFORNIA PUBLIC UTILITIES COMMISSION: Require the Pacific Gas and Electric Company to correct all deficiencies identified as a result of the San Bruno, California, accident investigation, as well as any additional deficiencies identified through the comprehensive audit recommended in Safety Recommendation P-11-22, and verify that all corrective actions are completed.

P-12-003 **Open—Unacceptable Response**
 TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Revise Title 49 *Code of Federal Regulations* 195.452 to clearly state (1) when an engineering assessment of crack defects, including environmentally assisted cracks, must be performed; (2) the acceptable methods for performing these engineering assessments, including the assessment of cracks coinciding with corrosion with a safety factor that considers the uncertainties associated with sizing of crack defects; (3) criteria for determining when a probable crack defect in a pipeline segment must be excavated and time limits for completing those excavations; (4) pressure restriction limits for crack defects that are not excavated by the required date; and (5) acceptable methods for determining crack growth for any cracks allowed to remain in the pipe, including growth caused by fatigue, corrosion fatigue, or stress corrosion cracking as applicable.

Ensure the Safe Transportation of Hazardous Materials

— continued

P-12-004 **Closed-Acceptable Action (01/23/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Revise Title 49 *Code of Federal Regulations* 195.452(h)(2), the “discovery of condition,” to require, in cases where a determination about pipeline threats has not been obtained within 180 days following the date of inspection, that pipeline operators notify the Pipeline and Hazardous Materials Safety Administration and provide an expected date when adequate information will become available.

P-14-001 **Closed-Acceptable Action (01/23/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Revise Title 49 *Code of Federal Regulations* Section 903, Subpart O, Gas Transmission Pipeline Integrity Management, to add principal arterial roadways including interstates, other freeways and expressways, and other principal arterial roadways as defined in the Federal Highway Administration’s *Highway Functional Classification Concepts, Criteria and Procedures* to the list of “identified sites” that establish a high consequence area.

P-15-004 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Increase the positional accuracy of pipeline centerlines and pipeline attribute details relevant to safety in the National Pipeline Mapping System.

P-15-005 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Revise the submission requirement to include high consequence area identification as an attribute data element to the National Pipeline Mapping System.

P-15-010 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Update guidance for gas transmission pipeline operators and inspectors on the evaluation of interactive threats. This guidance should list all threat interactions that must be evaluated and acceptable methods to be used.

P-15-011 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Develop and implement specific risk assessment training for inspectors in verifying the technical validity of risk assessments that operators use.

P-15-013 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Update guidance for gas transmission pipeline operators and inspectors on critical components of risk assessment approaches. Include (1) methods for setting weighting factors, (2) factors that should be included in consequence of failure calculations, and (3) appropriate risk metrics and methods for aggregating risk along a pipeline.

P-15-017

Open-Acceptable Response

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Develop a program to use the data collected in Response to Safety Recommendations P-15-15 and P-15-16 to evaluate the relationship between incident occurrences and (1) inappropriate elimination of threats, (2) interactive threats, and (3) risk assessment approaches used by the gas transmission pipeline operators. Disseminate the results of your evaluation to the pipeline industry, inspectors, and the public annually.

P-15-018 **Closed-Acceptable Alternate Action (01/23/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Require that all natural gas transmission pipelines be capable of being in-line inspected by either reconfiguring the pipeline to accommodate in-line inspection tools or by the use of new technology that permits the inspection of previously uninspectable pipelines; priority should be given to the highest risk transmission pipelines that considers age, internal pressure, pipe diameter, and class location. [Safety Recommendation P-15-018 superseded Safety Recommendation P-11-017.]

P-15-020 **Closed-Acceptable Action (01/23/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Identify all operational complications that limit the use of in-line inspection tools in pluggable pipelines, develop methods to eliminate the operational complications, and require operators to use these methods to increase the use of in-line inspection tools.

P-15-021 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Develop and implement a plan for eliminating the use of direct assessment as the sole integrity assessment method for gas transmission pipelines.

P-15-022 **Open-Acceptable Alternate Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Develop and implement a plan for all segments of the pipeline industry to improve data integration for integrity management through the use of geographic information systems.

P-15-034 **Closed-Acceptable Action (01/28/2020)**

TO CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.: Revise your plastic pipe fusion welding procedure to require cleaning of the surfaces to be welded with suitable solvents to remove all dirt, water, oil, paint, and other contaminants as recommended in ASTM F2620, *Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*.

P-17-001 **Open-Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Work with pipeline trade and standards organizations to modify the pipeline dent acceptance criteria to account for all the factors that lead to pipe failures caused by dents, and promulgate regulations to require the new criteria be incorporated into integrity management programs.

P-17-002 **Open-Unacceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Require operators to either (a) repair all excavated dent defects, or (b) install a local leak detection system at each location where a dent is not repaired, continuously monitor for hydrocarbons, and promptly take corrective action to stop a detected leak.

P-17-003 **Closed-Acceptable Action (07/01/2019)**

TO THE COLONIAL PIPELINE COMPANY: Revise the dent excavation evaluation procedure to require either (a) the repair of all excavated dent defects, or (b) the installation of a local leak detection system at each location where a dent is not repaired, continuous monitoring for hydrocarbons, and prompt corrective action to stop a detected leak.

CLOSED: CAA

P-18-001 **Closed-Acceptable Action (07/24/2019)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Work with state pipeline regulators to incorporate into their inspection programs a review to ensure that gas distribution pipeline operators are using best practices recommended by the manufacturer in their distribution integrity management programs, including using the specified tools and methods, to correctly install PermaLock mechanical tapping tee assemblies.

CLOSED: CAA

P-18-003 **Closed-Acceptable Alternate Action (03/12/2019)**

TO HONEYWELL: Update your PermaLock mechanical tapping tee assembly installation instructions to specify the exact tools that should be used during installation and explain what an installer should sense while using those tools throughout the installation process.

CLOSED: CAAA

P-18-004 **Open-Acceptable Alternate Response**

TO HONEYWELL: Specify in your PermaLock mechanical tapping tee assembly installation instructions a not-to-exceed torque limit for nylon bolts and have that value checked and adjusted with a torque wrench immediately after installation.

P-18-005 **Closed-Acceptable Action (10/24/2019)**

TO THE COMMONWEALTH OF MASSACHUSETTS: Eliminate the professional engineer licensure exemption for public utility work and require a professional engineer's seal on public utility engineering drawings.

CLOSED: CAA

P-18-006 **Closed-Acceptable Action (10/24/2019)**

TO NISOURCE: Revise the engineering plan and constructability review process across all of your subsidiaries to ensure that all applicable departments review construction documents for accuracy, completeness, and correctness, and that the documents or plans be sealed by a professional engineer prior to commencing work. (Urgent)

CLOSED: CAA

P-18-007 **Closed-Acceptable Action (07/22/2019)**

TO NISOURCE: Review and ensure that all records and documentation of your natural gas systems are traceable, reliable, and complete. (Urgent)

CLOSED: CAA

P-18-008 **Closed-Acceptable Action (10/24/2019)**

TO NISOURCE: Apply management of change process to all changes to adequately identify system threats that could result in a common mode failure. (Urgent)

CLOSED: CAA

P-18-009 **Closed-Acceptable Action (07/22/2019)**

TO NISOURCE: Develop and implement control procedures during modifications to gas mains to mitigate the risks identified during management of change operations. Gas main pressures should be continually monitored during these modifications and assets should be placed at critical locations to immediately shut down the system if abnormal operations are detected. (Urgent)

CLOSED: CAA

Railroad

R-01-002 **Closed-Acceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Evaluate, with the assistance of the Research and Special Programs Administration, the Association of American Railroads, and the Railway Progress Institute, the deterioration of pressure relief devices through normal service and then develop inspection criteria to ensure that the pressure relief devices remain functional between regular inspection intervals. Incorporate these inspection criteria into the U.S. Department of Transportation hazardous materials regulations.

CLOSED: CAA

R-04-007 **Closed-Acceptable Action Superseded (02/14/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop and implement tank car design-specific fracture toughness standards, such as a minimum average Charpy value, for steels and other materials of construction for pressure tank cars used for the transportation of U.S. Department of Transportation class 2 hazardous materials, including those in "low temperature" service. The performance criteria must apply to the material orientation with the minimum impact resistance and take into account the entire range of operating temperatures of the tank car. [Safety Recommendation R-04-007 superseded by Safety Recommendation R-19-001.]

CLOSED: CAAS

R-14-002 **Closed-Acceptable Alternate Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop a program to audit response plans for rail carriers of petroleum products to ensure that adequate provisions are in place to respond to and remove a worst-case discharge to the maximum extent practicable and to mitigate or prevent a substantial threat of a worst-case discharge.

CLOSED: CAAA

R-14-005 **Acceptable Action (01/28/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Revise the spill response planning thresholds contained in Title 49 *Code of Federal Regulations* Part 130 to require comprehensive plans to effectively provide for the carriers' ability to respond to worst-case discharges resulting from accidents involving unit trains or blocks of tank cars transporting oil and petroleum products.

CLOSED: CAA

R-14-013 **Open-Acceptable Response**

TO THE CONSOLIDATED RAIL CORPORATION: Amend *Hazardous Materials Instructions for Rail, HM-1* to require train crews to immediately provide their train consists and the emergency response information for all hazardous materials on the train to federal, state, or local emergency response officials when accidents occur.

R-14-014 **Open-Unacceptable Response**

TO THE UNITED STATES DEPARTMENT OF TRANSPORTATION: Require railroads transporting hazardous materials through communities to provide emergency responders and local and state emergency planning committees with current commodity flow data and assist with the development of emergency operations and response plans.

R-14-019 **Open-Acceptable Alternate Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Require railroads transporting hazardous materials to develop, implement, and periodically evaluate a public education program similar to Title 49 *Code of Federal Regulations* Parts 192.616 and 195.440 for the communities along railroad hazardous materials routes.

Ensure the Safe Transportation of Hazardous Materials

– continued

R-14-022 **Closed–Acceptable Action (01/02/2020)**

TO THE ASSOCIATION OF AMERICAN RAILROADS: Amend the *United States Hazardous Materials Instructions for Rail* to require train crews to immediately provide their train consists and the emergency response information for all hazardous materials on the train to federal, state, or local emergency response officials when accidents occur.

R-15-016 **Closed–No Longer Applicable (02/11/2020)**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Require an aggressive, intermediate progress milestone schedule, such as a 20 percent yearly completion metric over a 5-year implementation period, for the replacement or retrofitting of legacy DOT-111 and CPC-1232 tank cars to appropriate tank car performance standards, that includes equipping these tank cars with jackets, thermal protection, and appropriately sized pressure relief devices. (Urgent)

R-17-001 **Open–Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Evaluate the risks posed to train crews by hazardous materials transported by rail, determine the adequate separation distance between hazardous materials cars and locomotives and occupied equipment that ensures the protection of train crews during both normal operations and accident conditions, and collaborate with the Federal Railroad Administration to revise Title 49 *Code of Federal Regulations* 174.85 to reflect those findings.

R-17-002 **Open–Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Pending completion of the risk evaluation and action in accordance with its findings prescribed in Safety Recommendation R-17-01, withdraw regulatory interpretation 06-0278 that pertains to Title 49 *Code of Federal Regulations* 174.85 for positioning placarded rail cars in a train and require that all trains have a minimum of five nonplacarded cars between any locomotive or occupied equipment and the nearest placarded car transporting hazardous materials, regardless of train length and consist.

R-17-003 **Open–Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Evaluate the risks posed to train crews by hazardous materials transported by rail, determine the adequate separation distance between hazardous materials cars and locomotives and occupied equipment that ensures the protection of train crews during both normal operations and accident conditions, and collaborate with the Pipeline and Hazardous Materials Safety Administration to revise Title 49 *Code of Federal Regulations* 174.85 to reflect those findings.

R-18-027 **Open– Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Sponsor research to study and publish the difference in characteristics between denatured and undenatured ethanol and the benefits that could be achieved by transporting fuel ethanol without the use of volatile organic chemical denaturants.

R-19-001 **Open–Acceptable Response**

TO THE PIPELINE AND HAZARDOUS MATERIALS SAFETY ADMINISTRATION: Promulgate a final standard for pressure tank cars used to transport poison inhalation hazard/toxic inhalation hazard materials that includes enhanced fracture toughness requirements for tank heads and shells. [Safety Recommendation R-19-001 superseded Safety Recommendation R-04-007.]



Fully Implement Positive Train Control

Positive train control (PTC) can stop a train before a crash happens. Although Congress mandated that PTC be installed and operating by December 31, 2018, only 25 percent of passenger route miles and just 60 percent of passenger locomotives have met that criteria. A two-year extension has been granted to rail lines that are not fully compliant. **PTC must be fully implemented before the extended deadline to ensure the safety of railroad passengers and the people who live and work near railroads.**

RECOMMENDATION NO.

STATUS

Railroad

R-05-013 **Open-Acceptable Response**
TO METRA (NORTHEAST ILLINOIS REGIONAL COMMUTER RAILROAD): Install a positive train control system on your commuter train routes.

R-07-007 **Open-Acceptable Response**
TO THE CANADIAN NATIONAL RAILWAY: Develop and implement a positive train control system that includes collision avoidance capabilities on main line tracks, establishing priority requirements for high-risk corridors such as those where passenger trains operate.

R-09-014 **Open-Acceptable Response**
TO THE MASSACHUSETTS BAY TRANSPORTATION AUTHORITY: Develop and implement a positive train control system for all of your rail lines.

R-10-023 **Open-Acceptable Response**
TO ALSTOM SIGNALING, INC.: Develop and implement periodic inspection and maintenance guidelines for use by the Washington Metropolitan Area Transit Authority and other rail transit operators and railroads equipped with General Railway Signal Company audio frequency track circuit modules and assist them in identifying and removing from service all modules that exhibit pulse-type parasitic oscillation in order to ensure the vitality and integrity of the automatic train control system.

R-12-020 **Closed-Unacceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Require the use of positive train control technologies that will detect the rear of trains and prevent rear-end collisions.

R-12-027 **Open-Unacceptable Response**
TO THE FEDERAL RAILROAD ADMINISTRATION: Require railroads to install, along main lines in nonsignaled territory not equipped with positive train control, appropriate technology that warns approaching trains of incorrectly lined main track switches sufficiently in advance to permit stopping.

R-13-009 **Open-Unacceptable Response**
TO THE CANADIAN NATIONAL RAILWAY COMPANY: Discontinue the use of after-arrival track authorities in nonsignaled territory not equipped with positive train control.

R-13-016 **Open-Unacceptable Response**
TO CANADIAN PACIFIC RAILWAY LIMITED, KANSAS CITY SOUTHERN RAILWAY COMPANY, NORFOLK SOUTHERN RAILROAD, AND UNION PACIFIC RAILROAD: Discontinue the use of after-arrival track authorities for train movements in nonsignaled territory not equipped with a positive train control system.

R-13-027 **Open-Await Response**
TO ALL RAILROADS SUBJECT TO THE POSITIVE TRAIN CONTROL PROVISIONS OF THE RAIL SAFETY IMPROVEMENT ACT OF 2008: Provide positive train control implementation update reports to the Federal Railroad Administration every 6 months until positive train control implementation is complete. The update reports should consist of two sections: components and training. The components section should include a description of the positive train control component to be implemented, the number of components, the number of components completed on the report date, the number of components that remain to be completed, the overall completion percentage, and the estimated completion date. Components are defined as locomotives, wayside units, switches, base station radios, wayside radios, locomotive radios, and any new and novel technologies that are part of a positive train control system. The training section shall include the number of safety-related employees and equivalent railroad carrier contractors and subcontractors that need to be trained, by class and craft; minimum training standards for those employees and contractors, meaning the knowledge of and ability to comply with federal railroad safety laws and regulations and carrier rules and procedures to implement positive train control; the percentage of employees who have completed training; the percentage of employees who remain to be trained; and the estimated date that training will be completed.

R-13-039 **Open-Acceptable Response**
TO THE FEDERAL TRANSIT ADMINISTRATION: Issue a directive to all transit properties requiring redundant protection for roadway workers, such as positive train control, secondary warning devices, or shunting. (Urgent)

R-15-022 **Open-Acceptable Response**
TO THE FEDERAL TRANSIT ADMINISTRATION: Require rail transit agencies to implement transmission-based train control systems that prevent train collisions. [Supersedes Safety Recommendation R-09-008.]

R-15-024 **Open-Acceptable Response**
TO THE CHICAGO TRANSIT AUTHORITY: Install a transmission-based train control system on all passenger train routes.

R-17-018 **Open–Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Require railroads to install technology on hi-rail, backhoes, other independently operating pieces of maintenance-of-way equipment, and on the leading and trailing units of sets of maintenance-of-way equipment operated by maintenance workers to provide dispatchers and the dispatch system an independent source of information on the locations of this equipment to prevent unauthorized incursions by trains onto sections of track where maintenance activities are taking place in accordance with the Congressional mandate under the Rail Safety Improvement Act of 2008.

R-18-005 **Closed–Unacceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Issue an Emergency Order directing railroads to require that when signal suspensions are in effect and a switch has been reported lined for a main track, the next train or locomotive to pass the location must approach the switch location at restricted speed. After the switch position is verified, the train crew must report to the dispatcher that the switch is correctly lined for the main track before trains are permitted to operate at maximum-authorized speed. (Urgent)

CLOSED: CUA

R-18-023 **Open–Await Response**

TO THE AMERICAN PUBLIC TRANSPORTATION ASSOCIATION: Develop performance standards for the use of forward collision avoidance systems technology for light-rail vehicles operating on an urban street environment.

R-97-026 **Open–Acceptable Response**

TO CSX TRANSPORTATION INC.: Develop and install a positive train separation control system on track segments that have commuter and intercity passenger trains.



Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes

Speeding increases the likelihood of being involved in a crash and intensifies the severity of injuries sustained in a crash. Speeding-related crashes kill more than 10,000 people and cost society more than \$52 billion annually. **Proven countermeasures—including automated enforcement technology, vehicle technology, infrastructure design, and education campaigns—must be used more broadly to reduce speeding-related crashes.**

RECOMMENDATION NO.

STATUS

Highway

H-05-020 **Open–Unacceptable Response**
 TO THE TEXAS DEPARTMENT OF TRANSPORTATION: Install variable speed limit signs or implement alternate countermeasures at locations where wet weather can produce stopping distances that exceed the available sight distance.

H-12-020 **Open–Unacceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop performance standards for advanced speed-limiting technology, such as variable speed limiters and intelligent speed adaptation devices, for heavy vehicles, including trucks, buses, and motorcoaches.

H-12-021 **Open–Unacceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: After establishing performance standards for advanced speed-limiting technology for heavy commercial vehicles, require that all newly manufactured heavy vehicles be equipped with such devices.

H-17-018 **Open–Acceptable Response**
 TO THE UNITED STATES DEPARTMENT OF TRANSPORTATION: Complete the actions called for in your 2014 Speed Management Program Plan, and periodically publish status reports on the progress you have made.

H-17-019 **Open–Acceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Identify speeding-related performance measures to be used by local law enforcement agencies, including, but not limited to, the numbers and locations of speeding-related crashes of different injury severity levels, speeding citations, and warnings, and establish a consistent method for evaluating data-driven, high-visibility enforcement programs to reduce speeding. Disseminate the performance measures and evaluation method to local law enforcement agencies.

H-17-020 **Open–Acceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Identify best practices for communicating with law enforcement officers and the public about the effectiveness of data-driven, high-visibility enforcement programs to reduce speeding, and disseminate the best practices to local law enforcement agencies.

H-17-021 **Open–Acceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Work with the Governors Highway Safety Association, the International Association of Chiefs of Police, and the National Sheriffs' Association to develop and implement a program to increase the adoption of speeding-related Model Minimum Uniform Crash Criteria Guideline data elements and improve consistency in law enforcement reporting of speeding-related crashes.

H-17-022 **Open–Acceptable Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Work with the Federal Highway Administration to update the *Speed Enforcement Camera Systems Operational Guidelines* to reflect the latest automated speed enforcement (ASE) technologies and operating practices, and promote the updated guidelines among ASE program administrators.

H-17-023 **Open–Acceptable Alternate Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Work with the Federal Highway Administration to assess the effectiveness of point-to-point speed enforcement in the United States and, based on the results of that assessment, update the *Speed Enforcement Camera Systems Operational Guidelines*, as appropriate.

H-17-024 **Open–Acceptable Alternate Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Incentivize passenger vehicle manufacturers and consumers to adopt intelligent speed adaptation (ISA) systems by, for example, including ISA in the New Car Assessment Program.

H-17-025 **Open–Acceptable Alternate Response**
 TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Collaborate with other traffic safety stakeholders to develop and implement an ongoing program to increase public awareness of speeding as a national traffic safety issue. The program should include, but not be limited to, initiating an annual enforcement mobilization directed at speeding drivers.

Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes – *continued*

H-17-026 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Establish a program to incentivize state and local speed management activities.

H-17-027 **Open–Acceptable Response**
TO THE FEDERAL HIGHWAY ADMINISTRATION: Revise Section 2B.13 of the *Manual on Uniform Traffic Control Devices* so that the factors currently listed as optional for all engineering studies are required, require that an expert system such as USLIMITS2 be used as a validation tool, and remove the guidance that speed limits in speed zones should be within 5 mph of the 85th percentile speed.

H-17-029 **Open–Acceptable Response**
TO THE FEDERAL HIGHWAY ADMINISTRATION: Work with the National Highway Traffic Safety Administration to update the *Speed Enforcement Camera Systems Operational Guidelines* to reflect the latest automated speed enforcement (ASE) technologies and operating practices, and promote the updated guidelines among ASE program administrators.

H-17-030 **Open–Acceptable Response**
TO THE FEDERAL HIGHWAY ADMINISTRATION: Work with the National Highway Traffic Safety Administration to assess the effectiveness of point-to-point speed enforcement in the United States and, based on the results of that assessment, update the *Speed Enforcement Camera Systems Operational Guidelines*, as appropriate.

H-17-031 **Open–Await Response**
TO THE SEVEN STATES PROHIBITING AUTOMATED SPEED ENFORCEMENT (MAINE, MISSISSIPPI, NEW HAMPSHIRE, NEW JERSEY, TEXAS, WEST VIRGINIA, AND WISCONSIN): Amend current laws to authorize state and local agencies to use automated speed enforcement.

H-17-032 **Open–Await Response**
TO THE TWENTY EIGHT STATES WITHOUT AUTOMATED SPEED ENFORCEMENT LAWS (ALABAMA, ALASKA, CALIFORNIA, CONNECTICUT, DELAWARE, FLORIDA, GEORGIA, HAWAII, IDAHO, INDIANA, IOWA, KANSAS, KENTUCKY, MASSACHUSETTS, MICHIGAN, MINNESOTA, MISSOURI, MONTANA, NEBRASKA, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OKLAHOMA, PENNSYLVANIA, SOUTH DAKOTA, VERMONT, VIRGINIA, AND WYOMING): Authorize state and local agencies to use automated speed enforcement.

H-17-033 **Open–Await Response**
TO THE 15 STATES WITH AUTOMATED SPEED ENFORCEMENT RESTRICTIONS (ARIZONA, ARKANSAS, COLORADO, ILLINOIS, LOUISIANA, MARYLAND, NEVADA, NEW YORK, OHIO, OREGON, RHODE ISLAND, SOUTH CAROLINA, TENNESSEE, UTAH, AND WASHINGTON): Amend current laws to remove operational and location restrictions on the use of automated speed enforcement, except where such restrictions are necessary to align with best practices.

H-17-034 **Open–Acceptable Response**
TO THE GOVERNORS HIGHWAY SAFETY ASSOCIATION: Work with the National Highway Traffic Safety Administration, the International Association of Chiefs of Police, and the National Sheriffs' Association to develop and implement a program to increase the adoption of speeding-related Model Minimum Uniform Crash Criteria Guideline data elements and improve consistency in law enforcement reporting of speeding-related crashes.

H-17-035 **Open–Await Response**
TO THE INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE: Work with the National Highway Traffic Safety Administration, the Governors Highway Safety Association, and the National Sheriffs' Association to develop and implement a program to increase the adoption of speeding-related Model Minimum Uniform Crash Criteria Guideline data elements and improve consistency in law enforcement reporting of speeding-related crashes.

H-17-036 **Open–Acceptable Response**
TO THE NATIONAL SHERIFFS' ASSOCIATION: Work with the National Highway Traffic Safety Administration, the Governors Highway Safety Association, and the International Association of Chiefs of Police to develop and implement a program to increase the adoption of speeding-related Model Minimum Uniform Crash Criteria Guideline data elements and improve consistency in law enforcement reporting of speeding-related crashes.



Improve the Safety of Part 135 Aircraft Flight Operations

Air medical service, air taxi, charter, and on-demand operators are not required to adopt the same safety program criteria as Part 121 operators and could benefit from risk mitigation strategies that are subject to FAA oversight. **All Part 135 operators should implement safety management systems and flight data monitoring programs that address the unique risks associated with their operations, and the FAA should ensure compliance with standard operating procedures.**

RECOMMENDATION NO.

STATUS

Aviation

A-07-018

Open-Acceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: In cooperation with Hawaii commercial air tour operators, aviation psychologists, and meteorologists, among others, develop a cue-based training program for commercial air tour pilots in Hawaii that specifically addresses hazardous aspects of local weather phenomena and in-flight decision-making.

A-07-019

Open-Acceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: Once a cue-based training program that specifically addresses hazardous aspects of local weather phenomena and weather-related, decision-making issues is developed (as requested in Safety Recommendation A-07-18), require all commercial air tour operators in Hawaii to provide this training to newly hired pilots.

A-07-112 **Closed-Acceptable Alternate Action (01/07/2020)**

TO THE FEDERAL AVIATION ADMINISTRATION: Ensure that the minimum equipment lists for helicopters used in helicopter emergency medical services operations require that radar altimeters be operable during flights conducted at night.

A-09-092

Closed-Acceptable Action (12/07/2018)

TO THE FEDERAL AVIATION ADMINISTRATION: Permit the helicopter emergency medical services (HEMS) Aviation Digital Data Service Weather Tool to be used by HEMS operators as an official weather product.

A-10-029

Open-Acceptable Alternate Response

TO THE FEDERAL AVIATION ADMINISTRATION: Require Title 14 *Code of Federal Regulations* Part 121, 135, and 91K operators to (1) routinely download and analyze all available sources of safety information, as part of their flight operational quality assurance program, to identify deviations from established norms and procedures; (2) provide appropriate protections to ensure the confidentiality of the deidentified aggregate data; and (3) ensure that this information is used for safety-related and not punitive purposes.

A-13-012

Open-Acceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: Require the installation of a crash-resistant flight recorder system on all newly manufactured turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a flight data recorder and a cockpit voice recorder and are operating under Title 14 *Code of Federal Regulations* Parts 91, 121, or 135. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation, all as specified in Technical Standard Order C197, "Information Collection and Monitoring Systems."

A-13-013

Open-Acceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: Require all existing turbine-powered, nonexperimental, nonrestricted-category aircraft that are not equipped with a flight data recorder or cockpit voice recorder and are operating under Title 14 *Code of Federal Regulations* Parts 91, 121, or 135 to be retrofitted with a crash-resistant flight recorder system. The crash-resistant flight recorder system should record cockpit audio and images with a view of the cockpit environment to include as much of the outside view as possible, and parametric data per aircraft and system installation, all as specified in Technical Standard Order C197, "Information Collection and Monitoring Systems."

A-15-007

Open-Unacceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: Require that all existing aircraft operated under Title 14 *Code of Federal Regulations (CFR)* Part 121 or 135 and currently required to have a cockpit voice recorder and a flight data recorder be retrofitted with a crash-protected cockpit image recording system compliant with Technical Standard Order TSO-C176a, "Cockpit Image Recorder Equipment," TSO-C176a or equivalent. The cockpit image recorder should be equipped with an independent power source consistent with that required for cockpit voice recorders in 14 *CFR* 25.1457. [Supersedes Safety Recommendation A-00-30.]

A-15-008

Open-Unacceptable Response

TO THE FEDERAL AVIATION ADMINISTRATION: Require that all newly manufactured aircraft operated under Title 14 *Code of Federal Regulations (CFR)* Part 121 or 135 and required to have a cockpit voice recorder and a flight data recorder also be equipped with a crash-protected cockpit image recording system compliant with Technical Standard Order TSO-C176a, "Cockpit Image Recorder Equipment," or equivalent. The cockpit image recorder should be equipped with an independent power source consistent with that required for cockpit voice recorders in 14 *CFR* 25.1457. [Supersedes Safety Recommendation A-00-31.]

Improve the Safety of Part 135 Aircraft Flight Operations – continued

A-16-034 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require all Title 14 *Code of Federal Regulations* Part 135 operators to install flight data recording devices capable of supporting a flight data monitoring program.

A-16-035 **Open–Acceptable Alternate Response**

TO THE FEDERAL AVIATION ADMINISTRATION: After the action in Safety Recommendation A-16-34 is completed, require all Title 14 *Code of Federal Regulations* Part 135 operators to establish a structured flight data monitoring program that reviews all available data sources to identify deviations from established norms and procedures and other potential safety issues.

A-16-036 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require all Title 14 *Code of Federal Regulations* Part 135 operators to establish safety management system programs.

A-17-035 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Implement ways to provide effective terrain awareness and warning system (TAWS) protections while mitigating nuisance alerts for single-engine airplanes operated under Title 14 *Code of Federal Regulations* Part 135 that frequently operate at altitudes below their respective TAWS class design alerting threshold.

A-17-037 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Work with members of the Ketchikan air tour industry to improve existing training programs aimed at reducing the risk of weather-related accidents involving continuation of flight under visual flight rules into instrument meteorological conditions, with special attention paid to the human factors issues identified in this investigation, including (1) the need to help pilots better calibrate what constitutes safe weather conditions to conduct flights based on objective standards and requirements, such as set criteria for what landmarks must be clearly visible from which locations in order to proceed on a particular route; (2) the need to help pilots who are new to the area recognize dynamic local weather patterns that can place them in a dangerous situation; and (3) operational influences on pilot decision-making.

A-17-038 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Expand the application of Federal Aviation Administration Order 8900.1, volume 3, chapter 19, section 6, "Safety Assurance System: Flight Training Curriculum Segments," paragraphs 3-1251(B) and 3-1252, which address controlled flight into terrain-avoidance training programs for Title 14 *Code of Federal Regulations* (CFR) Part 135 helicopter operations, to all 14 CFR Part 135 operations.

A-17-042 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Analyze automatic dependent surveillance-broadcast data from Ketchikan air tour operations on an ongoing basis and meet annually with Ketchikan air tour operators to engage in a nonpunitive discussion of any operational hazards reflected in the data and collaborate on mitigation strategies for any hazards identified.

A-17-043 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Develop and implement special operating rules for the Ketchikan air tour industry that include en route visual flight rules weather minimums that are tailored to the industry's unique requirements and are more conservative than those specified in Title 14 *Code of Federal Regulations* Part 135.

A-18-013 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Although controlled flight into terrain (CFIT)-avoidance training programs are not required by federal regulation for Title 14 *Code of Federal Regulations* Part 135 fixed-wing operations, work with Part 135 operators in Alaska to improve any voluntarily implemented training programs aimed at reducing the risk of CFIT accidents involving continuation of flight under visual flight rules (VFR) into instrument meteorological conditions, with special attention paid to the human factors issues identified in recent Alaska accident investigations, including, but not limited to, (1) the challenges of flying in mountainous terrain in Alaska and low-altitude VFR flight in an area subject to rapid changes in weather; and (2) limitations of the Alaska infrastructure, particularly weather observations, communications, and navigation aids.

A-18-014 **Open–Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Work with Title 14 *Code of Federal Regulations* Part 135 certificate holders that operate under visual flight rules in the aircraft's required terrain awareness and warning system (TAWS) class to (1) ensure that management and pilots are aware of the risks associated with distraction (from continuous nuisance alerts) and complacency (brought about by routine use of the terrain inhibit feature); (2) develop plans for mitigating those risks and minimizing nuisance alerts; and (3) develop procedures that specifically address when pilots should test, inhibit, and uninhibit the TAWS alerts, considering the operator's typical operations and the TAWS manufacturer's guidance.

A-18-016 **Open–Await Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Install communications equipment throughout Alaska, after determining what would be most effective, to allow increased access to the instrument flight rules system, giving priority to those areas used by Title 14 *Code of Federal Regulations* Part 135 operators.

A-18-017 **Open–Await Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Ensure that Alaska airports that are served by Title 14 *Code of Federal Regulations* (CFR) Part 135 operators and have instrument approaches are equipped with weather-reporting capabilities to enable instrument flight rules operations in accordance with 14 CFR 135.225(a).



Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles

Motor vehicle crashes are a leading cause of death and injury in the U.S., and many of them could be prevented with collision avoidance systems that are already available. **Vehicle manufacturers should make this technology standard equipment on all vehicles. And consumers, informed about the technology's capabilities and limitations, should buy vehicles equipped with it.**

RECOMMENDATION NO. _____ STATUS _____

Highway

H-15-004 **Open–Unacceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop and apply testing protocols to assess the performance of forward collision avoidance systems in passenger vehicles at various velocities, including high speed and high velocity-differential.

H-15-005 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Complete, as soon as possible, the development and application of performance standards and protocols for the assessment of forward collision avoidance systems in commercial vehicles. [Safety Recommendation H-15-005 supersedes Safety Recommendation H-01-006.]

H-15-006 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Expand the New Car Assessment Program 5-star rating system to include a scale that rates the performance of forward collision avoidance systems.

H-15-007 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Once the rating scale, described in Safety Recommendation H-15-6, is established, include the ratings of forward collision avoidance systems on the vehicle Monroney labels.

H-15-008 **Open–Acceptable Response**
TO PASSENGER VEHICLE, TRUCK-TRACTOR, MOTORCOACH, AND SINGLE-UNIT TRUCK MANUFACTURERS: Install forward collision avoidance systems that include, at a minimum, a forward collision warning component, as standard equipment on all new vehicles.

H-15-009 **Open–Acceptable Response**
TO PASSENGER VEHICLE, TRUCK-TRACTOR, MOTORCOACH, AND SINGLE-UNIT TRUCK MANUFACTURERS: Once the National Highway Traffic Safety Administration publishes performance standards for autonomous emergency braking, install systems meeting those standards on all new vehicles.

H-18-008 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Require all new school buses to be equipped with collision avoidance systems and automatic emergency braking technologies.

H-18-019 **Open–Await Response**
TO BLUE BIRD CORPORATION, COLLINS INDUSTRIES, INC., IC BUS, STARCRAFT BUS, THOMAS BUILT BUSES, INC., TRANS TECH, AND VAN-CON, INC.: Install a collision avoidance system with automatic emergency braking as standard equipment on all newly manufactured school buses.

H-18-029 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Incorporate motorcycles in the development of performance standards for passenger vehicle crash warning and prevention systems.

H-18-043 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Incorporate pedestrian safety systems, including pedestrian collision avoidance systems and other more-passive safety systems, into the New Car Assessment Program.

H-18-044 **Open–Acceptable Response**
TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop a detailed pedestrian crash data set that represents the current, complete range of crash types and that can be used for local and state analysis and to model and simulate pedestrian collision avoidance systems.



Reduce Fatigue-Related Accidents

Fatigue is a pervasive problem in transportation that degrades a person's ability to stay awake, alert, and attentive to the demands of safely controlling a vehicle, vessel, aircraft, or train. **We are calling for a comprehensive approach to combating fatigue in transportation, focusing on research, education, and training; technology; sleep disorder treatment; hours-of-service regulations; and on- and off-duty scheduling policies and practices.**

RECOMMENDATION NO.

STATUS

Aviation

A-13-003 **Open–Acceptable Alternate Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require that personnel performing maintenance or inspections under Title 14 *Code of Federal Regulations* Parts 121, 135, 145, and 91 Subpart K receive initial and recurrent training on human factors affecting maintenance that includes a review of the causes of human error, including fatigue, its effects on performance, and actions individuals can take to prevent the development of fatigue.

A-14-072 **Open–Unacceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require principal operations inspectors to ensure that operators with flight crews performing Title 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K overnight operations brief the threat of fatigue before each departure, particularly those occurring during the window of circadian low.

A-14-087 **Open–Acceptable Response**

TO UPS (UNITED PARCEL SERVICE) AIRLINES: Work with the Independent Pilots Association to conduct an independent review of the fatigue event reporting system to determine the program's effectiveness as a nonpunitive mechanism to identify and effectively address the reported fatigue issues. Based on the findings, implement changes to enhance the safety effectiveness of the program.

A-14-088 **Open–Acceptable Response**

TO UPS (UNITED PARCEL SERVICE) AIRLINES: Work with the Independent Pilots Association to counsel pilots who call in fatigued and whose sick bank is debited to understand why the fatigue call was made and how to prevent it from recurring.

A-14-089 **Open–Acceptable Response**

TO THE INDEPENDENT PILOTS ASSOCIATION: Work with UPS to conduct an independent review of the fatigue event reporting system to determine the program's effectiveness as a nonpunitive mechanism to identify and effectively address the reported fatigue issues. Based on the findings, implement changes to enhance the safety effectiveness of the program.

A-14-090 **Open–Acceptable Response**

TO THE INDEPENDENT PILOTS ASSOCIATION: Work with UPS to counsel pilots who call in fatigued and whose sick bank is debited to understand why the fatigue call was made and how to prevent it from recurring.

A-18-029 **Open–Await Response**

TO TRANSPORT CANADA: Revise current regulations to address the potential for fatigue for pilots on reserve duty who are called to operate evening flights that would extend into the pilots' window of circadian low.

A-94-194 **Open–Unacceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Revise the Federal Aviation Regulations contained in Title 14 *Code of Federal Regulations* Part 135 to require that pilot flight time accumulated in all company flying conducted after revenue operations—such as training and check flights, ferry flights and repositioning flights—be included in the crew-member's total flight time accrued during revenue operations.

A-95-113 **Open–Unacceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Finalize the review of current flight and duty time regulations and revise the regulations, as necessary, within 1 year to ensure that flight and duty time limitations take into consideration research findings in fatigue and sleep issues. The new regulations should prohibit air carriers from assigning flightcrews to flights conducted under Title 14 *Code of Federal Regulations* (CFR) Part 91 unless the flightcrews meet the flight and duty time limitations of 14 CFR Part 121 or other appropriate regulations.

Highway

H-09-009 **Open–Await Response**

TO THE AMERICAN BUS ASSOCIATION AND THE UNITED MOTORCOACH ASSOCIATION: Inform your members through Web sites, newsletters, and conferences of the circumstances of the Mexican Hat, Utah, accident. The prepared information should encourage charter operators to develop written contingency plans for each charter to ensure that trip planning is in place in the event of driver fatigue, incapacitation, or illness or in the event of trip delays necessitating replacement drivers to avoid hours-of-service violations and inform drivers of their trip's contingency plans. The prepared information should also provide information about the risks of operating in rural areas without wireless telephone coverage and advise members to carry mobile cellular amplifiers or satellite-based devices to communicate emergency events.

H-09-010 **Open-Acceptable Response**

TO ARROW STAGE LINES: Develop written contingency plans for each charter to ensure that trip planning is in place in the event of driver fatigue, incapacitation, or illness or in the event of trip delays necessitating replacement drivers to avoid hours-of-service violations and inform drivers of their trip's contingency plans.

H-09-015 **Open-Unacceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Implement a program to identify commercial drivers at high risk for obstructive sleep apnea and require that those drivers provide evidence through the medical certification process of having been appropriately evaluated and, if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification.

H-09-016 **Open-Acceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Develop and disseminate guidance for commercial drivers, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea (OSA), emphasizing that drivers who have OSA that is effectively treated are routinely approved for continued medical certification.

H-12-029 **Closed-Unacceptable Action (06/03/2019)**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Establish an ongoing program to monitor, evaluate, report on, and continuously improve fatigue management programs implemented by motor carriers to identify, mitigate, and continuously reduce fatigue-related risks for drivers. [This safety recommendation supersedes Safety Recommendation H-08-14.]

CLOSED: CUA

H-12-030 **Open-Unacceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Incorporate scientifically based fatigue mitigation strategies into the hours-of-service regulations for passenger-carrying drivers who operate during the nighttime window of circadian low.

H-15-022 **Closed-Acceptable Action (03/30/2020)**

TO WAL-MART STORES INC. (ORIGINALLY ISSUED TO WALMART TRANSPORTATION LLC): Develop and implement a fatigue management program based on the North American Fatigue Management Program guidelines.

CLOSED: CAA

H-17-049 **Open-Acceptable Alternate Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Make the 2016 Medical Review Board/Motor Carrier Safety Advisory Committee recommendations on screening for obstructive sleep apnea (OSA) easily accessible to certified medical examiners, and instruct the examiners to use the recommendations as guidance when evaluating commercial drivers for OSA risk.

H-17-056 **Open-Acceptable Response**

TO THE UNITED STATES DEPARTMENT OF LABOR: Develop and disseminate guidelines and training material for agricultural employers and farm labor contractors on the dangers of driving while tired and on strategies for managing driver fatigue.

Marine

M-16-004 **Open-Acceptable Response**

TO THE UNITED STATES COAST GUARD: Address the risks associated with watch stander fatigue by implementing Commandant Instruction 3500.2, Crew Endurance Management, issued on March 30, 2006, in all operational units.

Railroad

R-06-003 **Closed-Superseded (04/10/2020)**

TO THE FEDERAL TRANSIT ADMINISTRATION: Require transit agencies, through the system safety program and hazard management process if necessary, to ensure that the time off between daily tours of duty, including regular and overtime assignments, allows train operators to obtain at least 8 hours of uninterrupted sleep. [Safety Recommendation R-06-003 superseded by Safety Recommendation R-15-019.]

CLOSED: CS

R-09-011 **Open-Acceptable Response**

TO 46 US RAIL TRANSIT AGENCIES: Establish a program to identify operators who are at high risk for obstructive sleep apnea or other sleep disorders and require that such operators be appropriately evaluated and treated.

R-12-016 **Open-Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Require railroads to medically screen employees in safety-sensitive positions for sleep apnea and other sleep disorders.

R-12-017 **Open-Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Establish an ongoing program to monitor, evaluate, report on, and continuously improve fatigue management systems implemented by operating railroads to identify, mitigate, and continuously reduce fatigue-related risks for personnel performing safety-critical tasks, with particular emphasis on biomathematical models of fatigue.

R-12-018 **Open-Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Conduct research on new and existing methods that can identify fatigue and mitigate performance decrements associated with fatigue in on-duty train crews.

R-12-019 **Open-Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Require the implementation of methods that can identify fatigue and mitigate performance decrements associated with fatigue in on-duty train crews that are identified or developed in response to Safety Recommendation R-12-18.

R-12-025 **Open-Acceptable Alternate Response**

TO THE BNSF RAILWAY: Require all employees and managers who perform or supervise safety-critical tasks to complete fatigue training on an annual basis and document when they have received this training.

R-12-026 **Open-Unacceptable Response**

TO THE BNSF RAILWAY: Medically screen employees in safety-sensitive positions for sleep apnea and other sleep disorders.

Reduce Fatigue-Related Accidents – continued

R-13-021 Open–Unacceptable Response

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop medical certification regulations for employees in safety-sensitive positions that include, at a minimum, (1) a complete medical history that includes specific screening for sleep disorders, a review of current medications, and a thorough physical examination, (2) standardization of testing protocols across the industry, and (3) centralized oversight of certification decisions for employees who fail initial testing; and consider requiring that medical examinations be performed by those with specific training and certification in evaluating medication use and health issues related to occupational safety on railroads. [This recommendation supersedes Safety Recommendations R-02-24 through -26.]

R-14-062 Closed–Acceptable Action (11/08/2019)

TO METRO-NORTH RAILROAD: Revise your medical protocols for employees in safety-sensitive positions to include specific protocols on sleep disorders, including obstructive sleep apnea.

R-14-064 Closed–Acceptable Action (11/08/2019)

TO METRO-NORTH RAILROAD: Develop and implement protocols to routinely screen and fully evaluate your safety-sensitive employees for sleep disorders and ensure that such disorders are adequately addressed if diagnosed.

R-14-065 Closed–Acceptable Action (11/08/2019)

TO THE LONG ISLAND RAILROAD: Develop and implement protocols to routinely screen and fully evaluate your safety-sensitive employees for sleep disorders and ensure that such disorders are adequately addressed, if diagnosed.

R-14-071 Open–Acceptable Alternate Response

TO THE ASSOCIATION OF AMERICAN RAILROADS, THE AMERICAN PUBLIC TRANSPORTATION ASSOCIATION, THE AMERICAN SHORT LINE AND REGIONAL RAILROAD ASSOCIATION, THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS, AND THE INTERNATIONAL ASSOCIATION OF SHEET METAL, AIR, RAIL AND TRANSPORTATION WORKERS: Collaborate to develop a model national labor agreement that supports effective programs for addressing sleep disorders and other medical conditions among safety-sensitive train operating personnel.

R-15-018 Open–Acceptable Response

TO THE FEDERAL TRANSIT ADMINISTRATION: Develop a work scheduling program for rail transit agencies that incorporates fatigue science—such as validated biomathematical models of fatigue—and provides for the management of personnel fatigue risks, and implement the program through the state safety oversight program.

R-15-019 Open–Unacceptable Response

TO THE FEDERAL TRANSIT ADMINISTRATION: Establish (through the state safety oversight program) scientifically based hours-of-service regulations that set limits on hours of service, provide predictable work and rest schedules, and consider circadian rhythms and human sleep and rest requirements. [This recommendation supersedes Safety Recommendation R-06-003.]

R-15-020 Open–Acceptable Response

TO THE FEDERAL TRANSIT ADMINISTRATION: Identify the necessary training and certification needs for work schedulers in the rail transit industry and require the transit agencies—through the state safety oversight program—to provide additional training or certification for their work schedulers.

R-15-021 Open–Acceptable Response

TO THE FEDERAL TRANSIT ADMINISTRATION: Require (through the state safety oversight program) rail transit employees who develop work schedules to complete initial and recurrent training based on current fatigue science to identify and mitigate work schedule risks that contribute to operator fatigue.

R-16-043 Open–Unacceptable Response

TO THE FEDERAL RAILROAD ADMINISTRATION: Require freight railroads to use validated biomathematical fatigue models, similar to the models used by passenger railroads, to develop work schedules that do not pose an excessive risk of fatigue.

R-16-044 Open–Unacceptable Response

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop and enforce medical standards that railroad employees in safety-sensitive positions diagnosed with sleep disorders must meet to be considered fit for duty.

R-16-045 Open–Await Response

TO BNSF RAILWAY, CANADIAN NATIONAL RAILWAY, CANADIAN PACIFIC RAILWAY, CSX TRANSPORTATION, KANSAS CITY SOUTHERN RAILWAY, NORFOLK SOUTHERN RAILWAY, INTERCITY RAILROADS, AND COMMUTER RAILROADS: Review and revise as necessary your medical rules, standards, or protocols to ensure you are informed of any diagnosed sleep disorders that employees in safety-sensitive positions must report and, when an employee makes such a report, perform periodic evaluations to ensure the condition is appropriately treated and the employee is fit for duty.

R-16-046 Open–Await Response

TO CLASS I RAILROADS: Revise your scheduling practices for train crews and implement science-based tools, such as validated biomathematical models, to reduce start time variability that results in irregular work-rest cycles and fatigue.

R-16-047 Open–Acceptable Response

TO UNION PACIFIC RAILROAD: Revise your medical rules to add any diagnosed sleep disorder to the list of medical conditions that employees in safety-sensitive positions must report and, when an employee makes such a report, perform periodic evaluations to ensure the condition is appropriately treated and the employee is fit for duty.

R-18-004 Open–Acceptable Response

TO NEW JERSEY TRANSIT AND METROPOLITAN TRANSPORTATION AUTHORITY: Ensure that operator impairment due to medical conditions, including obstructive sleep apnea, is part of the hazard management portion of your system safety program plan.



Require Medical Fitness—Screen for and Treat Obstructive Sleep Apnea

Undiagnosed and untreated obstructed sleep apnea continues to be deadly on our roads and rails, causing too many preventable accidents. **We want to see mandatory screening and treatment for obstructive sleep apnea for rail and highway personnel in safety-sensitive positions.**

RECOMMENDATION NO.

STATUS

Highway

H-09-015 **Open—Unacceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Implement a program to identify commercial drivers at high risk for obstructive sleep apnea and require that those drivers provide evidence through the medical certification process of having been appropriately evaluated and, if treatment is needed, effectively treated for that disorder before being granted unrestricted medical certification.

H-09-016 **Open—Acceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Develop and disseminate guidance for commercial drivers, employers, and physicians regarding the identification and treatment of individuals at high risk of obstructive sleep apnea (OSA), emphasizing that drivers who have OSA that is effectively treated are routinely approved for continued medical certification.

H-17-049 **Open—Acceptable Alternate Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Make the 2016 Medical Review Board/Motor Carrier Safety Advisory Committee recommendations on screening for obstructive sleep apnea (OSA) easily accessible to certified medical examiners, and instruct the examiners to use the recommendations as guidance when evaluating commercial drivers for OSA risk.

Railroad

R-09-011 **Open—Acceptable Response**

TO 46 US RAIL TRANSIT AGENCIES: Establish a program to identify operators who are at high risk for obstructive sleep apnea or other sleep disorders and require that such operators be appropriately evaluated and treated.

R-12-016 **Open—Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Require railroads to medically screen employees in safety-sensitive positions for sleep apnea and other sleep disorders.

R-12-026 **Open—Unacceptable Response**

TO THE BNSF RAILWAY: Medically screen employees in safety-sensitive positions for sleep apnea and other sleep disorders.

R-13-021 **Open—Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop medical certification regulations for employees in safety-sensitive positions that include, at a minimum, (1) a complete medical history that includes specific screening for sleep disorders, a review of current medications, and a thorough physical examination, (2) standardization of testing protocols across the industry, and (3) centralized oversight of certification decisions for employees who fail initial testing; and consider requiring that medical examinations be performed by those with specific training and certification in evaluating medication use and health issues related to occupational safety on railroads. [This recommendation supersedes Safety Recommendations R-02-24 through -26.]

R-14-062 **Closed—Acceptable Action (11/08/2019)**

TO METRO-NORTH RAILROAD: Revise your medical protocols for employees in safety-sensitive positions to include specific protocols on sleep disorders, including obstructive sleep apnea.

R-14-064 **Closed—Acceptable Action (11/08/2019)**

TO METRO-NORTH RAILROAD: Develop and implement protocols to routinely screen and fully evaluate your safety-sensitive employees for sleep disorders and ensure that such disorders are adequately addressed if diagnosed.

R-14-065 **Closed—Acceptable Action (11/08/2019)**

TO THE LONG ISLAND RAILROAD: Develop and implement protocols to routinely screen and fully evaluate your safety-sensitive employees for sleep disorders and ensure that such disorders are adequately addressed, if diagnosed.

R-14-071 **Open—Acceptable Alternate Response**

TO THE ASSOCIATION OF AMERICAN RAILROADS, THE AMERICAN PUBLIC TRANSPORTATION ASSOCIATION, THE AMERICAN SHORT LINE AND REGIONAL RAILROAD ASSOCIATION, THE BROTHERHOOD OF LOCOMOTIVE ENGINEERS, AND THE INTERNATIONAL ASSOCIATION OF SHEET METAL, AIR, RAIL AND TRANSPORTATION WORKERS: Collaborate to develop a model national labor agreement that supports effective programs for addressing sleep disorders and other medical conditions among safety-sensitive train operating personnel.

R-16-044 **Open—Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop and enforce medical standards that railroad employees in safety-sensitive positions diagnosed with sleep disorders must meet to be considered fit for duty.

**Require Medical Fitness—Screen for
and Treat Obstructive Sleep Apnea** – *continued*

R-16-045 **Open—Await Response**
TO BNSF RAILWAY, CANADIAN NATIONAL RAILWAY, CANADIAN PACIFIC RAILWAY, CSX TRANSPORTATION, KANSAS CITY SOUTHERN RAILWAY, NORFOLK SOUTHERN RAILWAY, INTERCITY RAILROADS, AND COMMUTER RAILROADS: Review and revise as necessary your medical rules, standards, or protocols to ensure you are informed of any diagnosed sleep disorders that employees in safety-sensitive positions must report and, when an employee makes such a report, perform periodic evaluations to ensure the condition is appropriately treated and the employee is fit for duty.

R-16-047 **Open—Acceptable Response**
TO UNION PACIFIC RAILROAD: Revise your medical rules to add any diagnosed sleep disorder to the list of medical conditions that employees in safety-sensitive positions must report and, when an employee makes such a report, perform periodic evaluations to ensure the condition is appropriately treated and the employee is fit for duty.

R-18-004 **Open—Acceptable Response**
TO NEW JERSEY TRANSIT AND METROPOLITAN TRANSPORTATION AUTHORITY: Ensure that operator impairment due to medical conditions, including obstructive sleep apnea, is part of the hazard management portion of your system safety program plan.



Strengthen Occupant Protection

Seat belts, child car seats, and child safety restraint systems in highway vehicles and on airplanes reduce the risk of injury and death. Restraints in motor vehicles saved 14,668 lives in 2016 alone. **We want all states to enact laws and regulations requiring all motor vehicle occupants to use seatbelts, and allowing primary enforcement of seat belt laws for all vehicle occupants. We also want to see requirements for enhanced vehicle design to provide better occupant protection, and for general aviation aircraft owners to install shoulder harness systems.**

RECOMMENDATION NO.

STATUS

Aviation

A-15-012 **Open-Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require, for all newly manufactured rotorcraft regardless of the design's original certification date, that the fuel systems meet the crashworthiness requirements of Title 14 *Code of Federal Regulations* 27.952 or 29.952, "Fuel System Crash Resistance."

A-16-011 **Open-Acceptable Response**

TO THE EUROPEAN AVIATION SAFETY AGENCY: Once Airbus Helicopters completes development of a retrofit kit to incorporate a crash-resistant fuel system into AS350 B3e and similarly designed variants, prioritize its approval to accelerate its availability to operators.

A-16-025 **Open-Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Require Title 14 *Code of Federal Regulations* Part 121 operators to provide (1) guidance that instructs flight attendants to remain at their assigned exits and actively monitor exit availability in all non-normal situations in case an evacuation is necessary and (2) flight attendant training programs that include scenarios requiring crew coordination regarding active monitoring of exit availability and evacuating after a significant event that involves a loss of communications.

A-16-026 **Open-Unacceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Develop best practices related to evacuation communication, coordination, and decision-making during emergencies through the establishment of an industry working group and then issue guidance for Title 14 *Code of Federal Regulations* Part 121 air carriers to use to improve flight and cabin crew performance during evacuations.

A-17-012 **Open-Acceptable Response**

TO THE ASSOCIATION OF CRITICAL CARE TRANSPORT: In collaboration with the Association of Air Medical Services and the Air Medical Operators Association, establish a working group to develop and distribute guidelines, for those who purchase, lease, or contract for helicopters, regarding the equipment and systems that would enhance the helicopters' crashworthiness, including, at a minimum, a crash-resistant fuel system and energy-absorbing seats.

A-17-013 **Open-Await Response**

TO THE ASSOCIATION OF AIR MEDICAL SERVICES AND AIR MEDICAL OPERATORS ASSOCIATION: Work with the Association of Critical Care Transport to establish a working group to develop and distribute guidelines, for those who purchase, lease, or contract for helicopters, regarding the equipment and systems that would enhance the helicopters' crashworthiness, including, at a minimum, a crash-resistant fuel system and energy-absorbing seats.

A-18-009 **Open-Acceptable Response**

TO THE FEDERAL AVIATION ADMINISTRATION: Conduct research to (1) measure and evaluate the effects of carry-on baggage on passenger deplaning times and safety during an emergency evacuation and (2) identify effective countermeasures to reduce any determined risks, and implement the countermeasures.

Highway

H-11-036 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Modify Federal Motor Vehicle Safety Standard 217 to require that all emergency exits on school buses be easily opened and remain open during an emergency evacuation.

H-11-038 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: To cover the interim period until Federal Motor Vehicle Safety Standard 217 is modified as specified in Safety Recommendations H-11-36 and -37, provide the states with guidance on how to minimize potential evacuation delays that could be caused by protruding latch mechanisms on emergency exit windows and by exit windows that require additional manual assistance to remain open during egress.

H-11-045 **Open-Response Received**

TO THE STATE OF MISSOURI: Revise your bus evacuation regulations to require that pupils traveling to an activity or on a field trip in a school bus or a school-chartered bus be instructed in safe riding practices and on the location and operation of emergency exits prior to starting the trip.

H-12-022 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Evaluate the effects of seat spacing and armrests as factors for potential occupant injury, and if safer spacing or armrest configurations are identified, develop and implement appropriate guidelines.

Strengthen Occupant Protection – continued

H-13-032 **Open–Await Response**

TO THE STATES OF CALIFORNIA, FLORIDA, LOUISIANA, NEW JERSEY, NEW YORK, AND TEXAS: Develop: (1) a handout for your school districts to distribute annually to students and parents about the importance of the proper use of all types of passenger seat belts on school buses, including the potential harm of not wearing a seat belt or wearing one but not adjusting it properly; and (2) training procedures for schools to follow during the twice yearly emergency drills to show students how to wear their seat belts properly.

H-13-033 **Open–Await Response**

TO THE STATES OF CALIFORNIA, FLORIDA, LOUISIANA, NEW JERSEY, NEW YORK, AND TEXAS: Upon publication of the National School Transportation Specifications and Procedures document, revise the handout and training procedures developed in Safety Recommendation H-13-32 to align with the national procedures as appropriate.

H-13-035 **Open–Acceptable Response**

TO THE NATIONAL ASSOCIATION OF STATE DIRECTORS OF PUPIL TRANSPORTATION SERVICES, NATIONAL ASSOCIATION FOR PUPIL TRANSPORTATION, NATIONAL SCHOOL TRANSPORTATION ASSOCIATION, SCHOOL BUS MANUFACTURERS TECHNICAL COUNCIL, AND NATIONAL SAFETY COUNCIL, SCHOOL TRANSPORTATION SECTION: Develop guidelines and include them in the next update of the National School Transportation Specifications and Procedures to assist schools in training bus drivers, students, and parents on the importance and proper use of school bus seat belts, including manual lap belts, adjustable lap and shoulder belts, and flexible seating systems.

H-13-036 **Open–Acceptable Alternate Response**

TO THE NATIONAL ASSOCIATION OF STATE DIRECTORS OF PUPIL TRANSPORTATION SERVICES, NATIONAL ASSOCIATION FOR PUPIL TRANSPORTATION, AND NATIONAL SCHOOL TRANSPORTATION ASSOCIATION: Provide your members with educational materials on lap and shoulder belts providing the highest level of protection for school bus passengers, and advise states or school districts to consider this added safety benefit when purchasing seat belt-equipped school buses.

H-13-037 **Open–Acceptable Alternate Response**

TO THE SCHOOL BUS MANUFACTURERS TECHNICAL COUNCIL: Develop a recommended practice for establishing and safeguarding the structural integrity of the entire school bus seating and restraint system, including the seat pan attachment to the seat frame, in severe crashes—in particular, those involving lateral impacts with vehicles of large mass.

H-15-010 **Open–Acceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Develop requirements addressing the minimum aisle width for safe evacuation from all buses, including those with moveable seats.

H-15-020 **Closed–Acceptable Action (04/05/2019)**

TO THE NATIONAL LIMOUSINE ASSOCIATION: Develop and distribute guidelines to your member operators urging them, during pretrip safety briefings, to (1) direct passengers to use seat belts where required by law and strongly encourage passengers to use seat belts where not required by law, and (2) encourage passengers to use properly adjusted head restraints.

H-15-042 **Open–Await Response**

TO THE FIFTY STATES, DISTRICT OF COLUMBIA, AND PUERTO RICO: Enact legislation that provides for primary enforcement of a mandatory seat belt use law for all vehicle seating positions equipped with a passenger restraint system. [Safety Recommendation H-15-042 supersedes Safety Recommendation H-97-2.]

H-17-001 **Open–Await Response**

TO MOTOR COACH INDUSTRIES INTERNATIONAL, INC.: Evaluate and, if appropriate, modify the driver and passenger floor structure design on new motorcoaches to prevent driver seat separation during crashes.

H-17-008 **Open–Await Response**

TO THE AMERICAN BUS ASSOCIATION AND THE UNITED MOTORCOACH ASSOCIATION: Encourage member passenger-carrying companies to (1) establish procedures to ensure that the seat belts on all buses are regularly inspected to maintain their functionality and accessibility, and (2) provide pretrip safety briefings emphasizing the benefits of seat belt use.

H-17-012 **Open–Acceptable Response**

TO GREYHOUND LINES, INC.: Provide pretrip safety briefings at all stops prior to departure when taking on new passengers, which describe the use of the emergency exits and the benefits of wearing seat belts.

H-17-061 **Open–Acceptable Response**

TO THE FEDERAL MOTOR CARRIER SAFETY ADMINISTRATION: Work with SAE International and the National Highway Traffic Safety Administration to improve truck-tractor side-mounted fuel tank crashworthiness to prevent catastrophic tank ruptures and limit postcollision fuel spillage, and develop and promulgate an updated standard.

H-17-062 **Open–Acceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Work with SAE International and the Federal Motor Carrier Safety Administration to improve truck-tractor side-mounted fuel tank crashworthiness to prevent catastrophic tank ruptures and limit postcollision fuel spillage, and develop and promulgate an updated standard.

H-17-065 **Open–Await Response**

TO SAE INTERNATIONAL: Work with the Federal Motor Carrier Safety Administration and the National Highway Traffic Safety Administration to improve truck-tractor side-mounted fuel tank crashworthiness to prevent catastrophic tank ruptures and limit postcollision fuel spillage, and develop and promulgate an updated standard.

H-18-009 **Open–Await Response**

TO THE STATES OF FLORIDA, LOUISIANA, NEW JERSEY, AND NEW YORK: Amend your statutes to upgrade the seat belt requirement from lap belts to lap/shoulder belts for all passenger seating positions in new large school buses in accordance with Federal Motor Vehicle Safety Standard 222.

H-18-010 **Open-Await Response**

TO THE STATES OF ALABAMA, ALASKA, ARIZONA, COLORADO, CONNECTICUT, DELAWARE, GEORGIA, HAWAII, IDAHO, ILLINOIS, INDIANA, IOWA, KANSAS, MAINE, MARYLAND, MICHIGAN, MINNESOTA, MISSISSIPPI, MISSOURI, MONTANA, NEBRASKA, NEW HAMPSHIRE, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OHIO, OKLAHOMA, OREGON, RHODE ISLAND, SOUTH CAROLINA, SOUTH DAKOTA, TENNESSEE, UTAH, VERMONT, WASHINGTON, WEST VIRGINIA, WISCONSIN, AND WYOMING; THE COMMONWEALTHS OF KENTUCKY, MASSACHUSETTS, PENNSYLVANIA, AND VIRGINIA; THE DISTRICT OF COLUMBIA; AND THE TERRITORY OF PUERTO RICO: Enact legislation to require that all new large school buses be equipped with passenger lap/shoulder belts for all passenger seating positions in accordance with Federal Motor Vehicle Safety Standard 222.

H-18-058 **Open-Acceptable Response**

TO THE NATIONAL TRAFFICS SAFETY ADMINISTRATION: Amend Federal Motor Vehicle Safety Standard 210 to increase the minimum anchorage spacing for individual seat belt assemblies, taking into account the dynamic testing of seat belt designs, seat belt fit, and vehicle configuration.

H-18-059 **Open-Acceptable Response**

TO THE NATIONAL TRAFFIC SAFETY ADMINISTRATION: Amend Federal Motor Vehicle Safety Standard 208 to require lap/shoulder belts for each passenger seating position on all new buses with a gross vehicle weight rating of more than 10,000 pounds but not greater than 26,000 pounds.

H-18-062 **Open-Await Response**

TO MEDIUM-SIZE BUS MANUFACTURERS ARBOC SPECIALTY VEHICLES, LLC; COACH & EQUIPMENT MANUFACTURING CORPORATION; REV GROUP, INC.; DIAMOND COACH CORPORATION; FOREST RIVER, INC.; GIRARDIN BLUE BIRD; SVO GROUP, INC.; AND THOMAS BUILT BUSES: Install lap/shoulder belts in all seating positions as standard, rather than optional, equipment in all newly manufactured medium-size buses.

H-18-063 **Open-Acceptable Response**

TO THE SEAT MANUFACTURERS FREEDMAN SEATING COMPANY AND HSM TRANSPORTATION SOLUTIONS: Supply seating systems equipped with lap/shoulder belts as standard, rather than optional, equipment for medium-size buses.

H-96-014 **Open-Acceptable Response**

TO THE 50 STATES, THE 5 US TERRITORIES, AND THE DISTRICT OF COLUMBIA: Review existing laws and enact legislation, if needed, that would: ensure that children up to 8 years old are required by the state's mandatory child restraint use law to use child restraint systems and booster seats.

H-99-009 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Revise the Federal Motor Vehicle Safety Standard 217, "Bus Window Retention and Release," to require that other than floor-level emergency exits can be easily opened and remain open during an emergency evacuation when a motorcoach is upright or at unusual attitudes.

H-99-049 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Expand your research on current advanced glazing to include its applicability to motorcoach occupant ejection prevention, and revise window glazing requirements for newly manufactured motorcoaches based on the results of this research.

H-99-050 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: In 2 years, develop performance standards for motorcoach roof strength that provide maximum survival space for all seating positions and that take into account current typical motorcoach window dimensions.

H-99-051 **Open-Unacceptable Response**

TO THE NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION: Once performance standards have been developed for motorcoach roof strength, require newly manufactured motorcoaches to meet those standards.

Marine

M-16-026 **Open-Acceptable Response**

TO THE UNITED STATES COAST GUARD: Amend Navigation and Vessel Inspection Circular 1-01 to ensure that (1) amphibious passenger vehicle (APV) operators tell passengers that seat belts must not be worn while the vessel/vehicle is operated in the water and (2) before the APV enters the water or departs the dock, the master or other crewmember visually checks that each passenger has unbuckled his or her seat belt.

M-16-027 **Open-Acceptable Response**

TO THE UNITED STATES COAST GUARD: Distribute a safety alert on amphibious passenger vehicle operations that addresses the role of risk assessment to mitigate driver distraction, as well as the need to tell passengers to remove seat belts before waterborne operations begin.

Railroad

R-12-021 **Closed-Unacceptable Action (09/16/2019)**

TO THE FEDERAL RAILROAD ADMINISTRATION: Revise Title 49 *Code of Federal Regulations* Part 229 to ensure the protection of the occupants of isolated locomotive operating cabs in the event of a collision. Make the revision applicable to all locomotives, including the existing fleet and those newly constructed, rebuilt, refurbished, and overhauled, unless the cab will never be occupied.

R-14-074 **Open-Acceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Develop a performance standard to ensure that windows (e.g., glazing, gaskets, and any retention hardware) are retained in the window opening structure during an accident and incorporate the standard into Title 49 *Code of Federal Regulations (CFR)* 238.221 and 49 *CFR* 238.421 to require that passenger railcars meet this standard.

R-15-001 **Open-Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Revise Title 49 *Code of Federal Regulations* 238.213 to require the existing forward-end corner post strength requirements for the back-end corner posts of passenger railcars.

Strengthen Occupant Protection – *continued*

R-16-035 **Open–Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: Conduct research to evaluate the causes of passenger injuries in passenger railcar derailments and overturns and evaluate potential methods for mitigating those injuries, such as installing seat belts in railcars and securing potential projectiles.

R-16-036 **Open– Unacceptable Response**

TO THE FEDERAL RAILROAD ADMINISTRATION: When the research specified in Safety Recommendation R-16-35 identifies safety improvements, use the findings to develop occupant protection standards for passenger railcars to mitigate passenger injuries likely to occur during derailments and overturns.



2019–2020 NTSB MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS

For more details and a complete history of action or inaction on these recommendations, see our Safety Recommendations database at www.nts.gov.

Under the Safety Advocacy drop-down menu, click Safety Recommendations.



Critical changes needed to reduce transportation accidents, injuries, and fatalities



2019-2020 NTSB MOST WANTED LIST OF TRANSPORTATION SAFETY IMPROVEMENTS

Eliminate Distractions



Improve the Safety of Part 135 Aircraft Flight Operations



End Alcohol and Other Drug Impairment



Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles



Ensure the Safe Shipment of Hazardous Materials



Reduce Fatigue-Related Accidents



Fully Implement Positive Train Control



Require Medical Fitness—Screen for and Treat Obstructive Sleep Apnea



Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes



Strengthen Occupant Protection



To Learn more about the Most Wanted List visit www.nts.gov/safety/mwl or contact SafetyAdvocacy@NTSB.gov

Summary Table of 2019–2020 MWL-Associated Open Safety Recommendations (as of April 17, 2020)

MWL Topic Area	Number of Associated Safety Recommendations	Focused 46	0	10	20	30	40	50
Eliminate Distractions	12	3						
End Alcohol and Other Drug Impairment	41	2						
Ensure the Safe Shipment of Hazardous Materials	46	5						
Fully Implement Positive Train Control	16	3						
Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes	21	7						
Improve the Safety of Part 135 Aircraft Flight Operations	21	3						
Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles	11	3						
Reduce Fatigue-Related Accidents	42	6						
Require Medical Fitness—Screen for and Treat Obstructive Sleep Apnea	15	5						
Strengthen Occupant Protection	43	9						

Total 268

To learn more about the Most Wanted List, visit www.nts.gov/safety/mwl or contact SafetyAdvocacy@NTSB.gov



The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—highway, marine, railroad, and pipeline. The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. For more information, visit www.nts.gov.

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**National Transportation Safety Board
2019 Federal Employee Viewpoint Survey Results
All Respondents**

Interpretation of Results: The 2019 results for the 85-item survey again strongly demonstrate that employees are satisfied with their work and understand how it contributes to achieving the NTSB’s mission. Demographic data showed that respondents were representative of the agency’s workforce across the various indicators, including age, race and ethnicity, tenure, and work location.

The Office of Personnel Management (OPM) identifies a strength as a positive response of 65% or more and a challenge as a negative response of 35% or more. Forty-eight items had positive responses of 65% or more. The highest among them include:

Item	Question	Percent Positive
Q7	When needed, I am willing to put in the extra effort to get a job done	97% marked “Strongly Agree” or “Agree”
Q8	I am constantly looking for ways to do my job better.”	94% marked “Strongly Agree” or “Agree”
Q13	The work I do is important.	93% marked “Strongly Agree” or “Agree”

Two items in the survey received negative responses of 35% or more (e.g., “Disagree” or “Strongly Disagree”), an indicator of challenges for the organization:

Item	Question	Percent Positive
Q33	Pay raises depend on how well employees perform their jobs.	36% marked “Disagree” or “Strongly Disagree”
Q23	In my work unit, steps are taken to deal with a poor performer who cannot or will not improve.	35% marked “Disagree” or “Strongly Disagree”

We achieved a response rate of 70.0% in 2019, slightly lower than 2018’s response rate of 73.8%, and far exceeding the government-wide response rate of 42.6%. Our response rate demonstrates that employees continue to engage in the annual survey process to assess the leadership and management practices that contribute to agency performance and employee satisfaction. The trend is reflected in the table below.

Instrument	Surveys Launched	Responses	Response Rate
2019 Federal Employee Viewpoint Survey	370	259	70.0%
2018 Federal Employee Viewpoint Survey	382	282	73.8%
2017 Federal Employee Viewpoint Survey	392	291	74.2%
2016 Federal Employee Viewpoint Survey	384	270	70.3%
2015 Federal Employee Viewpoint Survey	384	228	59.4%

Our goal is to use employee input to make the NTSB a more effective agency and a better place to work. Ongoing initiatives to increase engagement resulted in the highest ever Engagement Index Score of 75%. Efforts to foster greater diversity and inclusion and global satisfaction are showing progress, with high scores for both the New Inclusion Quotient Score of 68% and the Global Satisfaction Index Score of 80%.

1. **How the survey was conducted:** The survey was conducted online from May 23, 2019, to July 5, 2019.
2. **Description of sample:** 370 full-time and part-time permanent employees of the agency were surveyed.
3. **Survey items and response choices:** See the tables on the following pages.

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Agree-disagree	1	*I am given a real opportunity to improve my skills in my organization.	74.4%	34.0%	40.4%	13.2%	9.2%	3.2%	12.4%	92	102	33	23	8	258	N/A
Agree-disagree	2	I have enough information to do my job well.	78.8%	32.0%	46.8%	10.2%	8.3%	2.8%	11.1%	84	121	22	22	8	257	N/A
Agree-disagree	3	I feel encouraged to come up with new and better ways of doing things.	65.3%	33.4%	32.0%	14.1%	15.1%	5.5%	20.6%	89	82	37	38	12	258	N/A
Agree-disagree	4	My work gives me a feeling of personal accomplishment.	84.3%	57.0%	27.3%	8.7%	4.3%	2.6%	6.9%	151	71	21	10	5	258	N/A
Agree-disagree	5	I like the kind of work I do.	88.7%	64.6%	24.0%	8.5%	1.6%	1.2%	2.9%	170	61	19	4	3	257	N/A
Agree-disagree	6	I know what is expected of me on the job.	86.5%	49.9%	36.6%	5.3%	4.6%	3.6%	8.2%	132	93	13	12	8	258	N/A
Agree-disagree	7	When needed I am willing to put in the extra effort to get a job done.	96.9%	80.2%	16.7%	1.5%	0.8%	0.8%	1.6%	206	44	4	2	2	258	N/A
Agree-disagree	8	I am constantly looking for ways to do my job better.	93.7%	63.2%	30.5%	4.6%	0.9%	0.8%	1.7%	166	76	12	2	2	258	N/A
Agree-disagree	9	I have sufficient resources (for example, people, materials, budget) to get my job done.	58.2%	20.9%	37.4%	11.9%	16.6%	13.3%	29.9%	52	98	32	40	35	257	0
Agree-disagree	10	*My workload is reasonable.	56.8%	19.2%	37.6%	13.8%	19.0%	10.4%	29.4%	50	101	34	47	26	258	0
Agree-disagree	11	*My talents are used well in the workplace.	68.4%	27.9%	40.5%	13.6%	11.8%	6.2%	18.0%	73	100	36	31	15	255	0
Agree-disagree	12	*I know how my work relates to the agency's goals.	90.2%	57.3%	32.9%	5.4%	2.2%	2.2%	4.4%	148	83	14	6	4	255	0
Agree-disagree	13	The work I do is important.	93.4%	68.6%	24.8%	4.5%	0.8%	1.4%	2.1%	181	61	12	2	2	258	0
Agree-disagree	14	Physical conditions (for example, noise level, temperature, lighting, cleanliness in the workplace) allow employees to perform their jobs well.	85.7%	49.7%	36.0%	8.0%	3.1%	3.1%	6.3%	130	90	20	7	9	256	2
Agree-disagree	15	My performance appraisal is a fair reflection of my performance.	85.9%	49.7%	36.1%	7.9%	2.9%	3.3%	6.2%	131	94	18	8	8	259	0
Agree-disagree	16	I am held accountable for achieving results.	91.3%	48.4%	42.8%	6.6%	1.7%	0.4%	2.1%	126	111	16	4	1	258	0

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Agree-disagree	17	*I can disclose a suspected violation of any law, rule or regulation without fear of reprisal.	72.4%	44.8%	27.6%	11.6%	10.0%	6.1%	16.1%	109	70	26	23	12	240	19
Agree-disagree	18	My training needs are assessed.	56.2%	24.8%	31.4%	19.6%	14.5%	9.7%	24.2%	66	83	50	36	23	258	0
Agree-disagree	19	In my most recent performance appraisal, I understood what I had to do to be rated at different performance levels (for example, Fully Successful, Outstanding).	82.5%	47.0%	35.5%	7.7%	6.1%	3.7%	9.8%	120	89	19	15	9	252	6
Agree-disagree	20	*The people I work with cooperate to get the job done.	87.4%	50.2%	37.2%	5.4%	4.7%	2.6%	7.2%	132	96	13	10	7	258	N/A
Agree-disagree	21	My work unit is able to recruit people with the right skills.	48.3%	17.7%	30.5%	19.2%	24.0%	8.6%	32.6%	45	80	46	56	18	245	9
Agree-disagree	22	Promotions in my work unit are based on merit.	51.0%	18.3%	32.7%	19.3%	11.8%	18.0%	29.8%	46	80	47	27	38	238	18
Agree-disagree	23	In my work unit, steps are taken to deal with a poor performer who cannot or will not improve.	39.8%	13.8%	26.0%	25.3%	18.6%	16.4%	34.9%	32	60	56	37	34	219	34
Agree-disagree	24	*In my work unit, differences in performance are recognized in a meaningful way.	52.1%	17.6%	34.5%	19.6%	17.1%	11.3%	28.4%	42	84	47	38	23	234	21
Agree-disagree	25	Awards in my work unit depend on how well employees perform their jobs.	58.9%	22.5%	36.4%	21.2%	9.7%	10.3%	19.9%	55	86	51	22	21	235	19
Agree-disagree	26	Employees in my work unit share job knowledge with each other.	83.0%	37.0%	46.0%	9.0%	2.9%	5.1%	8.0%	99	117	21	8	11	256	0
Agree-disagree	27	The skill level in my work unit has improved in the past year.	62.5%	27.9%	34.6%	26.7%	7.2%	3.6%	10.7%	74	85	63	18	9	249	5
Good-poor	28	How would you rate the overall quality of work done by your work unit?	90.2%	66.0%	24.2%	6.9%	2.1%	0.8%	2.9%	173	59	16	6	2	256	N/A
Agree-disagree	29	*My work unit has the job-relevant knowledge and skills necessary to accomplish organizational goals.	86.9%	50.3%	36.5%	7.2%	4.0%	1.9%	5.9%	134	89	16	11	5	255	1
Agree-disagree	30	Employees have a feeling of personal empowerment with respect to work processes.	58.7%	21.7%	37.1%	17.1%	14.8%	9.4%	24.1%	55	90	43	35	22	245	9

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Agree-disagree	31	Employees are recognized for providing high quality products and services.	62.6%	23.9%	38.7%	20.4%	9.5%	7.6%	17.0%	63	97	48	24	17	249	5
Agree-disagree	32	Creativity and innovation are rewarded.	57.3%	18.4%	38.9%	21.5%	11.4%	9.8%	21.3%	48	94	49	28	21	240	10
Agree-disagree	33	Pay raises depend on how well employees perform their jobs.	40.7%	11.4%	29.3%	23.2%	19.3%	16.9%	36.1%	30	71	54	43	36	234	21
Agree-disagree	34	Policies and programs promote diversity in the workplace (for example, recruiting minorities and women, training in awareness of diversity issues, mentoring).	69.3%	26.8%	42.5%	21.6%	4.5%	4.6%	9.1%	67	102	50	11	9	239	16
Agree-disagree	35	Employees are protected from health and safety hazards on the job.	86.5%	38.6%	47.9%	6.6%	4.0%	2.9%	6.9%	100	117	16	10	8	251	4
Agree-disagree	36	My organization has prepared employees for potential security threats.	71.7%	27.9%	43.8%	17.7%	5.2%	5.4%	10.7%	70	111	42	13	14	250	5
Agree-disagree	37	Arbitrary action, personal favoritism and coercion for partisan political purposes are not tolerated.	62.8%	30.7%	32.1%	19.7%	10.9%	6.6%	17.5%	74	81	47	24	14	240	15
Agree-disagree	38	Prohibited Personnel Practices (for example, illegally discriminating for or against any employee/applicant, obstructing a person's right to compete for employment, knowingly violating veterans' preference requirements) are not tolerated.	76.4%	39.8%	36.6%	15.4%	4.5%	3.7%	8.2%	93	85	34	9	7	228	27
Agree-disagree	39	My agency is successful at accomplishing its mission.	91.2%	50.2%	41.0%	5.4%	2.3%	1.2%	3.5%	133	99	13	6	3	254	2
Agree-disagree	40	*I recommend my organization as a good place to work.	79.7%	49.4%	30.3%	13.4%	4.9%	2.0%	6.9%	131	75	31	13	5	255	N/A
Agree-disagree	41	*I believe the results of this survey will be used to make my agency a better place to work.	53.5%	30.3%	23.1%	21.3%	16.0%	9.2%	25.2%	78	56	51	38	21	244	10
Agree-disagree	42	My supervisor supports my need to balance work and other life issues.	85.3%	58.7%	26.5%	9.6%	2.7%	2.4%	5.2%	153	64	23	5	7	252	1

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Agree-disagree	43	My supervisor provides me with opportunities to demonstrate my leadership skills.	77.2%	46.1%	31.1%	12.8%	5.5%	4.5%	10.0%	121	78	29	14	11	253	1
Agree-disagree	44	Discussions with my supervisor about my performance are worthwhile.	73.8%	41.0%	32.8%	15.0%	7.3%	3.9%	11.2%	109	81	35	18	10	253	1
Agree-disagree	45	My supervisor is committed to a workforce representative of all segments of society.	78.8%	51.0%	27.8%	16.3%	2.6%	2.3%	4.9%	121	61	38	6	4	230	24
Agree-disagree	46	My supervisor provides me with constructive suggestions to improve my job performance.	74.6%	39.4%	35.1%	13.9%	6.8%	4.7%	11.5%	104	89	32	17	12	254	0
Agree-disagree	47	Supervisors in my work unit support employee development.	78.2%	47.4%	30.8%	12.1%	6.6%	3.1%	9.7%	124	75	29	15	8	251	2
Agree-disagree	48	My supervisor listens to what I have to say.	83.9%	54.2%	29.8%	8.6%	4.9%	2.6%	7.5%	141	73	21	11	7	253	N/A
Agree-disagree	49	My supervisor treats me with respect.	89.1%	60.9%	28.2%	3.3%	5.3%	2.3%	7.6%	159	70	9	10	6	254	N/A
Agree-disagree	50	In the last six months, my supervisor has talked with me about my performance.	87.9%	57.0%	31.0%	4.8%	3.6%	3.6%	7.3%	149	76	11	9	9	254	N/A
Agree-disagree	51	I have trust and confidence in my supervisor.	77.3%	49.3%	28.0%	11.7%	6.3%	4.6%	11.0%	129	71	27	14	12	253	N/A
Good-poor	52	Overall, how good a job do you feel is being done by your immediate supervisor?	75.9%	54.3%	21.6%	14.3%	6.5%	3.3%	9.8%	140	57	33	14	8	252	N/A
Agree-disagree	53	In my organization, senior leaders generate high levels of motivation and commitment in the workforce.	57.1%	26.4%	30.7%	15.5%	15.8%	11.6%	27.3%	66	76	39	37	29	247	3
Agree-disagree	54	My organization's senior leaders maintain high standards of honesty and integrity.	64.6%	32.5%	32.0%	19.1%	7.8%	8.6%	16.3%	79	77	46	17	21	240	9
Agree-disagree	55	Supervisors work well with employees of different backgrounds.	75.3%	37.6%	37.7%	16.4%	6.0%	2.4%	8.4%	92	87	37	15	6	237	13
Agree-disagree	56	*Managers communicate the goals of the organization.	62.2%	29.7%	32.5%	18.7%	12.9%	6.2%	19.0%	71	81	44	31	14	241	6

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Agree-disagree	57	Managers review and evaluate the organization's progress toward meeting its goals and objectives.	64.2%	29.8%	34.4%	23.3%	8.9%	3.6%	12.5%	67	80	52	20	8	227	22
Agree-disagree	58	Managers promote communication among different work units (for example, about projects, goals, needed resources).	58.4%	27.7%	30.7%	17.4%	16.8%	7.4%	24.2%	67	76	40	42	17	242	8
Agree-disagree	59	Managers support collaboration across work units to accomplish work objectives.	65.2%	28.5%	36.6%	15.9%	12.8%	6.1%	19.0%	70	88	38	31	15	242	6
Good-poor	60	Overall, how good a job do you feel is being done by the manager directly above your immediate supervisor?	71.5%	40.5%	31.0%	16.2%	4.4%	8.0%	12.4%	96	75	40	10	20	241	8
Agree-disagree	61	I have a high level of respect for my organization's senior leaders.	65.0%	34.5%	30.5%	18.3%	8.5%	8.1%	16.7%	89	75	42	22	20	248	0
Agree-disagree	62	Senior leaders demonstrate support for Work-Life programs.	69.0%	37.2%	31.8%	17.8%	7.2%	6.1%	13.3%	91	76	40	17	15	239	10
Satisfied-dissatisfied	63	*How satisfied are you with your involvement in decisions that affect your work?	60.8%	29.4%	31.4%	19.1%	14.8%	5.2%	20.1%	72	79	46	36	13	246	N/A
Satisfied-dissatisfied	64	*How satisfied are you with the information you receive from management on what's going on in your organization?	61.1%	28.0%	33.1%	16.1%	16.7%	6.1%	22.8%	69	84	39	41	15	248	N/A
Satisfied-dissatisfied	65	*How satisfied are you with the recognition you receive for doing a good job?	66.9%	29.2%	37.7%	18.7%	9.2%	5.2%	14.4%	74	94	45	22	12	247	N/A
Satisfied-dissatisfied	66	How satisfied are you with the policies and practices of your senior leaders?	56.1%	23.9%	32.2%	21.5%	17.2%	5.3%	22.5%	60	80	53	40	13	246	N/A
Satisfied-dissatisfied	67	How satisfied are you with your opportunity to get a better job in your organization?	46.9%	22.7%	24.2%	31.3%	12.1%	9.8%	21.8%	57	58	78	28	25	246	N/A
Satisfied-dissatisfied	68	How satisfied are you with the training you receive for your present job?	65.8%	27.7%	38.1%	15.9%	12.8%	5.6%	18.4%	70	94	38	31	14	247	N/A

Response Type	Item	Item Text	Percent Positive %	Strongly Agree/ Very Good/ Very Satisfied %	Agree/ Good/ Satisfied %	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied %	Disagree/ Poor/ Dissatisfied %	Strongly Disagree/ Very Poor/ Very Dissatisfied %	Percent Negative %	Strongly Agree/ Very Good/ Very Satisfied N	Agree/ Good/ Satisfied N	Neither Agree nor Disagree/ Fair/ Neither Satisfied nor Dissatisfied N	Disagree/ Poor/ Dissatisfied N	Strongly Disagree/ Very Poor/ Very Dissatisfied N	Item Response Total** N	Do Not Know/ No Basis to Judge N
Satisfied-dissatisfied	69	*Considering everything, how satisfied are you with your job?	81.7%	38.9%	42.7%	8.3%	6.9%	3.2%	10.1%	97	107	19	17	8	248	N/A
Satisfied-dissatisfied	70	Considering everything, how satisfied are you with your pay?	80.5%	35.3%	45.2%	6.3%	8.9%	4.3%	13.2%	89	112	16	20	9	246	N/A
Satisfied-dissatisfied	71	*Considering everything, how satisfied are you with your organization?	77.2%	39.0%	38.2%	11.5%	8.0%	3.3%	11.3%	99	92	28	18	8	245	N/A

* AES prescribed items as of 2017 (5 CFR Part 250, Subpart C)

** Unweighted count of responses excluding 'Do Not Know' and 'No Basis to Judge'

The Dashboard only includes items 1-71.

Percentages are weighted to represent the Agency's population.



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¹ Ongoing investigations are those that, as of December 31, 2019, were not yet completed. Updates on their progress or completion will be provided in the 2020 Annual Report.

Abbreviations, Acronyms, and Initialisms

ADAS	advanced driver assistance systems
ALJ	Office of Administrative Law Judges
AS	Office of Aviation Safety
BH	The Bahamas
<i>CFR</i>	<i>Code of Federal Regulations</i>
CMA	Columbia Gas of Massachusetts
DOT	Department of Transportation
DS	Digital Services Division
FAA	Federal Aviation Administration
FIU	Florida International University
FRA	Federal Railroad Administration
FV	fishing vessel
GA	Government and Industry Affairs Division
HS	Office of Highway Safety
HOV	high-occupancy vehicle
IIC	investigator-in-charge
IMO	International Maritime Organization
ICAO	International Civil Aviation Organization
JP	Japan
MAIIF	Marine Accident Investigators' International Forum
MCAS	Maneuvering Characteristics Augmentation System
MI	Marshall Islands
mph	miles per hour
MR	Media Relations Division
MS	Office of Marine Safety
MV	motor vessel
MWL	Most Wanted List of Transportation Safety Improvements

NHTSA	National Highway Traffic Safety Administration
NO	Norway
nm	nautical miles
NTSB	National Transportation Safety Board
NYCT	New York City Transit
PIC	pilot-in-command
PN	Panama
PHMSA	Pipeline and Hazardous Materials Safety Administration
PT	Portugal
PV	passenger vessel
RE	Office of Research and Engineering
RPH	Office of Railroad, Pipeline, and Hazardous Materials Investigations
SA	Safety Advocacy Division
SEPTA	Southeastern Pennsylvania Transportation Authority
SIC	second-in-command
SIS	substantially interested State
SR	Safety Recommendations Division
SRC	Office of Safety Recommendations and Communications
sUAS	small unmanned aircraft system (drone)
SUV	sport utility vehicle
TDA	Transportation Disaster Assistance Division
TC	Training Center
TV	towing vessel
Uber ATG	Uber Advanced Technologies Group
UP	Union Pacific Railroad
<i>U.S.C.</i>	<i>United States Code</i>

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NTSB on Social Media

-  www.twitter.com/ntsb
-  www.instagram.com/ntsbgov
-  www.facebook.com/ntsbgov
-  www.youtube.com/user/ntsbgov
-  www.flickr.com/ntsb

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Chairman's Message



Figure 2. The Honorable Robert L. Sumwalt, III, above, has served as the NTSB Chairman since August 10, 2017.

I am pleased to present the 2019 Annual Report to Congress for the National Transportation Safety Board (NTSB). Since our inception in 1967, the agency has been at the forefront of transportation safety and is recognized internationally for our accident investigation expertise. We have investigated nearly 150,000 aviation accidents and thousands of surface transportation accidents and have issued more than 15,000 safety recommendations as a result.

In 2019, we were again recognized as one of the [Best Places to Work](#) in the federal government for small agencies. This report showcases our outstanding work over the last year and provides details about our completed and ongoing investigations, safety recommendations, safety accomplishments, transportation disaster assistance activities, and emerging safety-related issues.

We continued to respond to both longstanding and leading-edge challenges in 2019 as we advanced our transportation safety mission. We completed a total of 1,169 investigations, including the [Amtrak passenger train derailment in DuPont, Washington](#); the [collision between US Navy Destroyer John S McCain and Tanker Alnic MC](#); the [Southwest Airlines engine failure](#) in Philadelphia, Pennsylvania; and the [pedestrian bridge collapse](#) in Miami, Florida. We also completed a [safety research report on bicycle safety](#) and participated in 319 international investigations.

Our 2019 activities included providing our technical expertise regarding the Boeing 737 MAX aircraft and its systems to the Ethiopian Airlines accident investigation. As a result of our participation in that investigation and in the 2018 737 MAX investigation in Indonesia, we developed safety recommendations to address the design certification process.

In addition to deploying teams to accident and crash sites, we promoted the exchange of safety information by holding these safety forums, roundtables, webinars, and workshops:

- Forum: [Raise the Bar of Your Safety Culture—NTSB at Experimental Aircraft Association Airventure](#) (Aviation Safety)
- Roundtables: [Alaska Part 135 Flight Operations—Charting a Safer Course](#) (Aviation Safety)
[Distracted Driving: Perspectives from the Trucking Industry](#); and [Act to End Deadly Distractions](#) (Highway Safety)
- Webinar: [Collision Avoidance Systems—Why You Need Them in Your Trucks Today!](#) (Highway Safety)
- Workshop: [Seafloor Investigations Workshop](#) (Marine Safety)

We hope you find this 2019 Annual Report to Congress to be an informative presentation of the agency's accomplishments.

Sincerely,

A handwritten signature in blue ink that reads "Robert L. Sumwalt, III". The signature is fluid and includes a stylized flourish at the end.

Robert L. Sumwalt, III
Chairman

BEST PLACES TO WORK
IN THE FEDERAL GOVERNMENT



**PARTNERSHIP
FOR PUBLIC SERVICE**



NTSB At a Glance

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we conduct transportation safety studies and coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters.

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History

The NTSB's origins can be traced to the Air Commerce Act of 1926, in which the US Congress charged the US Department of Commerce with investigating the causes of aircraft accidents. That responsibility was transferred to the Civil Aeronautics Board's Bureau of Aviation Safety when it was created in 1940. In 1967, Congress consolidated all US transportation agencies into a new US Department of Transportation (DOT) and established the NTSB as an independent agency within the DOT. In creating the NTSB, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of safety in the transportation system than the individual modal agencies could working separately. Since 1967, the NTSB has investigated accidents in the aviation, highway, marine, pipeline, railroad, and public transportation modes, as well as accidents related to the transportation of hazardous materials.

Figure 3. In 1966, President Johnson signed the Department of Transportation Act that created the NTSB.



Source: Department of Transportation

Figure 4. The series of badges pictured below were worn by US accident investigators beginning in the 1940s.



In 1974, Congress reestablished the NTSB as a separate entity outside of the DOT, reasoning that "no federal agency can properly perform such (investigatory) functions unless it is totally separate and independent from any other . . . agency of the United States." Because the DOT has broad operational and regulatory responsibilities that affect the safety and efficiency of the transportation system, and transportation accidents may suggest deficiencies in that system, the NTSB's independence was deemed necessary to provide objectivity in its investigations and recommendations.

NTSB | National Transportation Safety Board



Role in Transportation Safety

Since its inception in 1967, the NTSB has investigated nearly 150,000 aviation accidents and thousands of surface transportation accidents. On call 24 hours a day, 365 days a year, our investigators travel throughout the country and to every corner of the world in response to transportation disasters.

The NTSB investigates accidents to determine their probable cause, examine safety issues, and devise recommendations to prevent the occurrence of similar accidents in the future. We have issued more than 15,000 safety recommendations to more than 2,400 recipients in all transportation modes. The recommended action has been implemented for 82 percent of the over 12,400 recommendations that have been closed.

Since 1990, we have compiled and published an annual or biennial Most Wanted List of transportation safety improvements, which increases awareness of—and support for—the most critical changes needed to reduce transportation accidents and save lives.

The agency also develops safety studies focused on broader safety questions and topic areas, enabling us to better perform our mission. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and the US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

OUR MISSION

MAKING TRANSPORTATION SAFER

BY CONDUCTING INDEPENDENT ACCIDENT INVESTIGATIONS,
ADVOCATING SAFETY IMPROVEMENTS, AND
DECIDING PILOTS' AND MARINERS' CERTIFICATION APPEALS

OUR CORE VALUES

- INTEGRITY
- TRANSPARENCY
- INDEPENDENCE
- EXCELLENCE
- DIVERSITY AND INCLUSION

LEGISLATIVE MANDATE

MAINTAINING

our congressionally mandated independence and objectivity

CONDUCTING

objective, precise accident investigations and safety studies

PERFORMING

fair and objective pilot and mariner certification appeals

ADVOCATING and PROMOTING safety recommendations

ASSISTING

victims of transportation accidents and their families

Strategic Goals and Objectives

NTSB STRATEGIC GOALS	OBJECTIVES
<p>IMPROVING Processes: Evaluating and identifying ways to enhance the effectiveness and efficiency of our investigative and business processes</p>	<ul style="list-style-type: none"> ➤ Improve the timeliness of investigations through data analysis ➤ Improve the timeliness of agency operations through data analysis
<p>IMPROVING Products: Evaluating and identifying ways to enhance the effectiveness and efficiency of our products</p>	<ul style="list-style-type: none"> ➤ Improve the effectiveness of agency products
<p>IMPROVING Employee Engagement, Diversity, and Inclusion: Implementing actions to ensure we sustain a culture that is fair and diverse, and that provides opportunities for all employees to excel.</p>	<ul style="list-style-type: none"> ➤ Improve the engagement of agency staff ➤ Attract, develop, and retain a high-performing, diverse, and inclusive workforce

Organization and Program Structure

The NTSB's organizational structure is designed around sound business and management principles. The **Board** comprises five Members, each nominated by the President and confirmed by the US Senate to serve a 5-year term. One of these is nominated by the President to serve a 3-year term as Chairman, which requires separate Senate confirmation. Another, designated by the President to be Vice Chairman, serves in that position for 3 years and as Acting Chairman when the Board has no designated Chairman.

Our current Board Members are pictured below (figure 5). Figure 6 shows our organizational structure. For more information about our offices and their functions, visit the [organization page of our website](#).

Figure 5. For the first time in several years, the NTSB has a full complement of Board Members.



Honorable
Robert L. Sumwalt
Chairman



Honorable
Bruce Landsberg
Vice Chairman



Honorable
Jennifer Homendy
Board Member

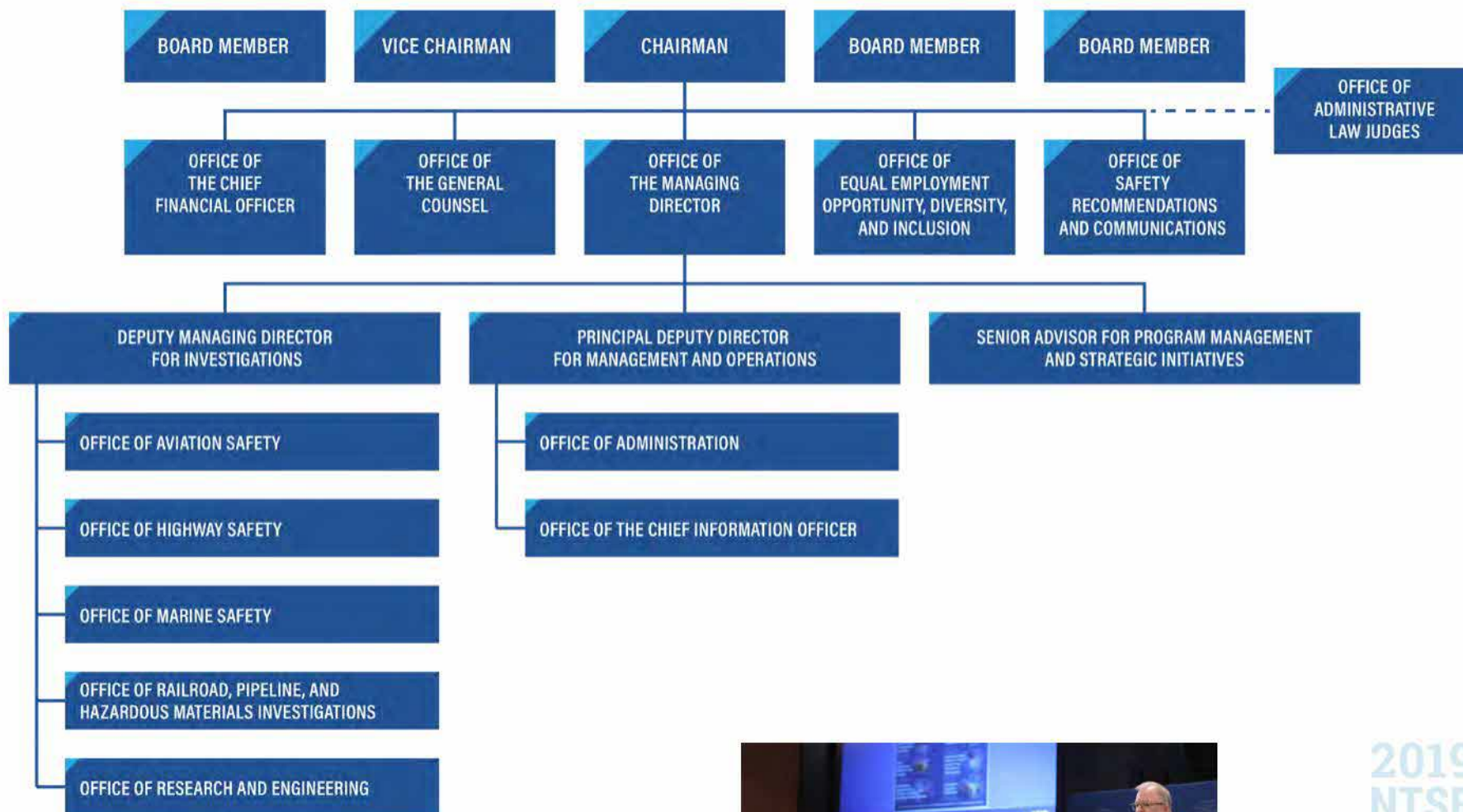


Honorable
Michael Graham
Board Member



Honorable
Thomas Chapman
Board Member

Figure 6. The chart below shows the organization of the NTSB.



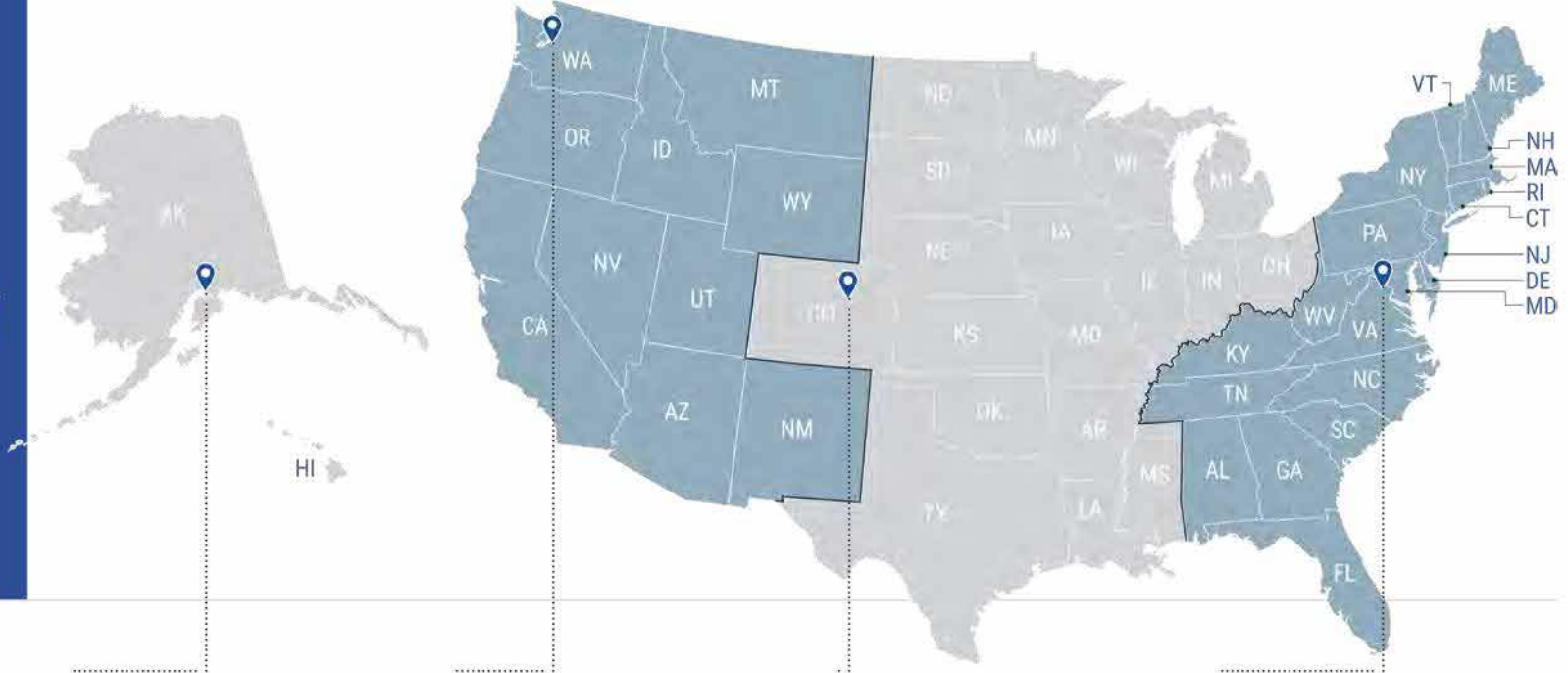
2019
NTSB

Figure 7. From left, Member Graham, Member Chapman, Member Homendy, and Vice Chairman Landsberg listen to Chairman Sumwalt during a Most Wanted List presentation.

NTSB Regions

Headquartered in Washington, DC, our agency has staff working remotely throughout the country and in regional offices in **Ashburn, Virginia; Denver, Colorado; Anchorage, Alaska; and Federal Way, Washington.**

Figure 8. The United States is divided into four NTSB regions, as illustrated below.



ANC: Alaska Region Anchorage, Alaska

Alaska
Hawaii

WPR: Western Pacific Region Federal Way, Washington

Arizona
California
Idaho
Montana
Nevada
New Mexico
Oregon
Utah
Washington
Wyoming

American Samoa
Guam
Northern Mariana Islands

CEN: Central Region Denver, Colorado

Arkansas
Colorado
Indiana
Illinois
Iowa
Kansas
Louisiana
Michigan
Minnesota

Missouri
Nebraska
North Dakota
Ohio
Oklahoma
South Dakota
Texas
Wisconsin

ERA: Eastern Region Ashburn, Virginia

Alabama
Connecticut
Delaware
Florida
Georgia
Kentucky
Maine
Maryland
Massachusetts
Mississippi
North Carolina
New Hampshire

New Jersey
New York
Pennsylvania
Rhode Island
South Carolina
Tennessee
Vermont
Virginia
Washington, DC
West Virginia
Puerto Rico
US Virgin Islands

Table 1. 2019² NTSB Safety Statistics At a Glance

Safety Recommendations		Research and Engineering/Laboratory	
Issued	154	Safety Research Published	5
Closed "Acceptable"	68	Safety Data Analyses Completed	275
Closed "Unacceptable"	22	Readouts of Vehicle Recorders and Other Electronic Devices Completed	447
Urgent Closed "Acceptable"	7	Material Laboratory Exam Reports Completed	174
Urgent Closed "Unacceptable"	1	Vehicle Performance Reports and Animations Completed	41
Reports and Products		Advocacy and Outreach	
Major Reports	22	Journal Publications	4
Accident Briefs	1,148	Advocacy and Outreach Presentations and Events	434
Public Safety Forums, Hearings, Roundtables, Seminars, Webinars, and Workshops	6	Testimony to Congressional Committees	11
Safety Alerts and Videos	3	Testimony or Legislative Support to State Legislative Committees	3
Safety Accomplishments ³	107	Earned Media Mentions (print, broadcast, online)	230,595
Safety Results ⁴	142	Family Members and Victims Assisted	2,249
Accident Launches		Aviation Certificate Appeals	
Major Accident ⁵ Launches	29	Total Cases Received	257
Regional/Field Accident Launches	256	Total Cases Closed	225
International Accident Launches	5	Emergency Cases Received	137
International Accident Travel	7	Emergency Cases Closed	137
		Hearings Held	29
		NTSB Training Center	
		Courses, Programs, and Seminars Offered	128
		Total Attendance	6,111
		External Participants	1,269
		International Participants	187

² This annual report reflects NTSB activities from January 1 through December 31, 2019.

³ A safety accomplishment is defined as a positive measurable change within the transportation environment that is brought about through some direct action of an NTSB employee. Such changes are considered safety accomplishments only if the action is taken without the NTSB's issuing a formal safety recommendation.

⁴ Safety results are defined as positive changes within the transportation environment that are effected because of an NTSB accident or incident investigation. Such changes are considered safety results if they occur as a result of the NTSB investigator's interacting with elements of the transportation environment and by virtue of the investigator's direct investigation of the facts, conditions, and circumstances of the occurrence.

⁵ The criteria for determining whether an accident is considered "major" varies among the modes, as does the makeup of the investigative team launched to the accident site.

2019–2020 Most Wanted List of Transportation Safety Improvements

Critical changes needed to reduce accidents, injuries, and fatalities in transportation

Tens of thousands of people die in preventable transportation accidents and crashes every year—our neighbors, our coworkers, our schoolmates, our family members. With each accident, we learn lessons about safety gaps and make recommendations that, if acted upon, could close these gaps.

The **Most Wanted List** (MWL), the NTSB’s premier advocacy tool, was created in 1990 to identify the top safety improvements that can be made across all modes to prevent accidents, minimize injuries, and save lives. These issue areas are ripe for action now; if addressed, they will significantly impact transportation safety. The MWL groups together safety recommendations under broad topic areas that we refer to as issue areas. These issue areas are developed from selected safety recommendations and safety issues, and are based on the magnitude of risk, potential safety benefits, timeliness, and probability of advocacy efforts to bring about change. Simply put, MWL issue areas are those that we believe need the most attention to close existing safety gaps. The MWL is our road map from lessons learned to lives saved.

The NTSB issued its 2019–2020 MWL on February 4, 2019.⁶ The list highlights 10 issues (shown in table 2, below) that contribute to the preventable loss of life across the nation’s transportation system. We identified 268 open safety recommendations addressing these key safety issues.

Table 2. Summary Table of NTSB 2019–2020 MWL-Associated Open Safety Recommendations

Topic Area	Open Safety Recommendations
Eliminate Distractions	12
End Alcohol and Other Drug Impairment	41
Ensure the Safe Shipment of Hazardous Materials	46
Fully Implement Positive Train Control	16
Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes	21
Improve the Safety of Part 135 Aircraft Flight Operations	21
Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles	11
Reduce Fatigue-Related Accidents	42
Require Medical Fitness—Screen for and Treat Obstructive Sleep Apnea	15
Strengthen Occupant Protection	43
TOTAL	268

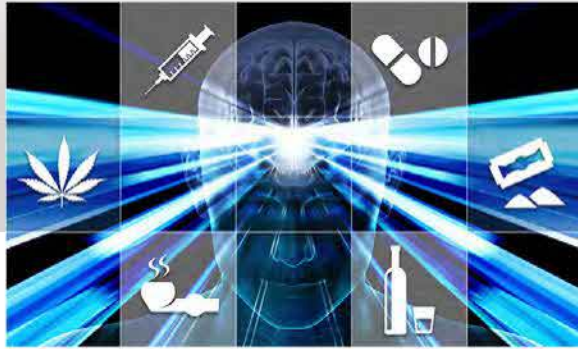


Eliminate Distractions

Distraction is a growing and life-threatening problem in all modes of transportation. All drivers, pilots, and operators need to eliminate distractions and stay focused on safely operating their vehicle, aircraft, vessel, or train. Pedestrians are equally susceptible to distraction and need to remain aware of their surroundings.

We believe distraction should be addressed through a three-pronged approach of education, legislation, and enforcement as well as technology.

⁶ The content included on pages 14–17 is taken from the 2019–2020 MWL. Statistics are those that were available as of February 2019, when the list was issued.



End Alcohol and Other Drug Impairment

Impairment is a contributing factor in far too many transportation accidents across all modes, with alcohol impairment a leading cause of highway crashes. We want to continue to see states adopt per se blood alcohol concentration limits of 0.05 percent or below, as well as broaden their use of other effective countermeasures, such as ignition interlock devices and high-visibility enforcement. Impairment in transportation is not limited to alcohol; it also includes impairment by other drugs—both legal and illicit.

We want a national drug testing standard for drivers of passenger vehicles and stronger screening and toxicology testing in commercial transportation.



Ensure the Safe Shipment of Hazardous Materials

More than 2 million miles of pipeline deliver 24 percent of the natural gas and 39 percent of the total oil consumed in the United States, and as infrastructure ages, the risk to the public from pipeline ruptures grows. In addition, older, more dangerous tank cars continue to carry flammable liquids; less than half of US rail tank cars carrying these liquids meet the improved safety specifications for DOT-117/DOT-117R cars.

We are calling on the railroad industry to meet existing federal deadlines for replacing or retrofitting rail tank cars, and on the pipeline industry to conduct adequate risk assessments. Failure to meet safety standards by—or ahead of—deadlines places communities near railroads or above pipelines at an unacceptable risk.



Fully Implement Positive Train Control

Positive train control (PTC) systems have great potential to prevent or reduce the number of serious train collisions and overspeed derailments by providing safety redundancy to protect against human performance failures. Although Congress mandated that PTC be installed and operating by December 31, 2018, no railroads were in full compliance with the mandate. A 2-year extension was granted to railroads that were not fully compliant. Every day that full implementation is delayed puts the public at risk.

PTC must be fully implemented before the extended deadline to ensure the safety of railroad passengers and the people who live and work near railroads.



Implement a Comprehensive Strategy to Reduce Speeding-Related Crashes

Speeding increases the likelihood of being involved in a crash and intensifies the severity of injuries sustained in a crash. Speeding-related crashes killed 9,378 people in 2018 and cost society more than \$52 billion annually.

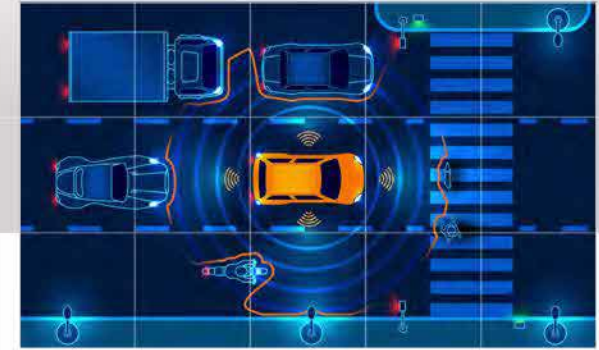
Proven countermeasures—including automated speed enforcement, vehicle technology, infrastructure design, and education campaigns—must be used more broadly to reduce speeding-related crashes.



Improve the Safety of Part 135 Aircraft Flight Operations

Air medical service, air taxi, charter, and on-demand operators are not required to adopt the same safety program criteria as Part 121 operators and could benefit from risk mitigation strategies that are subject to FAA oversight.

All Part 135 operators should implement safety management systems and flight data monitoring programs that address the unique risks associated with their operations, and the FAA should ensure compliance with standard operating procedures.



Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles

Motor vehicle crashes are a leading cause of death and injury in the United States, and many of them could be prevented with collision avoidance systems that are already available.

Vehicle manufacturers should make this technology standard equipment on all vehicles. And consumers, informed about the technology's capabilities and limitations, should buy vehicles equipped with it.



Reduce Fatigue-Related Accidents

✔ Fatigue is a pervasive problem in transportation that degrades a person's ability to stay awake, alert, and attentive to the demands of safely controlling a vehicle, vessel, aircraft, or train.

We are calling for a comprehensive approach to combating fatigue in transportation, focusing on research, education, and training; technology; sleep disorder treatment; hours-of-service regulations; and on- and off-duty scheduling policies and practices.



Require Medical Fitness—Screen for and Treat Obstructive Sleep Apnea

✔ Undiagnosed and untreated obstructive sleep apnea continues to be deadly on our roads and railways, causing too many preventable accidents.

We want to see mandatory screening and treatment for obstructive sleep apnea for rail and highway personnel in safety-sensitive positions.



Strengthen Occupant Protection

✔ Seat belts, child car seats, and child safety restraint systems in highway vehicles and on airplanes reduce the risk of injury and death. Restraints in motor vehicles saved 14,668 lives in 2016 alone.

We want all states to enact laws and regulations requiring all motor vehicle occupants to use seat belts and allowing primary enforcement of seat belt laws for all vehicle occupants.

We also want to see requirements for enhanced vehicle and rail car design to provide better occupant protection, and for general aviation aircraft owners to install shoulder harness systems.



Office of Safety Recommendations and Communications

Table 3. Office of Safety Recommendations and Communications Safety Statistics

Recommendations Issued	154
Recommendations Closed “Acceptable”	68
Recommendations Closed “Unacceptable”	22
Urgent Recommendations Closed “Acceptable”	7
Urgent Recommendations Closed “Unacceptable”	1
Testimony to Congressional Committees	11
Testimony or Legislative Support to State Legislative Committees	3
Earned Media Mentions (print, broadcast, online)	230,595
Family Members and Victims Assisted	2,249
Advocacy and Outreach Events	78

The Office of Safety Recommendations and Communications (SRC) publicly releases information across multiple communication channels to engage a range of stakeholders regarding NTSB investigations, activities, and safety recommendations. These stakeholders include victims of transportation accidents and their families; recipients of NTSB recommendations; the transportation industry; transportation workers; federal, state, and local government officials and agencies; transportation safety advocacy organizations; and the public our agency serves. SRC’s mission spans an investigation’s lifecycle, providing the transparency that supports our independence while building public trust and support.

After an investigation concludes, SRC efforts focus on advocating for and monitoring the implementation of safety recommendations. Through many avenues of communication, SRC tells the NTSB story to gain support for the agency and understanding of its mission.

SRC includes the following six divisions:

- Safety Recommendations (SR)
- Transportation Disaster Assistance (TDA)
- Media Relations (MR)
- Government and Industry Affairs (GA)
- Safety Advocacy (SA)
- Digital Services (DS)

Through many avenues of communication, SRC tells the NTSB story to gain support for the agency and understanding of its mission.

Safety Recommendations Division

NTSB safety recommendations address specific issues uncovered during investigations and specify actions to help prevent similar accidents from occurring in the future. They are the agency’s most important products, because they are the means of alerting government, industry, and the public of critical changes that are needed to save lives and property.

The Board issues its safety recommendations to the organizations best able to take corrective action. Typical recipients include the DOT and its modal administrations, the Coast Guard, other federal and state agencies, manufacturers, operators, and industry and trade organizations, among others. Once the Board has issued a recommendation, the SR Division helps develop and coordinate strategies to encourage its implementation.

SR handles the ongoing correspondence between the agency and each recipient, tracking and analyzing a recipient’s responses and determining a classification—“acceptable” or “unacceptable”—for the Board Members to consider. The journey from issuance to implementation for a specific safety recommendation is sometimes long and can be challenging. SR staff monitors the progress of each recommendation until it is closed. The division also

maintains the NTSB safety recommendations database, compiles monthly statistics, and responds to data queries from other offices.

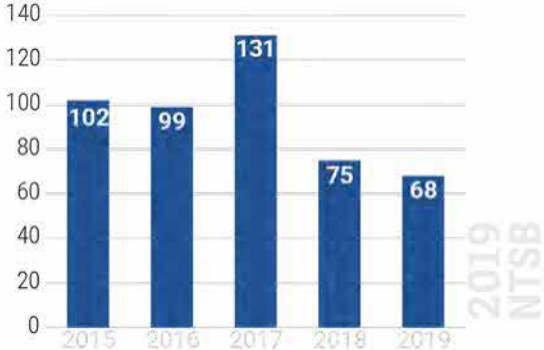
This division’s unique experience prepares staff to assist investigative offices in crafting new recommendations. SR staff members research the history of similar recommendations and advise the modes in choosing language shown to be most effective in addressing the safety issue that prompted the recommendation.

In 2019, in response to NTSB safety recommendations, DOT agencies issued several notices of proposed rulemaking, advance notices of proposed rulemaking, draft manuals, notices of proposed information collection, notices of application for exemption, notices of request for comments, and notices of proposed data collection in the *Federal Register*. Table 4 provides a summary of these actions.

When a major final rule is issued by a DOT agency, it can lead to the closure of numerous NTSB safety recommendations. The fluctuation in the number of recommendations closed in any given year is often the result of such major rulemaking activity—or the lack of

it—by DOT agencies that year. Over the last 5 years, the number of recommendations closed “acceptable” to all recipients has ranged from 102 in 2015 to 68 in 2019. (See figure 9.)⁷

Figure 9. The chart below shows safety recommendations that have been closed “acceptable” (by year).⁸



Of the 68 safety recommendations closed “acceptable” in 2019, 30 were to the DOT, its modal agencies, or the Coast Guard. Table 5, below, shows all the safety recommendations closed to these recipients in 2019.

Table 4. NTSB Safety Recommendations Addressed in *Federal Register* Notices From Federal Agencies in 2019

Agency	Number of <i>Federal Register</i> Notices	Number of Safety Recommendations Addressed
Center for Disease Control and Prevention	1	3
US Department of Transportation	1	3
Federal Aviation Administration	3	1
Federal Motor Carrier Safety Administration	3	15
Federal Railroad Administration	1	5
National Highway Traffic Safety Administration	1	2
Pipeline and Hazardous Materials Safety Administration	1	2
US Coast Guard	2	3

⁷ In addition, 22 safety recommendations were closed “unacceptable” in 2019.
⁸ Closed “acceptable” classifications include “Closed—Acceptable Action,” “Closed—Acceptable Alternate Action,” and “Closed—Exceeds Recommended Action.”

Table 5. NTSB Safety Recommendations Issued to the DOT, DOT Modal Agencies, and the Coast Guard Closed in 2019

Agency	Number of Safety Recommendations Closed
US Department of Transportation	1
Federal Railroad Administration	20
Federal Aviation Administration	18
Federal Motor Carrier Safety Administration	6
Pipeline and Hazardous Materials Safety Administration	5
National Highway Traffic Safety Administration	2
Federal Transit Administration	2
Federal Highway Administration	1
US Coast Guard	3

Transportation Disaster Assistance Division

TDA coordinates federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to meet the needs of family members and survivors following major aviation and rail accidents, as defined in Title 49 *United States Code (U.S.C.) sections 1136 and 1139*. TDA staff also serve as the primary source of investigative information for family members and survivors for any accident investigated by the NTSB (49 *U.S.C.* 1140).

To support both our investigative and family assistance efforts at major accidents, we maintain formal agreements with [the American Red Cross](#); the US Departments of [Homeland Security](#), [Defense](#), [Health and Human Services](#), and [State](#); and the [Federal Bureau of Investigation](#).

During 2019, TDA staff participated in 16 accident launches. Staff also provided nonlaunch family assistance support for an additional 538 accident investigations in all modes of transportation and supported 10 Board meetings and investigative hearings, interacting with 2,249 accident victims and family members.

On average, each week staff engaged with family members associated with 56 different accidents, encounters that ranged from a single phone call or email to several hours of work over multiple days with numerous family members from a single accident. The division also supported a total of 65 domestic and 4 international outreach events, and coordinated 2 training courses at the NTSB Training Center, resulting in direct contact with approximately 3,993 participants.

Staff interfaced with 347 federal, state, and local agencies; transportation industry organizations; and other nongovernmental organizations that have a role in family assistance operations, with an average of 26 engagements per week requiring either travel or remote interaction.



Figure 10. TDA specialist Max Green, standing, and Division Chief Elias Kontanis, seated at right, work close by an accident scene with a representative from a party to the investigation (image altered to hide names and contact information).

TDA OPERATING AUTHORITY

- In 1996, Congress enacted the Aviation Disaster Family Assistance Act (Title 49 *U.S.C.* sections 1136 and 41113), which charged the NTSB with assisting victims of aviation disasters and their families, and coordinating among federal agencies, domestic air carriers, and state and local authorities to ensure that the fundamental concerns of families are met.
- In 1997, Congress enacted the Foreign Air Carrier Family Support Act (Title 49 *U.S.C.* section 41313) to require foreign air carriers operating flights to and from the United States to meet similar victim assistance standards as their US counterparts.
- The Rail Safety Improvement Act of 2008 gave similar responsibilities to the NTSB, Amtrak, and other interstate and intercity high-speed passenger rail operators following rail passenger accidents (Title 49 *U.S.C.* sections 1139 and 24316).
- In 2018, Congress expanded the Board's responsibilities to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accident investigated by the NTSB to the maximum extent practicable in advance of the media (Title 49 *U.S.C.* section 1140).

Media Relations Division

MR is responsible for developing and maintaining mutually beneficial relationships with the media to tell the NTSB story and to communicate information to external audiences that promotes transparency and accountability. The division is the primary conduit through which the agency releases information to the media about accident and incident investigations, as well as other newsworthy agency activities, including the release of reports, safety alerts, safety studies, and safety recommendations. The staff responds to media inquiries, arranges and supports media interviews of agency personnel, and are the on-scene public affairs officers supporting Board Members during major accident investigations. The division also supports deployed regional investigators and investigators-in-charge (IIC) and provides training to both NTSB and transportation industry personnel to prepare them for successful media engagement. The staff supports agency events that are open to the media, such as Board meetings, media briefings, and safety advocacy events of media interest.



Figure 11. Peter Knudson from the MR Division provides support for an NTSB Board meeting.

The division helped the NTSB garner more than 230,595 print, broadcast, and online news mentions in 2019. Special projects included media relations support for nine multimedia projects, including six episodes of the Cineflex production *Mayday*; documentaries for the Smithsonian Channel (US) and the Discovery Channel (Canada) about the sinking of the SS *El Faro*; a *PBS News Hour* story on railroad safety in America; a press conference in Darien, Connecticut, on PTC; Hearst Television's in-depth news package on PTC; and the satellite media tour commemorating the 10th anniversary of the Colgan Air crash.

MR continued to robustly support the 2019–2020 MWL, resulting in more than 2,200 articles mentioning the MWL and the NTSB. Staff supported the agency's *Alaska Part 135 Roundtable*, *Distracted Driving Roundtable*, and a series of advocacy events focused on impairment and occupant safety to help tell the NTSB story and advance transportation safety.

NTSB media advisories and news releases enjoyed a 24 percent open rate—3 points above the accepted 21 percent average for government communications. The 465 unique URLs used in MR products yielded more than 201,624 link clicks, driving online traffic to agency products on the ntsb.gov website, our YouTube channel, and our Flickr account. The resultant earned-media coverage and online engagement speak to the power of the NTSB story and that story's relevance to our audiences.

Building on past success, MR continued to emphasize the use of imagery in its news releases and tweets. Staff issued 22 media advisories and 56 news releases; more than 60 percent of the news releases contained imagery. Staff also issued 767 tweets via @NTSB_Newsroom, generating more than 66,763 clicks; 9,145 retweets; and 15,189 likes.

MR launched staff on every 2019 major investigation or "Go Team" launch, and supported regional investigators remotely and, in some cases, with on-scene support. The division provided training to more than 1,246 people in 2019 in 24 training events.

Figure 12. MR staff member Keith Holloway photographs Southwest Airlines Flight 1380, a Boeing 737-7H4, during the on-scene phase of the investigation. IIC Bill English is pictured in the background, left.



Government and Industry Affairs Division

GA is the NTSB's primary liaison with Congress, the [White House](#), the [Government Accountability Office](#), other federal agencies, and state and local governments. The division staff informs Congress, governors, and state legislatures about NTSB activities, including accident launches, investigations, Board meetings, and recommendations, and manage inquiries from these groups. The division supports interaction with the transportation industry regarding agency initiatives, and works with the Safety Advocacy (SA) Division to support programs and legislation consistent with safety recommendations and to monitor relevant state legislative activity.

In 2019, staff provided on-scene support to Board Members and investigators for seven accident launches and responded to hundreds of requests for information in each mode of transportation. The division also initiated agency outreach to congressional, state, and local officials who expressed an interest in improving

transportation safety. Staff prepared Board Members and senior officials to testify before Congress at 11 hearings to provide information regarding the investigation of 2 crashes involving 737 MAX aircraft (2 hearings), aviation safety (2 hearings), pipeline safety (2 hearings), highway safety, Amtrak, school bus safety, maritime vessel safety, and automated vehicles. The division also filed 10 statutorily required reports to Congress and coordinated responses to 10 engagements from the Government Accountability Office. In addition, GA supported the Senate confirmation process for two new Board Members, and the reconfirmation of two Board Members.

At the state level, GA supported Board Member and senior official testimonies and legislative advocacy efforts before state legislatures, including those regarding highway safety in Massachusetts and Connecticut.



Figure 13. Office of Aviation Safety Director Dana Schulze, left, testifies to the House Committee on Transportation and Infrastructure, Aviation Subcommittee, during the subcommittee's hearing on the [State of Aviation](#), July 2019. Chief Christopher Wallace and specialist Joseph Schmoll, seated behind her, provided GA support.

Safety Advocacy Division

SA leads the agency's advocacy efforts and promotes the implementation of safety recommendations on the NTSB's [MWL](#). The division relays NTSB safety messages and lessons learned through print, digital media, and social media communications, including the [NTSB blog](#) on [www.nts.gov](#), [Instagram](#), [LinkedIn](#), [Facebook](#), [YouTube](#), and [Twitter](#). The division distributes agency products and information to stakeholders and advocacy groups.

SA's primary advocacy focus is the MWL. The division leads the list's biennial development, working with Board Members, the Office of Research and Engineering (RE), and modal office directors to identify issues for the list. SA also works with MR to create an overall campaign strategy for the MWL, then develops the strategic communications plan that will be employed for each issue area.

The division identifies and coordinates speaking opportunities for Board Members and staff to promote

MWL topics and NTSB recommendations, and tracks agency-wide advocacy efforts related to the list. SA produces all MWL-related materials (such as fact sheets, briefing memos, and legislative testimony) directed toward the range of stakeholders interested in the list.

Figure 14. SA staff prepared numerous graphics like this one for MWL presentations.



To develop the 2019–2020 MWL, the division executed a new process that included facilitated meetings with modal offices and RE, and revamped its methodology for identifying topics to be included on the list. Staff developed and coordinated the Board Member review and approval process and developed MWL products—fact sheets, key messages, and related brochures. Additionally, SA worked with MR to plan a press conference and public meeting to announce the new list, and the division helped coordinate a response to Congress regarding new appropriations language related to the MWL. Following the public meeting, staff engaged in several activities and events to move the needle on the issues and safety recommendations identified in the new list, raising awareness about the causes and countermeasures of accidents, injuries, and fatalities in all modes of transportation.

In 2019, SA also accomplished the following:

➤ **Increased social media use and presence.** The division continued to expand the agency’s use of social media and digital media platforms to highlight significant investigative findings, share MWL safety messages and lessons learned, and promote NTSB recommendations. Staff posted hundreds of social media messages via the NTSB blog, Twitter, Facebook, LinkedIn, Instagram, YouTube, and Flickr. Followers increased in all social media. For example, from 2018 to 2019, Twitter followers increased from 138,000 to 149,400; Instagram followers increased from 4,000 to 5,900. In 2019, NTSB blog posts received more than 35,844 views. In addition, SA posted numerous items on Facebook, reaching more than 191,000 people, and connections on the NTSB LinkedIn account increased by 4,000. The division also became more fully engaged with the agency’s official LinkedIn page, including developing and posting a biweekly safety message from the Chairman, highlighting the work of agency staff and job announcements, and promoting key advocacy events.

➤ **Developed and released new products.** The division introduced a new podcast host, developed a motorcycle safety and truck fleet safety tip card, produced a webinar, and created safety event videos. SA also taped and released 14 episodes of the “Behind the Scene @ NTSB” podcast and developed 8 YouTube videos, which received more than 15,000 total views.

➤ **Increased information dissemination capabilities to stakeholders via email messaging platforms.** The number of stakeholder subscribers receiving our products increased by 22 percent in 2019 compared to 2018. SA also increased the number of notifications staff sent out related to events, reports, investigative findings, and MWL-associated information.

➤ **Increased awareness about the MWL and promoted adoption of MWL-related recommendations.**

The division supported 78 advocacy and outreach events, which included 15 exhibits, reaching more than 20,000 stakeholders and interested parties. Of the 78 advocacy and outreach events, staff also supported 26 Board-Member trips and presentations, reaching thousands more people. The division hosted four roundtables to discuss topics such as eliminating distractions and improving Part 135 safety. These roundtables drew more than 1,000 attendees, and involved participation with survivor advocates and aviation association groups. In 2019, advocacy funds supported 66 agency staff member trips focused on promoting the recommendations associated with the MWL issue areas. For the first time, SA worked with MR to publicly highlight, via news releases and other announcements, specific recommendations related to the MWL as they were closed.

➤ **Developed a regular Chairman’s Message.**

The division developed and released new advocacy and agency promotion products via social and digital media, such as the *Chairman’s Message*.

➤ **Developed and released three Advocacy Spotlight newsletters.** SA emailed a digital newsletter to thousands of advocacy groups and other interested stakeholders, sharing news of agency activities and other MWL developments.



Figure 15. The SA Division employed a wide variety of graphics such as these in social media messaging.

Digital Services Division

DS supports the NTSB's internal and external strategic communications goals. The division designs and develops a range of audiovisual products that optimize the NTSB's ability to communicate investigation findings and safety messages, and to facilitate employee engagement internally. The division also establishes standards for the agency for visual style and branding and advises internal stakeholders on how to optimize visual information to enhance their products.

In 2019, DS completed more than 2,000 requests for information release via the web, social media, and visual media (graphics, publications, video). Staff supported 22 accident investigation launches; 11 Board meetings; and 7 public forums, symposia, and other events. The division also provided graphics and video support for the 2019–2020 MWL.

DS managed outgoing agency communications on the NTSB's public website and supported the agency's social media messaging, increasing engagement with the public and other stakeholders. In addition, staff developed an editorial calendar to ensure consistent informational content for the agency's digital platforms.

The division also developed a new internal internet site to support employee engagement, using internal resources and technologies, which saved the agency approximately \$200,000 in outside contracting fees.



Figure 16. *InsideNTSB* was developed to help employees find work resources faster, get to know each other better, and keep up with the latest NTSB news and information.

The six divisions described above are charged with providing information to Congress, industry, the general public, and the families of victims of transportation disasters. From the day of an accident through the day recommended safety measures are implemented, SRC plays a crucial role in the NTSB's mission.



Table 6. SRC Accident Launch Support in 2019

	Date	Location	Accident Information
RAIL, PIPELINE & HAZARDOUS MATERIALS	February 6	San Francisco, California	An excavator damaged a Pacific Gas & Electric natural gas main. A release of gas and the subsequent ignition led to a fire.
	August 1	Danville, Kentucky	A 30-inch natural gas transmission pipeline failed, releasing a fireball.
HIGHWAY	June 21	Randolph, New Hampshire	A pickup truck towing a trailer collided with a group of motorcyclists on a two-lane highway, causing the death of seven motorcyclists.
	September 9	Bryce Canyon, Utah	A 29-passenger medium-size bus departed the roadway and, as the driver attempted to regain control, the vehicle rolled over. The crash caused the death of four people.
MARINE	September 2	Ventura, California	A fire broke out aboard the commercial diving vessel <i>Conception</i> (US Flag, 75-foot) offshore of Ventura. The Coast Guard classified this accident a major marine casualty. The NTSB is leading the investigation.
AVIATION	February 3	Yorba Linda, California	A Cessna 414 impacted terrain east of Fullerton airport. An in-flight breakup was reported just before the wreckage impacted a residential neighborhood.
	February 22	Baytown, Texas	A Boeing 767-300 crashed into Trinity Bay during approach to George Bush Intercontinental Airport, causing the deaths of three people.
	April 22	Kerrville, Texas	A Beechcraft BE-58 crashed on approach to Kerrville Municipal Airport.
	May 3	Jacksonville, Florida	A B737-800 departed the end of the runway and entered St. John's River.
	May 13	Ketchikan, Alaska	A de Havilland DHC-2 collided midair with a de Havilland DHC-3. Both flights were operating as Part 135 sightseeing tours.
	June 10	New York, New York	An Augusta A109E helicopter crash-landed on a roof in midtown Manhattan. The helicopter was destroyed.
	June 21	Mokuleia, Hawaii	A Beech 65-A90 airplane crashed north of the runway at Dillingham Airfield during a parachute operation.
	June 30	Addison, Texas	A Beech BE-350 collided with a hangar and terrain after takeoff from Addison Airport. The airplane was destroyed and a postimpact fire ensued.
	August 17	Lagrangeville, New York	A Cessna 303 crashed into a residence under unknown circumstances.
	October 2	Windsor Locks, Connecticut	A Boeing B-17G operating as a sightseeing flight under Part 91 was destroyed when it collided with an airport building following a runway excursion while landing at Bradley International Airport.

2019
NTSB



Office of Aviation Safety

Table 7. Office of Aviation Safety Statistics

Recommendations Issued	23
Recommendations Closed "Acceptable"	16
Recommendations Closed "Unacceptable"	5
Major Reports	5
Accident Briefs	1095
Major Investigation Launches	10
Regional Investigation Launches	212
International Accident Launches	2
International Accident Travel	6
International Accident Notifications	311
Safety Accomplishments	94
Safety Results	142
Safety Alerts	2
Public Forums and Seminars	2
Journal Publication	1
Advocacy and Outreach Events	196

The Office of Aviation Safety's (AS) mission is to—

- investigate all air carrier, commuter, and air taxi accidents; fatal and nonfatal general aviation accidents; certain public aircraft accidents; and select serious incidents.
- participate in the investigations of major airline and significant general aviation crashes in foreign countries that involve US carriers, US-manufactured or designed equipment, or US-registered aircraft to fulfill US obligations under International Civil Aviation Organization (ICAO) agreements.
- conduct investigations concerning safety issues that extend beyond a single accident to examine specific aviation safety problems from a broader perspective.

AS investigates over 1,300 domestic aviation accidents and incidents annually and proposes probable causes for approval either by the Board or under delegated authority. Working with other offices within the NTSB, AS develops recommendations to prevent the occurrence of similar accidents and incidents and to improve aviation safety.

AS conducts investigative activities through four specialty divisions based in Washington, DC, and a regional investigation management structure consisting of four regional office sites. Investigators are located throughout the country. International aviation activities are coordinated from the Washington, DC, office.

AS investigates over 1,300 domestic aviation accidents and incidents annually and proposes probable causes for approval either by the Board or under delegated authority.

Completed Major Investigations

Runway Overrun During Rejected Takeoff Ameristar Air Cargo Inc. Ypsilanti, Michigan (1 injured)

On March 8, 2017, Ameristar Air Cargo Inc., dba Ameristar Charters, flight 9363, a Boeing MD-83 airplane, N786TW, overran the departure end of runway 23L at Willow Run Airport in Ypsilanti, Michigan, after the captain executed a rejected takeoff. All 110 passengers and 6 crewmembers evacuated the airplane via emergency escape slides; however, one slide failed to inflate and could not be used. One passenger received a minor injury, and the airplane sustained substantial damage. The airplane was operated under the provisions of Title 14 *CFR* Part 121 as an on-demand charter flight and was destined for Washington Dulles International Airport in Virginia.

We determined that the probable cause of this accident was the airplane's jammed right elevator, which resulted from exposure to localized dynamic wind while the airplane was parked and rendered the airplane unable to rotate during takeoff. Contributing to the accident was the effect of a large structure on the gusting surface wind at the airplane's parked location, which led to turbulent gust loads on the right elevator sufficient to jam it, even though the horizontal surface wind speed was below the certification design limit and maintenance inspection criteria for the airplane. Also contributing to the accident was the lack of a means to enable the flight crew to detect a jammed elevator during preflight checks for the Boeing MD-83 airplane. Contributing to the survivability of the accident was the captain's timely and appropriate decision to reject the takeoff, the check airman's disciplined adherence to standard operating procedures after the captain called for the rejected takeoff, and the dimensionally compliant runway safety area where the overrun occurred.



Source: The Boeing Company

Figure 17. The probable cause of the runway overrun of this Boeing MD-83 airplane was a jammed right elevator resulting from strong, turbulent wind gusts.

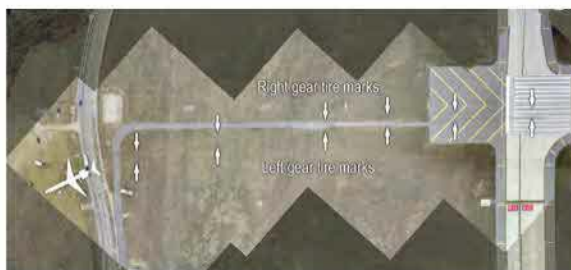


Figure 18. The orthomosaic image above shows the Boeing MD-83's path from the end of runway 23L to the airplane's final location.

As a result of this investigation, we issued six safety recommendations and classified two previously issued safety recommendations. The FAA and The Boeing Company received recommendations.

Departure From Controlled Flight Trans-Pacific Air Charter LLC Teterboro, New Jersey (2 fatalities)

On May 15, 2017, a Learjet 35A, N452DA, departed controlled flight while on a circling approach to runway 1 at Teterboro Airport in New Jersey and impacted a commercial building and parking lot. The pilot-in-command (PIC) and the second-in-command (SIC) died; no one on the ground was injured. The airplane was destroyed by impact forces and postcrash fire. The airplane was registered to A&C Big Sky Aviation LLC and was operated by Trans-Pacific Air Charter LLC under the provisions of 14 *CFR* Part 91 as a positioning flight. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed. The flight departed from Philadelphia International Airport in Pennsylvania and was destined for Teterboro Airport.



Source: Carlstadt, New Jersey, Police Department.
Note: inset image enhanced by the NTSB.

Figure 19. This security video image (inset) shows the Learjet 35A as it crashes into a parking lot at the Teterboro Airport.

We determined that the probable cause of this accident was the PIC's attempt to salvage an unstabilized visual approach, which resulted in an aerodynamic stall at low altitude. Contributing to the accident was the PIC's decision to allow an unapproved SIC to act as pilot flying, the PIC's inadequate and incomplete preflight planning, and the flight crew's lack of an approach briefing. Also contributing to

the accident were Trans-Pacific's lack of safety programs that would have enabled the company to identify and correct patterns of poor performance and procedural noncompliance and the FAA's ineffective safety assurance system procedures, which failed to identify these company oversight deficiencies.

As a result of this investigation, we issued three safety recommendations and reiterated six previously issued safety recommendations to the FAA.

Fatal, Doors-Off Helicopter Crash East River, New York (5 fatalities, 1 injured)

On March 11, 2018, an American Eurocopter Corp (Airbus Helicopters) AS350B2, N350LH, was substantially damaged when it impacted the East River and subsequently rolled inverted after the pilot reported a loss of engine power near New York City. The pilot egressed from the helicopter and sustained minor injuries. The five passengers died on board. The scheduled 30-minute, doors-off aerial photography flight was operated by Liberty Helicopters Inc, on behalf of FlyNYON under the provisions of 14 *CFR* Part 91. Visual meteorological conditions prevailed, and no flight plan was filed for the flight, which originated from Helo Kearny Heliport in Kearny, New Jersey.

We determined that the probable cause of this accident was Liberty Helicopters Inc.'s use of a NYONair-provided passenger harness/tether system, which caught on and activated the floor mounted engine fuel shutoff lever and resulted in the in-flight loss of engine power and the subsequent ditching. Contributing to this accident were Liberty's and NYONair's deficient safety management, which did not adequately mitigate foreseeable risks associated with the harness/tether system interfering with the floor-mounted controls and hindering passenger egress. Also contributing was Liberty allowing NYONair to influence the operational control of Liberty's FlyNYON flights, and the FAA's inadequate oversight of Title 14 *CFR* Part 91 revenue-passenger-carrying operations. Contributing to the severity of the accident was the rapid capsizing of the helicopter caused by partial

inflation of the emergency flotation system and Liberty's and NYONair's use of the harness/tether system that hindered passenger egress.

As a result of this investigation, we issued one urgent recommendation (in March 2018) and 16 additional safety recommendations upon adoption of our final report. The FAA, Airbus Helicopters, the European Union Aviation Safety Agency, Liberty Helicopters, and NYONair received recommendations.



Figure 20. This photo shows the front passenger's tether with top locking carabiner inserted through the third webbing loop (from floor) with three excess loops hanging as a tail. Note: The tether tail's terminating loop (yellow) is partially obscured.

CFM International Engine Failure Southwest Airlines Philadelphia, Pennsylvania (1 fatality, 8 injured)

On April 17, 2018, Southwest Airlines flight 1380, a Boeing 737-700, N772SW, experienced a failure of the left CFM International CFM-56-7B engine and loss of engine inlet and cowling while climbing at an altitude of 32,000 feet. Fragments from the engine inlet and cowling struck the wing and fuselage, which damaged a passenger window and resulted in a rapid depressurization. The flight crew conducted an emergency descent and diverted into Philadelphia International Airport in Pennsylvania. Of the 144 passengers and 5 crewmembers onboard, 1 passenger received fatal injuries and 8 passengers received minor injuries. The airplane sustained substantial damage.

The regularly scheduled domestic passenger flight was operating under Title 14 *CFR* Part 121 from LaGuardia Airport in Queens, New York, to Dallas Love Field in Texas.



Figure 21. The engine inlet of the Boeing 737-700 was substantially damaged when the inner barrel forward of the containment shield separated circumferentially from the rest of the inlet. Only a portion of the inner barrel back skin remained.

We determined that the probable cause of this accident was a low-cycle fatigue crack in the dovetail of fan blade No. 13, which resulted in the fan blade's separating in flight and impacting the engine fan case at a location that was critical to the structural integrity and performance of the fan cowl structure. This impact led to the in-flight

separation of fan cowl components, including the inboard fan cowl aft latch keeper, which struck the fuselage near a cabin window and caused the window to depart from the airplane, the cabin to rapidly depressurize, and the passenger to be fatally injured.

As a result of this investigation, we issued seven safety recommendations to the FAA, Southwest Airlines, and the European Union Aviation Safety Agency.

Completed Accident or Incident Briefs

In 2019, 1,095 investigations were completed. The accident and incident briefs below highlight some of the investigations that resulted in critical safety changes and addressed new technology (unmanned aircraft systems).

Loss of Engine Power Gypsum, Kansas (no fatalities or injuries)

On May 5, 2017, a Thrush Aircraft Inc. S2R-H80 airplane, N3045R, lost engine power and impacted terrain and a fence during a forced landing near Gypsum, Kansas. The commercial pilot was uninjured; the airplane sustained substantial fuselage damage during the forced landing. The airplane was registered to and operated by Central Ag Air LLC as a 14 *CFR* Part 137 aerial application flight. The local flight originated from the Marion Municipal Airport, near Marion, Kansas.

We determined that the probable cause of this accident was a total loss of engine power during a low-altitude agricultural application flight for reasons that could not be determined during detailed examinations. Contributing to the accident was the pilot's failure to follow the airplane manufacturer's emergency procedures to recover engine power, which resulted in a forced landing.

As a result of this investigation, Thrush Aircraft issued a service bulletin that provides instructions and parts for an improved fuel pump system including new hardware, fuel lines, and location of pumps to ease replacement in the field.

Loss of Engine Power During Cruise Flight Adrian, Michigan (2 injured)

On August 11, 2017, a Navion G airplane, N249KC, lost engine power and impacted trees near Adrian, Michigan. The flight instructor and private pilot were seriously injured, and the airplane sustained substantial damage. The airplane was registered to Kalea Co. LLC and operated by Sky Walker Flying under the provisions of 14 *CFR* Part 91 as an instructional flight. The local flight departed Lenawee County Airport in Adrian.

We determined that the probable cause of this accident was a leak in the gascolator, which allowed air to enter the fuel system and resulted in a partial loss of engine power.

As a result of this investigation, the FAA issued an aviation maintenance alert recommending that all Navion model airplanes complete the gascolator test found in manufacturer service bulletins and take the proper corrective action if the gascolator fails the test.

Engine Fire After Touchdown Glendale, Arizona (no fatalities or injuries)

On August 22, 2017, an Enstrom F-28F helicopter, N52PD, experienced smoke coming from the engine cowling area after touchdown at the Glendale Municipal Airport, Glendale, Arizona. The certified flight instructor and student pilot were not injured, and the helicopter was not damaged. The helicopter was registered to and operated by Airwest Aviation Academy LLC under the provisions of 14 *CFR* Part 91 as an instructional flight.

We determined that the probable cause of this incident was an internal failure of the turbocompressor, which resulted in oil leaking into the turbocompressor's exhaust.

As a result of this investigation, the FAA issued a safety airworthiness information bulletin alerting owners, operators, maintenance technicians, and inspectors of the potential failure of v-band couplings used in exhaust systems on turbocharged aircraft.

■ Engine Fire During Takeoff Las Vegas, Nevada (no fatalities or injuries)

On September 6, 2017, a Delta Air Lines Boeing 757-232, N686DA, equipped with two Pratt & Whitney PW2037 turbofan engines, experienced a No. 1 (left) engine undercowl fire during takeoff from McCarran International Airport in Las Vegas, Nevada. The flight crew reported a left engine fire indication and associated aural fire alert at rotation/initial climb. The crew completed the quick reference handbook procedures, declared an emergency, shut down the left engine, and discharged one of the fire bottles; the fire warning was cleared momentarily. The crew then initiated engine-out procedures to return to the airport. During the downwind leg of the airplane's flight pattern, the fire warning indication re-illuminated and the second fire bottle was discharged, which cleared the fire warning a second time. The airplane made an uneventful overweight landing at McCarran International Airport and was met by aircraft rescue and firefighting personnel on the runway, who sprayed fire retardant into the engine and confirmed that the fire was extinguished. The airplane was cleared to taxi to the gate under its own power. There were no passenger or crew injuries reported. The flight was being operated in accordance with 14 *CFR* Part 121 and was a regularly scheduled flight from Las Vegas to John F. Kennedy International Airport in Queens, New York.

We determined that the probable cause of this incident was a No. 1 (left) engine undercowl fire caused by a fuel nozzle installation error during engine overhaul at Delta TechOps. A fuel nozzle b-nut was cross threaded, which allowed fuel to leak on hot engine case surfaces and subsequently ignite.

As a result of this investigation, Delta Airlines updated the diffuser and combustor assembly work instruction card to add an inspector sign-off requirement during the pneumatic leak check step of the fuel system assembly to avoid future installation errors.

■ Impact with Terrain After Takeoff San Diego, California (1 fatality)

On February 21, 2018, a Cirrus SR22T airplane, N707DF, impacted terrain shortly after takeoff from Montgomery-Gibbs Executive Airport in San Diego, California. The private pilot was fatally injured and the airplane sustained substantial damage. The airplane was registered to the pilot, who was operating it as a 14 *CFR* Part 91 personal flight.

We determined that the probable cause of this accident was the pilot's exceedance of the airplane's critical angle of attack during an attempted return to the runway following a total loss of engine power after takeoff, which resulted in an aerodynamic stall. Contributing to the accident was the excessive amount of fuel being delivered to the engine for reasons that could not be determined based on the available information.

As a result of this investigation, Cirrus issued a service advisory reminding pilots of the proper use of the fuel pump and of the proper fuel flow parameters.

■ Runway Excursion During Takeoff Parkin, Arkansas (no fatalities or injuries)

On May 31, 2018, a Thrush Aircraft S2R-H80, N6215P, received substantial damage during a runway excursion during takeoff on runway 18 from a private airstrip near Parkin, Arkansas. The pilot was not injured. The aircraft was registered to Mid Continent Aircraft Corporation and operated by Air Aids Inc. under the provisions of 14 *CFR* Part 137 as an aerial application flight.

We determined that the probable cause of this accident was the improper operation of the rudder pedal adjustment mechanism for an undetermined period of time, which led to the failure of the rudder pedal adjustment track, the detachment of the rudder pedal, and the pilot's subsequent inability to maintain directional control.

As a result of this investigation, Thrush Aircraft issued a service letter to operators detailing proper use, rigging, and maintenance of the rudder system, including the rudder pedal adjustment mechanism.

■ Inflight Wing Separation on Piper PA-28R Airplane

Daytona Beach, Florida (2 fatalities)

On April 4, 2018, a Piper PA-28R-201, N106ER, collided with terrain following an in-flight separation of the left-wing near the wing root during climb after a touch-and-go maneuver at Daytona Beach International Airport in Florida. The airline transport pilot and private pilot were fatally injured, and the airplane was destroyed. The airplane was registered to and operated by Embry-Riddle Aeronautical University under the provisions of 14 *CFR* Part 91 as a local instructional flight.

We determined that the probable cause of this accident was extensive fatigue cracking in the left-wing main spar lower cap and doublers, which resulted in the in-flight separation of the left wing. The fatigue cracks initiated and grew to a critical size because of flight and ground loads associated with flight-training: flight-training maneuvers, significant operation at low altitudes, and frequent landing cycles. Previously established inspection criteria were insufficient to detect the fatigue crack before it grew to a critical size.

As a result of this investigation, Piper developed new inspection techniques, procedures, and tools to improve inspection accuracy, and the FAA issued an airworthiness directive for inspections and for owners to report findings.

Unmanned Aircraft System Crash Blacksburg, Virginia (no fatalities or injuries)

On August 14, 2018, at the Mountain Lake Biological Station, Blacksburg, Virginia, a Dà-Jiang Innovations Phantom 4 small unmanned aircraft system (sUAS, or drone), registration FA3HCWCR4X, operated by the Virginia Tech Conservation Management Institute, collided with a bystander, who sustained minor injuries. The drone was not damaged. The flight was an educational demonstration flight conducted in Class G airspace under the provisions of 14 CFR Part 107. Visual flight rules conditions prevailed at the time of the incident.

We determined that the probable cause of this incident was the drone pilot's incorrect control inputs caused by insufficient knowledge of the aircraft flight manual procedures. Contributing to the incident was the close proximity of the observers and the decision to conduct a demonstration near the observers in a confined area with no assistance.

➤ **This accident highlights our continued work investigating accidents and incidents involving sUAS, an emerging sector of the aviation industry. NTSB investigators have expanded their knowledge base and training to effectively and comprehensively investigate accidents and incidents involving these aircraft, including commercial operations underway in the National Airspace System, such as package delivery. In addition, AS is currently investigating an accident in which an unmanned passenger air vehicle (an urban air mobility vehicle) crashed during landing in Manassas, Virginia.**

Completed Safety Recommendation Report

Assumptions Used in the Safety Assessment Process and the Effects of Multiple Alerts and Indications on Pilot Performance

We issued seven safety recommendations to the FAA as a result of our participation under the provisions of ICAO Annex 13 in the investigations of two fatal accidents involving the Boeing 737 MAX. As the accident investigation authority for the state of design and manufacture of the airplane in these accidents, we examined the US design certification process that was used to approve the Maneuvering Characteristics Augmentation System (MCAS) on the Boeing 737 MAX. Following the PT Lion Mentari Airlines accident on October 29, 2018, Boeing developed an MCAS software update to provide additional layers of protection and was working on updated procedures and training when the Ethiopian Airlines accident occurred on March 10, 2019. We are concerned that the process used to evaluate the original design needs improvement because that process is still used to certify current and future aircraft and system designs. The Ethiopian accident investigation is ongoing, and we continue to participate in that investigation.

Ongoing Investigations

As of December 31, 2019, AS had 2,062 open domestic investigations. The following highlights the major investigations involving significant safety issues that which we launched on in 2019:

- A Bell 400 helicopter air ambulance crash in instrument meteorological conditions; Zaleski, Ohio; January 29, 2019; 3 fatalities.
- A Boeing 767-375BCF cargo airplane rapid descent and crash; Trinity Bay, Texas; February 23, 2019; 3 fatalities.
- A de Havilland DHC-2 and a de Havilland DHC-3 midair collision; Ketchikan, Alaska; May 13, 2019; 6 fatalities.
- A Beech 65-A90 airplane crash on takeoff during a parachute operation; Mokuleia, Hawaii; June 21, 2019; 11 fatalities.
- Safety of Part 91 commercial passenger-carrying operations; multiple investigations.
- A Saab 2000 airplane runway overrun; Dutch Harbor, Alaska; October 17, 2019; 1 fatality.
- An Airbus AS 350B2 air tour crash; Lihue, Hawaii; December 26, 2019; 7 fatalities.



Figure 22. NTSB investigator Clint Crookshanks and Board Member Jennifer Homendy observe the site of the midair collision near Ketchikan, Alaska.

INTERNATIONAL PROGRAM



The NTSB participates in investigations of aviation accidents and serious incidents outside the United States, in accordance with the Chicago Convention of the ICAO and the Standards and Recommended Practices provided in Annex 13 to the convention.

If an accident or serious incident occurs in a foreign state involving a civil aircraft of US registry, a US operator, or an aircraft of US design or manufacture, and the foreign state is a signatory to the ICAO Convention, that state is responsible for the investigation. In accordance with Annex 13, upon receiving ICAO notification of the accident or serious incident, the NTSB designates a US-accredited representative and appoints advisors to carry out the obligations, receive the entitlements, provide consultation, and receive safety recommendations from the state of occurrence.

If an accident or serious incident occurs in a foreign state not bound by the provisions of Annex 13, if a foreign state delegates all or part of an investigation by mutual consent to the NTSB, or if the accident or serious incident involves a public aircraft, the investigation will be conducted in consonance with any agreement entered into between the United States and the foreign state.

International Investigations

The AS international program accomplishes its overall mission of improving aviation safety most directly through participation in foreign investigations involving US aviation operations and products in accordance with ICAO protocols. NTSB participation in foreign investigations is crucial to identifying and driving aviation safety improvements in the US and abroad.

The international program also includes an array of collaborative and outreach initiatives to ensure support for US interests and to enhance the overall effectiveness of the international investigation process. AS staff represent the US on the ICAO Accident Investigation Panel and are actively involved in working groups addressing international investigation matters. AS serves as the focal point for NTSB participation in the US Interagency Group on International Aviation, a multi-agency initiative responsible for coordinating US positions for the Department of State on high-level international aviation issues.

The AS international program also includes extensive outreach to international accident investigation authorities, the FAA, and other US agencies and stakeholders to promote harmonized improvements to the aviation safety system.

The following are ongoing international investigations on which staff launched in 2019:

- On March 10, 2019, Ethiopian Airlines flight 302, a **Boeing 737 MAX**, crashed shortly after takeoff from Addis Ababa Bole International Airport in Ethiopia. All 157 passengers and flight crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Ethiopian Civil Aviation Authority. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.
- On October 20, 2019, a Thai Airways International **Boeing 777-300ER** powered by two **General Electric GE90-115B** turbofan engines aborted takeoff after experiencing a high pressure turbine uncontainment in the No. 1 engine. The incident is being investigated by Thailand's Aircraft Accident and Incident Investigation Commission. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane and engines.



Office of Highway Safety

HS

Table 8. Office of Highway Safety Statistics

Recommendations Issued	52
Recommendations Closed “Acceptable”	4
Recommendations Closed “Unacceptable”	7
Major Reports	5
Accident Briefs	8
Major Accident Launches	3
Field Investigation Accident Launches	4
Safety Accomplishments	8
Public Roundtables and Webinars	3
Journal Publication	1
Advocacy and Outreach Events	22

The Office of Highway Safety (HS) investigates accidents that have a significant impact on public confidence in highway transportation safety, highlight national safety issues, or generate high public interest and media attention. Such accidents may include collapses of highway bridge or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), collisions at highway–rail grade crossings, and accidents that involve new safety issues or technologies. In addition, HS publishes safety reports based on trends emerging from NTSB accident investigations and from other research and accident data to identify common risks or underlying causes of accidents. To accomplish these tasks, HS is organized into two primary units: the Investigations Division and the Report Development Division.

Accidents may include collapses of highway bridge or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), collisions at highway–rail grade crossings, and accidents that involve new safety issues or technologies.

Completed Major Investigation Reports

■ School Bus Run-Off-Road and Fire Oakland, Iowa (2 fatalities)

On December 12, 2017, a 2004 International 65-passenger school bus, operated by the Riverside Community School District, was traveling south on rural 480th Street outside Oakland, Iowa. The bus driver turned onto a residential driveway to pick up the first student on his route. After the 16-year-old student boarded, the driver reversed out of the driveway, his normal practice, then backed across 480th Street and continued driving in reverse until the bus's rear wheels ran off the road and dropped into a 3-foot-deep ditch. As the driver tried to drive the bus out of the ditch, a fire began in the engine compartment and spread throughout the bus. Both the driver and passenger died in the fire.



Source: Pottawattamie County Sheriff's Office

Figure 23. This school bus burned when the driver backed into a ditch, the exhaust pipe was blocked, and the fuel was ignited. Both the driver and the only passenger died in the fire.

We determined that the probable cause of the investigation was the driver's failure to control the bus, backing it into a roadside ditch for reasons that could not be established, and the failure of the Riverside Community School District to provide adequate oversight by allowing a driver with a known physical impairment that limited his ability to perform emergency duties to operate a school bus. The probable cause of the fire was ignition of a fuel source on the exterior of the engine's turbocharger because of turbocharger overload and heat production, resulting from the blockage of the exhaust pipe by the bus's position in the ditch and the driver's attempts to accelerate out of the

ditch. Contributing to the severity of the fire was the spread of flames, heat, and toxic gases from the engine into the passenger compartment through an incomplete firewall.

As a result of this investigation, we issued 10 safety recommendations. The DOT; the National Highway Traffic Safety Administration (NHTSA); 44 states (including Iowa), the District of Columbia, and the Commonwealth of Puerto Rico; the Riverside Community School District; 3 school transportation associations; and 7 school bus manufacturers received safety recommendations. We also reiterated one recommendation to NHTSA and classified a previously issued recommendation to the three school transportation associations.

■ Pedestrian Bridge Collapse Miami, Florida (6 fatalities, 8 injured)

On March 15, 2018, a partially constructed pedestrian bridge crossing an eight-lane roadway in Miami, Florida, experienced a catastrophic structural failure in the nodal connection between truss members 11 and 12 and the bridge deck. The 174-foot-long bridge span fell about 18.5 feet onto SW 8th Street, which consists of four through travel lanes and one left-turn lane in the eastbound direction, and three through travel lanes in the westbound direction. Two of the westbound lanes below the north end of the bridge were closed to traffic at the time of the collapse; however, one westbound lane and all five eastbound lanes were open.

The pedestrian bridge was under construction as part of the Florida International University (FIU) City Prosperity Project. Eight vehicles that were stopped below the bridge at the time of the collapse were fully or partially crushed; seven of those were occupied. As a result of the bridge collapse, one bridge worker and five vehicle occupants died. Four bridge workers and four other people were injured.

We determined that the probable cause of the bridge collapse was the load and capacity calculation errors made by FIGG Bridge Engineers Inc. in its design of

the main span truss member 11/12 nodal region and connection to the bridge deck. Contributing to the collapse was the inadequate peer review performed by Louis Berger, which failed to detect the calculation errors in the bridge design. Further contributing to the collapse was the failure of the FIGG engineer of record to identify the significance of the structural cracking observed in this node before the collapse and to obtain an independent peer review of the remedial plan to address the cracking. Contributing to the severity of the collapse outcome was the failure of MCM (the design builder); FIGG; Bolton, Perez and Associates Consulting Engineers; FIU; and the Florida Department of Transportation to cease bridge work when the structure cracking reached unacceptable levels and to take appropriate action to close SW 8th Street as necessary to protect public safety.

As a result of this investigation, we issued 11 safety recommendations. The Federal Highway Administration, Florida Department of Transportation, American Association of State Highway and Transportation Officials, and FIGG received recommendations.



Source: Florida International University video camera

Figure 24. These still images from an FIU parking garage camera show an east view of the pedestrian bridge on March 15, 2018, pre-collapse (top) and postcollapse (bottom).

Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian

Tempe, Arizona (1 fatality)

On March 18, 2018, a 49-year-old woman died when a test vehicle struck her as she was walking a bicycle mid-block across Mill Avenue in Tempe, Arizona. The test vehicle, a 2017 Volvo XC90 sport utility vehicle modified with an Uber Advanced Technologies Group (ATG) developmental automated driving system, was occupied by one operator, who was not injured in the crash. The vehicle was controlled by the Uber ATG developmental automated driving system as it encountered the pedestrian.

We determined that the probable cause of the collision was the failure of the vehicle operator to monitor the driving environment and the operation of the automated driving system because she was visually distracted throughout the trip by her personal cell phone.

Contributing to the crash were Uber ATG's inadequate safety risk assessment procedures, ineffective oversight of vehicle operators, and inadequate mechanisms for addressing operators' automation complacency—all a consequence of Uber ATG's inadequate safety culture. Further factors contributing to the crash were the impaired pedestrian's crossing the street outside a crosswalk, and the Arizona Department of Transportation's insufficient oversight of automated vehicle testing.

As a result of this collision, we issued six safety recommendations. Recipients included NHTSA, the state of Arizona, the American Association of Motor Vehicle Administrators, and Uber ATG.



Figure 25. This photo shows the approximate position of the bicycle at impact.

Figure 26. Then-HS investigator Jennifer Morrison and HS investigator David Pereira on scene in Tempe, Arizona, examine the automated test vehicle.



Completed Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and primarily determine probable cause.

These briefs may be issued by the office director under delegated authority or may be adopted by the Board.

Low-Speed Collision Between Truck-Tractor and Autonomous Shuttle

Las Vegas, Nevada (no fatalities or injuries)

On November 8, 2017, a minor collision occurred on south 6th Street in downtown Las Vegas, Nevada, between a truck-tractor combination vehicle, operated by a 48-year-old driver, and a 2017 Navya Arma autonomous shuttle carrying 7 passengers and a 38-year-old attendant. The shuttle, manufactured by Navya and operated by Keolis North America, was on a 0.6-mile designated loop beginning and ending at a downtown shopping center known as Container Park. The combination vehicle, a 2006 International truck-tractor pulling a 2010 Utility refrigerated trailer, was backing into an alley west of South 6th Street

while on a delivery route for US Foods when it struck the shuttle.

The shuttle was a test vehicle, part of a pilot program in Las Vegas, and was on its first day of passenger-carrying operations (shuttle rides were free) when the collision occurred. The pilot program ran from October 2017 to October 2018.

We determined that the probable cause of this collision was the truck driver's backing into the alley and expecting that the shuttle would stop at a sufficient distance from his vehicle to allow him to complete his backup maneuver. Contributing to the cause of the collision was the attendant's inability to take manual control of the vehicle in an emergency.

Figure 27. The external sensors and communication devices that guided the autonomous shuttle in the Las Vegas accident were located on the vehicle as shown below.



Rear-End Collision Between a Car Operating with Advanced Driver Assistance Systems and a Stationary Fire Truck

Culver City, California (no fatalities or injuries)

On January 22, 2018, a 2014 Tesla Model S P85 car was traveling behind another vehicle in the high-occupancy vehicle (HOV) lane of southbound Interstate 405 (I-405) in Culver City, California. Because of a collision in the northbound freeway lanes that had happened about 25 minutes earlier, a California Highway Patrol vehicle was parked on the left shoulder of southbound I-405, and a Culver City Fire Department truck was parked diagonally across the southbound HOV lane. The emergency lights were active on both the California Highway Patrol vehicle and the fire truck. When the vehicle ahead of the Tesla changed lanes to the right to go around the fire truck, the Tesla remained in the HOV lane, accelerated, and struck the rear of the fire truck at a recorded speed of about 31 miles per hour (mph).

At the time of the crash, the fire truck was unoccupied. The Tesla driver did not report any injuries. The car was equipped with advanced driver assistance systems (ADAS),⁹ including Autopilot. Based on the driver's statements and on performance data downloaded from the car after the crash, Autopilot was engaged at the time of the collision.

We determined that the probable cause of the rear-end crash was the Tesla driver's lack of response to the stationary fire truck in his travel lane, caused by inattention and overreliance on the vehicle's ADAS; the Tesla's Autopilot design, which permitted the driver to disengage from the driving task; and the driver's use of the system in ways inconsistent with guidance and warnings from the manufacturer.

Single-Vehicle Run-Off-Road Crash and Fire Fort Lauderdale, Florida (2 fatalities, 1 injured)

On Tuesday, May 8, 2018, a 2014 Tesla Model S electric-powered car occupied by an 18-year-old driver and two 18-year-old passengers was traveling south in the 1300 block of Seabreeze Boulevard in Fort Lauderdale, Florida, at a recorded speed of 116 mph. The driver and his passengers were on their way to the driver's residence from a nearby shopping mall, a trip of about 4 miles. The posted speed limit at the crash location is 30 mph, and the roadway curves to the left for southbound traffic. The approach to the curve has a turn-warning sign indicating that the roadway turns left, augmented by a flashing beacon and a posted advisory speed of 25 mph.

According to witnesses, the driver maneuvered the car into the left lane and was passing another vehicle. The driver lost control while moving back into the right lane as he attempted to negotiate the curve. As the car exited the curve, it struck and mounted the curb on the west side of the road, crossed the sidewalk, and continued south, striking a wall on the north side of a residential driveway. The car continued forward and struck the wall on the south side of the driveway. Witnesses reported that flames came from the car after the second collision. Both the driver and the front passenger died in the crash. The rear passenger was ejected during the crash and was transported to a local hospital with serious injuries.

We determined the probable cause of the crash was the driver's loss of control as a result of excessive speed. Contributing to the severity of the injuries was the postcrash fire originating in the crash-damaged lithium-ion traction battery.



Figure 28. The right side of the car involved in the Fort Lauderdale, Florida, accident, shows the severe crash and fire damage.

⁹ ADAS are designed to help drivers perform certain driving tasks, such as staying in a lane, parking, avoiding collisions, and maintaining a safe headway. ADAS also helps reduce blind spots and improve safety. Autopilot gives automated longitudinal and lateral control of a vehicle.

Completed Safety Recommendation Reports

Providing Occupant Protection for Limousine Passengers

Schoharie, New York (20 fatalities)

We issued four safety recommendations as a result of our investigation of a collision involving a 2001 Ford Excursion stretch limousine, a 2015 Toyota Highlander sport utility vehicle (SUV), and two pedestrians that occurred in Schoharie, New York, on October 6, 2018. Our investigation identified safety issues related to occupant protection, including the integrity of limousine seat and seat belt systems and the accessibility and use of seat belts by limousine passengers.

As a result of this ongoing investigation, NHTSA, the New York State Department of Transportation, and the National Limousine Association received recommendations. We also reiterated one safety recommendation to the state of New York.

Addressing Systemic Problems Related to the Timely Repair of Traffic Safety Hardware in California

Mountain View, California (1 fatality, 1 injured)

As of December 2019, we were investigating a fatal collision between an SUV and a previously damaged and nonoperational crash attenuator in Mountain View, California, that occurred on March 23, 2018. Our investigation identified systemic problems within the California Department of Transportation that negatively affect the timely repair of traffic safety hardware. Consequently, we issued a safety recommendation to the California State Transportation Agency.

Ongoing Investigations

- Electric vehicle battery fire safety report; multiple cases; 3 fatalities, 3 injured.
- Electrical conduit impacted commercial vehicle after breaking away from tunnel; East Penn Township, Pennsylvania; February 21, 2018; 1 fatality.
- Multi-vehicle crash; Elmhurst, Illinois; March 1, 2018; 1 fatality, 6 injured.
- Tesla SUV crash and postcrash fire on reignition; Mountain View, California; March 23, 2018; 1 fatality, 1 injured.
- Truck-tractor collision with multiple vehicles at end of work zone traffic queue; Boise, Idaho; June 16, 2018; 4 fatalities, 1 injured.
- Truck-tractor tire failure and collision with oncoming motorcoach; Thoreau, New Mexico; August 30, 2018; 8 fatalities, 40 injured.
- Limousine collision with parked car after failing to stop at intersection; Schoharie, New York; October 6, 2018; 20 fatalities, 1 injured.
- Four children in school bus loading zone hit by passing car; Rochester, Indiana; October 25, 2018; 3 fatalities, 1 injured.
- Truck-tractor in combination with van semitrailer impacted passenger car, crashed through median, and struck van, causing rollover and additional vehicle collisions; Alachua, Florida; January 3, 2019; 7 fatalities, 8 injured.
- Truck-tractor in combination with semitrailer crossed in front of 2018 Tesla Model 3 operating with autopilot engaged, shearing off the vehicle's roof; Delray Beach, Florida; March 1, 2019; 1 fatality.
- Box truck collision with 15-passenger van; Scooba, Mississippi; June 3, 2019; 8 fatalities, 2 injured.
- Pickup truck collision with group of motorcyclists after crossing center line; postcrash fire ensued; Randolph, New Hampshire; June 21, 2019; 7 fatalities, 3 injured.
- Passenger car collision with medium-size bus after crossing center median; SeaTac, Washington; July 25, 2019; 1 fatality, 6 injured.
- Medium-size bus rollover after departing roadway; Bryce Canyon City, Utah; September 30, 2019; 4 fatalities, 26 injured.
- Medium-size bus impacted by passenger vehicle that crossed centerline; Belton, South Carolina; December 17, 2019; 1 fatality, 6 injured.

Figure 29. A local state police investigator discusses details of the June 21, 2019, collision in Randolph, New Hampshire, involving a pickup truck and numerous motorcycles, with HS investigators Kenny Bragg and Dennis Collins.



Safety Roundtables and Webinar

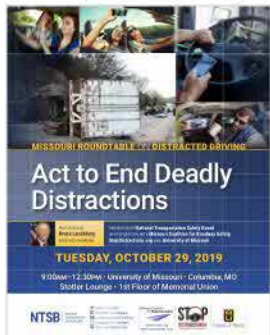
Safety Roundtable: Distracted Driving: Perspectives from the Trucking Industry

On April 11, 2019, we held the third roundtable on distracted driving in partnership with Jetco and StopDistractions.org in Houston, Texas. The roundtable included members of the trucking community, victim advocacy groups, the business community, and legislators, who discussed the problem of distracted driving and potential countermeasures. Although the roundtable discussions were focused on Texas, the topics are applicable nationwide.

Safety Roundtable: Act to End Deadly Distractions

On October 29, 2019, we held a roundtable on distracted driving in Columbia, Missouri, in cooperation with Missouri Coalition for Roadway Safety, StopDistractions.org and the University of Missouri. Participants included state

and federal government officials, victims' families, and other safety advocates, who discussed strategies to prevent distracted driving.



Safety Webinar: Collision Avoidance Systems: Why You Need Them in Your Trucks Today!

On April 18, 2019, we held a safety webinar to discuss the benefits of collision avoidance system technology and why we put this issue on our MWL (**Increase Implementation of Collision Avoidance Systems in All New Highway Vehicles**). Representatives from the heavy duty truck industry discussed the rate of implementation and current industry perspectives, and carriers discussed why they installed collision avoidance systems in their fleets and the benefits that resulted.



Office of Marine Safety

Table 9. Office of Marine Safety Statistics

Recommendations Issued	16
Recommendations Closed "Acceptable"	8
Recommendations Closed "Unacceptable"	3
Major Reports	4
Major Accident Launches	5
Accident Briefs Completed	35
Field Investigation Accident Launches	40
International Investigations	2
International Launches	1
Safety Accomplishment	1
Public Workshop	1
Other Products Produced	1
Advocacy and Outreach Events	45

The Office of Marine Safety (MS) investigates major marine casualties on or under the territorial waters of the United States, including accidents involving US-flagged merchant vessels worldwide and those involving both US public and nonpublic vessels in the same casualty. In addition, the office investigates selected catastrophic marine accidents and those of a recurring nature.

The Coast Guard conducts preliminary investigations of all marine accidents and notifies the NTSB if an accident qualifies as a major marine casualty, which is defined as resulting in at least one of the following:

- The loss of six or more lives.
- The loss of a mechanically propelled vessel of 100 or more gross tons.
- Property damage initially estimated at \$500,000 or more.
- Serious threat (as determined by the Coast Guard Commandant and concurred with by the NTSB Chairman) to life, property, or the environment from hazardous materials.

MS investigates and determines the probable cause of all major marine casualties. For select major marine casualties, the office launches a full investigative team and presents the investigative product to the Board. In all other major marine casualties, MS launches marine investigators to the scene to gather sufficient factual information to develop a marine accident brief report. Most of these brief investigation reports are adopted by the MS director through delegated authority; the remainder, including reports on accidents involving public and nonpublic marine casualties, are adopted by the Board.

MS investigates major marine casualties on or under the territorial waters of the United States.

INTERNATIONAL PROGRAM

The international program involves reviewing US Administration position papers related to marine accident investigations and participating in select International Maritime Organization (IMO) meetings. In the last year, the NTSB attended IMO meetings about reviewing and classifying maritime accidents and accident reporting, mariner certification and training, and voyage data recorder technical standards and requirements.



Under the MS international program, the NTSB also coordinates with other US and foreign agencies to ensure consistency with IMO conventions, most notably in joint US flag state marine accident investigations. We also cooperate with other accident investigation organizations worldwide, such as the Marine Accident Investigators' International Forum, and track developments in marine accident investigation and prevention.

International Investigations

Given the international nature of the marine transportation system and the number of foreign-registered cruise and cargo ships operating from US ports, accident investigations involving both domestic and foreign-registered vessels promote marine safety worldwide. MS is responsible for the overall management of the NTSB international marine safety program and investigates major marine casualties involving foreign-flagged vessels operating in US waters and US-flagged vessels involved in major marine casualties all over the world. MS has investigated accidents involving US-flagged ships as far away as the North Sea, American Samoa, Japan, and Singapore. Accidents involving foreign-flagged vessels have accounted for 28 percent of NTSB marine accident investigations over the past 5 years.

Every year, more than 11 million Americans travel on board foreign-flagged cruise ships. MS cooperates, along with the Coast Guard, with foreign marine casualty investigation authorities under standards established by the IMO Code for the Investigation of Marine Casualties and Incidents as a substantially interested state (SIS) when a casualty involves a foreign-flagged cruise ship with US citizens on board outside US waters. In 2019, MS and the Coast Guard joined Norway in the SIS investigation of the Norwegian flag MV *Viking Sky*, an investigation which remained ongoing at year's end (see page 49).

Collision Between US Navy Destroyer *John S McCain* and Tanker *Alnic MC*¹⁰ Singapore Strait (10 fatalities, 48 injured)

On August 21, 2017, the US Navy destroyer *John S McCain* was overtaking the Liberian-flagged tanker *Alnic MC* as both vessels were transiting the westbound lane in the Middle Channel passage of the Singapore Strait Traffic Separation Scheme. The destroyer's crew perceived a loss of steering; as the crew attempted to regain control of the vessel, the *John S McCain* unintentionally turned to port into the path of the *Alnic MC*, and the two vessels collided. As a result of the collision, 10 *John S McCain* sailors died, 48 were injured, and the vessel sustained over \$100 million in damage. No one was injured

on the *Alnic MC*, but the vessel sustained about \$225,000 in damage. We determined that the probable cause of the collision between the *John S McCain* and the *Alnic MC* was a lack of effective operational oversight of the destroyer by the US Navy, which resulted in insufficient training and inadequate bridge operating procedures. Contributing to the accident were the *John S McCain* bridge team's loss of situation awareness and failure to follow loss-of-steering emergency procedures, which included the requirement to inform nearby traffic of their perceived loss of steering. Also contributing to the accident was the operation of the steering system in backup manual mode, which allowed for an unintentional, unilateral transfer of steering control.

As a result of this investigation, we issued seven safety recommendations to the US Navy.



Source: US Coast Guard

Figure 30. After the accident, the *Alnic MC* was anchored in Singapore.



Figure 31. The *John S McCain* sustained significant port-side damage from the bow of the *Alnic MC*.

¹⁰ The collision between USS *John S McCain* and Liberian-flagged tanker *Alnic MC* launched an international marine casualty investigation with the NTSB as the lead US agency in a public/nonpublic investigation. The Republic of Singapore produced an independent casualty investigation report as the port state, and the Republic of Liberia produced an independent casualty investigation report as the flag state of the *Alnic MC*.

Completed Major Investigations

Explosion and Fire Aboard Articulated Tug and Barge *Buster Bouchard/B. No. 255* Port Aransas, Aransas Pass Fairway, Anchorage, Texas (2 fatalities)

On October 20, 2017, the crews of the articulated tug and barge *Buster Bouchard/B. No. 255* (US) were preparing to get under way from anchorage to proceed into the Port of Corpus Christi, Texas, when an explosion and subsequent fire occurred on the bow of the barge. Two barge crewmembers who were on the bow were killed in the explosion. The fire was extinguished later that day. Approximately 2,000 barrels (84,000 gallons) of crude oil were released from the barge into the water or were consumed in the fire. Damages exceeded \$5 million. The barge was scrapped after the accident; there was no damage to the tugboat.

We determined that the probable cause of the explosion was the lack of effective maintenance and safety management of the barge by Bouchard Transportation, which resulted in crude oil cargo leaking through a corroded bulkhead into the forepeak void space, forming vapor, and igniting. Contributing to the accident were the ineffective inspections and surveys by the Coast Guard and the American Bureau of Shipping.



Source: US Coast Guard

Figure 32. The *B. No. 255* sustained significant bow damage from the explosion.



Source: US Coast Guard

Figure 33. Looking aft from barge *B. No. 255*, the damage to the chain locker, center forepeak and port forepeak ballast tanks is visible.

As a result of this investigation, we issued three safety recommendations to the Bouchard Transportation Company Inc., the Coast Guard, and the American Bureau of Shipping.

Barge Breakaway and Contact with the Emsworth Locks and Dams Emsworth, Pennsylvania, (no fatalities or injuries)

On January 13, 2018, 27 dry cargo barges (US) broke free from the Jacks Run barge fleeting area on the Ohio River near Pittsburgh, Pennsylvania. The barges drifted, uncontrolled, downriver and struck the dams at the US Army Corps of Engineers Emsworth Locks and Dams complex. Two Corps of Engineers workboats moored at the foot of the dam were also struck and driven into one of the dam's concrete piers, causing significant damage to both vessels. Nine barges and the workboats were declared constructive total losses in the accident. Total damages exceeded \$12.5 million.

We determined that the probable cause of the accident was the failure of the fleeting area owner, Allegheny County Sanitary Authority, and the operator, Industry Terminal and Salvage Company, to maintain the area's mooring cells and prevent shoaling, which resulted in inadequate mooring arrangements during highwater and ice conditions. Contributing to the accident was the Corps of Engineers' and the Coast Guard's lack of resources and authority to inspect fleeting areas effectively and ensure that they are maintained.

As a result of this investigation, we issued four safety recommendations to the Coast Guard and the Corps of Engineers.

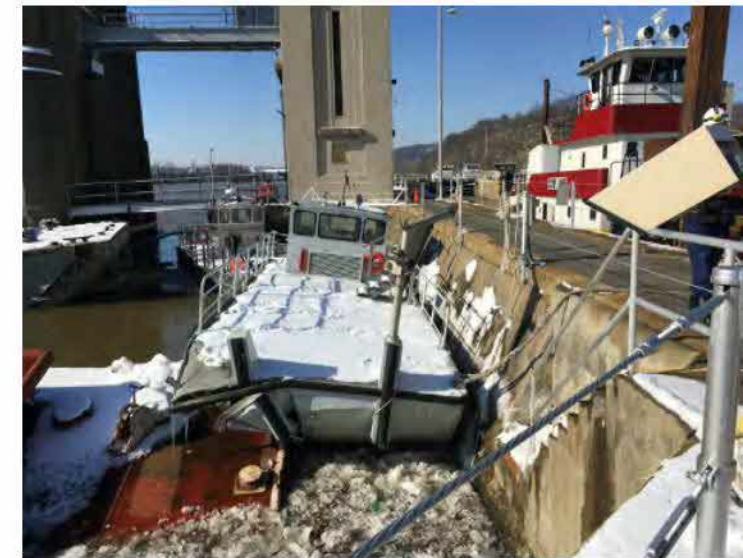


Figure 34. The US Army Corps of Engineers vessel (covered in snow, above) was damaged when dry cargo barges drifted downriver and struck the dams. Damages exceeded \$12.5 million.

Completed Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and primarily determine probable cause. These briefs may be issued by the office director under delegated authority or may be adopted by the Board.

The briefs described below are 6 of the 35 completed in 2019.

Diesel Generator Failure Aboard Offshore Supply Vessel *Red Dawn*

Amchitka Island, Alaska (no fatalities or injuries)

On December 13, 2017, the offshore supply vessel *Red Dawn* (US) was transiting through the North Pacific Ocean en route to resupply the radar station Sea-Based X-Band Radar. When the vessel was about 375 miles south-southwest of Amchitka Island, Alaska, its no. 2 main diesel engine suffered a mechanical failure that led to the ejection of components from the cylinder block, which destroyed the engine. No pollution or injuries to the 12 crewmembers or 33 passengers on board were reported. Estimated damages were \$957,000.



Figure 35. The HOS *Red Dawn* suffered a mechanical failure in December 2017 that destroyed the engine.

We determined that the probable cause of the mechanical failure was a connecting rod assembly on the no. 2 diesel engine that came loose and separated from the crankshaft caused by improper tightening (torqueing) of the connecting rod bolts during the previous engine overhaul.

Engine Room Fire on Board Towing Vessel *Leland Speakes*

Greenville, Mississippi (no fatalities or injuries)

On February 21, 2018, the towing vessel (TV) *Leland Speakes* (US) was pushing 21 barges up the lower Mississippi River when a fire broke out in the engine room south of Greenville, Mississippi. The nine crewmembers on board tried to fight the fire but, unable to control it, they abandoned the vessel to a skiff dispatched from a Good Samaritan towboat. The abandoned tow drifted 11 miles downriver until another towing vessel pushed it into a sandbar. The fire burned until later that evening before being extinguished by fire response teams and vessels. No crewmembers were injured, and no environmental damage was reported. Estimated damages were \$4.5–5 million.



Figure 36. Fire consumed the upper engine room spaces of the MV *Leland Speakes*.

We determined that the probable cause of the fire was a catastrophic failure and crankcase breach of the port main engine resulting from failure of the caps that secured two piston connecting rods to the crankshaft. Contributing to the severity of the fire was the vessel's lack of a fixed fire-extinguishing system for the engine room and lack of redundant fire pumps.

Anchor Contact of Articulated Tug and Barge *Clyde S VanEnkevort/Erie Trader* with Underwater Cables and Pipelines

Mackinac Bridge, Michigan (no fatalities or injuries)

On April 1, 2018, the articulated tug and barge *Clyde S VanEnkevort/Erie Trader* (US) was westbound with a crew of 14 in the Straits of Mackinac, Michigan, when the barge's starboard anchor, which had released and was dragging on the bottom, struck and damaged three underwater electrical transmission cables and two oil pipelines. About 800 gallons of dielectric mineral oil leaked into the water from the cables; the oil pipelines sustained only superficial damage. Repair and replacement of the cables was estimated at more than \$100 million. No injuries were reported.

We determined that the probable cause of this accident was the failure of the anchor detail to secure the barge's starboard anchor and the improper adjustment of the anchor brake band after the engineering crew replaced the brake liner, the combination of which allowed the anchor and chain to play out under way.

Collision of Bulk Carrier *Yochow* with Articulated Tug and Barge *OSG Independence/OSG 243* Houston Ship Channel, Houston, Texas (no fatalities or injuries)

On June 13, 2018, the inbound Hong Kong flag bulk carrier *Yochow* collided with the articulated tug and barge *OSG Independence/OSG 243*, which was moored on the Houston Ship Channel in Houston, Texas. The *OSG 243*'s tanks were empty and awaiting a cargo of methyl tert-butyl ether. As a result of the collision, two of the barge's tanks and *Yochow*'s bulbous bow were punctured, and the facility bore extensive structural damage. There were no injuries among the crew of 18 on the *Yochow* or the 8 aboard the tug *OSG Independence*, nor was any pollution reported. Damage to the facility (\$20 million), the barge (\$1 million), and the bulk carrier (\$338,000) amounted to an estimated \$21,338,000.

We determined that the probable cause of the collision was the *Yochow* mate's failure to monitor the helmsman effectively, contrary to the principles of good bridge resource management. Contributing to the accident was the lack of company and shipboard oversight to ensure that crewmembers adhered to work-rest guidelines, resulting in the helmsman's fatigue.

Capsizing and Sinking of Barge *Dredge200* and Loss of Workboat *R.E. Pierson 2* Pushed by Tugboat *Big Jake*

5 miles east of Minots Ledge Light, Massachusetts Bay, Massachusetts (2 injured)

On December 2, 2018, the TV *Big Jake* (US) was under way in Massachusetts Bay towing five barges and two workboats when the tow broke apart. As a result of the breakaway, the barge *Dredge200* (US) and the workboat *R.E. Pierson 2* (US) both sank. Two crewmembers sustained minor injuries. Although both sunken vessels had fuel and lube oil on board, no visible oil sheen or pollution was reported. Estimated value of the *Dredge200* and the *R.E. Pierson 2* totaled \$1.98 million.

We determined that the probable cause of the capsizing and sinking of the *Dredge200* and the *R.E. Pierson 2* was the decision by the tow captain and owner to attempt a transit in forecasted wind and waves that exceeded their original plan for the voyage.

Contact of the Cruise Ship *Nippon Maru* with Mooring Dolphins

Apra Harbor, Guam, USA (no fatalities or injuries)

On December 30, 2018, the stern of the passenger vessel *Nippon Maru* (JP) struck mooring dolphins at a US Navy fueling wharf in Apra Harbor, Guam, while the vessel was maneuvering in a turning basin after getting under way from the harbor's commercial port. No pollution or injuries were reported. Damage to the vessel was estimated at \$456,080; damage to the mooring dolphins was in excess of \$500,000.

We determined that the probable cause of this accident was the master's alcohol impairment, which resulted in an errant astern engine input.



Source: US Coast Guard

Figure 37. The MV *Nippon Maru* sustained damage when it struck mooring dolphins in Apra Harbor, Guam.

Figure 38. This close-up of the starboard side of the stern of the MV *Nippon Maru* shows the damage to the ship.

Source: US Coast Guard



Safety Recommendation Report

During accident and incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations outside of a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation, as happened in the investigation described below.

Safety Recommendation Report: Improving Vessel Survivability and Passenger Emergency Egress of DUKW Amphibious Passenger Vessels Tabletop Lake, Branson, Missouri (17 fatalities, 6 injured)

On July 19, 2018, 17 of the 31 people aboard the *Stretch Duck 7* (US) died when the amphibious passenger vessel sank during a high-wind storm that developed rapidly on Table Rock Lake near Branson, Missouri. As of December 2019, we were investigating the sinking of the *Stretch Duck 7*, which was built in 1944 as a DUKW landing craft to carry military personnel and cargo during World War II and then modified for commercial purposes to carry passengers on excursion tours.

Our investigation found that, having been constructed with a low freeboard and without compartmentalization or subdivision, the *Stretch Duck 7* lacked adequate reserve buoyancy and therefore quickly sank after it encountered severe weather and water entered the vessel. We also found that both the fixed canopy and a closed side curtain spanning the starboard side of the passenger compartment on the *Stretch Duck 7* impeded passenger escape, which likely increased the number of fatalities.

As a result of our ongoing investigation, we issued two safety recommendations to the Coast Guard.



Figure 39. Seventeen of the 31 people aboard the *Stretch Duck 7* died when the vessel sank in high winds during a storm on Table Rock Lake near Branson, Missouri.

Marine Board of Investigation Hearings Held in Conjunction with the NTSB

NTSB investigators participate in Coast Guard Marine Board of Investigation hearings,¹¹ which are public hearings related to investigations in which the agency is authorized to obtain testimony under oath.

When the Coast Guard holds a Marine Board of Investigation Hearing with respect to a major marine casualty, the NTSB joins as an equal partner. Consistent with Coast Guard responsibility to direct the course of the investigation, the person or persons designated by the Board may make recommendations about the scope of the investigation, call and examine witnesses, and submit or request additional evidence.

Collision Between the Liquid Propane Gas Carrier *Genesis River* and barges being pushed by the Towing Vessel *Voyager*

September 16–20, 2019, we participated in the Coast Guard's formal investigation public hearing regarding the May 10, 2019, collision between the liquid propane gas carrier *Genesis River* (PN) and barges being pushed by the TV *Voyager* (US) in Galveston, Texas. Cargo tanks in one of the barges were breached, spilling about 10,000 barrels of reformat, a gasoline blending stock, into the waterway. The second barge capsized. The Houston Ship Channel was shut down for 2 days after the accident during salvage operations. There were no injuries. Damage to the *Genesis River* and the two barges was estimated at over \$600,000.

Allision of the Towing Vessel *Kristin Alexis* and Crane Barge *Mr Ervin* with the Sunshine Bridge

May 6–11, 2019, we participated in the Coast Guard formal investigation–Marine Board of Investigation public hearing regarding the allision of the TV *Kristin Alexis* (US) and crane barge *Mr Ervin* (US) with the Sunshine Bridge in St. James Parish, Louisiana. On October 11, 2018, the tug *Kristin Alexis* left a mooring facility, pushing the crane barge *Mr Ervin* ahead, heading for a dock located about 8 miles upriver. The next day, the crane barge struck and became lodged under the Sunshine Bridge that crossed the Mississippi River about 30 miles south-southeast of Baton Rouge, Louisiana. Damage to the crane was minimal. Damage to the bridge is estimated at \$3.5 million.

¹¹ Title 49 *CFR* 850.30, Procedures for Coast Guard investigation. The Board may designate a person or persons to participate in every phase of an investigation, including on-scene investigation, that is conducted under the provisions of 49 *CFR* 850.25.

Ongoing Investigations

- USS *Fitzgerald* (USN) & ACX *Crystal* (PH), collision; 56 nautical miles (nm) southwest of Yokosuka, Japan; June 17, 2017; 7 fatalities, 3 injured.
- Amphibious passenger vessel *Stretch Duck 7* (US) sinking; Table Lake near Branson, Missouri; July 19, 2018; 17 fatalities, 6 injured.



Figure 40. Senior investigator Luke Wisniewski departs the *Fairchem Filly* after completing crew interviews and document collection.

- TV *Kristin Alexis*/barge *Mr. Ervin* (US), crane strike with Sunshine Bridge; St. James, Louisiana; October 12, 2018; no fatalities or injuries.
- TV *Mary Lucy Lane* (US) collision with US Army Corps of Engineers workboat *Gibson*; Warsaw, Kentucky; December 18, 2018; public/nonpublic; no fatalities or injuries.
- TV *Tom Bussler* (US) flooding; Calvert City, Kentucky; January 7, 2019; no fatalities or injuries.
- MV *Louisiana Responder* (US), MSRC 8-1, Coast Guard Small Vessel; New Orleans, Louisiana; January 16, 2019; public/nonpublic; no fatalities or injuries.
- TV *Lindberg Crosby* (US) machinery/equipment damage; Channelview, Texas; February 11, 2019; no fatalities or injuries.
- PV *Norwegian Epic* (BH) contact with San Juan Passenger Terminal Pier 3; San Juan, Puerto Rico; February 12, 2019; no fatalities or injuries.
- TV *Miss Dixie* (US) collision with TV *D&R Boney*; St Rose, Louisiana; February 13, 2019; no fatalities or injuries.
- TV *Bettye M Jenkins* (US) contact; Vidalia, Louisiana; February 15, 2019; no fatalities or injuries.
- FV *Pacific I* (US) flooding; Unalaska Island, Alaska; February 15, 2019; no fatalities or injuries.
- MV *St. Clair* (US) fire; Oregon, Ohio; February 17, 2019; no fatalities or injuries.
- TV *Chad Pregracke* (US) contact with highway bridge; Vicksburg, Mississippi; February 27, 2019; no fatalities or injuries.
- TV *Saint Rita* (US) flooding; Baton Rouge, Louisiana; March 7, 2019; no fatalities or injuries.
- TV *Leviticus* (US) contact with pier; Sunshine, Louisiana; March 8, 2019; no fatalities or injuries.
- FV *Freyja* (US) grounding; Tebenkof Point, Unalaska, Alaska; March 9, 2018; no fatalities or injuries.
- TV *Rivers Wilson* (US) barges struck NS Railway bridge; Tombigbee River/Mile Marker 89.9, Alabama; March 10, 2019; no fatalities or injuries.
- TVs (US) *Dixie Vandal* and *Trinity*, collision; Pasadena, Texas; March 15, 2019; no fatalities or injuries.
- MV *APL Guam* (US), collision; Tokyo Bay, Japan; March 21, 2019; no fatalities or injuries.
- PV *Viking Sky* (NO), machinery/equipment damage, IMO SIS investigation; Molde, Norway; March 23, 2019; no fatalities or injuries.
- MV *Hawk* (NO), collision; Pascagoula, Mississippi; March 29, 2019; no fatalities or injuries.
- TV *Dewey R* (US) contact with B&O Railroad bridge; Chicago, Illinois; April 13, 2019; no fatalities or injuries.
- TV *Dejeanne Maria* (US) contact with flooding; Venice, Louisiana; April 15, 2019; no fatalities or injuries.
- TV *Edna T Gattle* (US) contact with Krotz Springs Railroad bridge; Atchafalaya River, Baton Rouge, Louisiana (Krotz Springs); April 25, 2019; no fatalities or injuries.
- MV *Genesis River* (PN)/TV *Voyager* (US) collision; Houston Ship Channel, Texas; May 10, 2019; no fatalities or injuries.
- *American Liberty* (US), *Don D* (US), *African Griffon* (BH), *Ever Grace* (BH) contact; La Place, Louisiana; May 16, 2019; no fatalities or injuries.
- Barges (US) *MTC7256* & *LTD11140* contact and breakup; Webbers Fall, Oklahoma; May 23, 2019; no fatalities or injuries.
- MV *Fairchem Filly* (MI) hull/machinery, equipment, damage and tank over pressurization and rupture; Deer Park, Texas; May 30, 2019; no fatalities or injuries.
- Bulk vessel *Century Queen* (PN) and TV *Kaytin Marie* (US) collision; Norco, Louisiana; June 8, 2019; no fatalities or injuries.
- MV *Dank Silver* (MI) contact with Sunshine Bridge; Lemannville, Louisiana; June 16, 2019; no fatalities or injuries.
- Commercial fishing vessels (US) *American Eagle* and *Koorale*, collision; about 1,475 nm northeast of Pago Pago, American Samoa; June 16, 2019; no fatalities or injuries.
- TV *Goose Creek* (US) crane barge contact with overhead high-voltage transmission lines; Elizabeth River, Chesapeake, Virginia; June 20, 2020; no fatalities or injuries.
- TVs (US) *Chattie Sue Smith*; *Mary R*; *Mary Fern*, *Dock Barge* flooding; Hardin, Illinois; July 5, 2019; no fatalities or injuries.

- FV *Alaganik* (US) fire/explosion; Whittier, Alaska; July 8, 2019; no fatalities or injuries.
- Recreational vessel *Silver Lining* (US) flooding; Hood Canal, Washington; July 23, 2019; no fatalities or injuries.
- TV *Mangilao* (US) flooding, capsizing, sinking; 800 nm northwest of Guam; August 4, 2019; no fatalities or injuries.
- FV *Ariel* (US) fire/explosion and sinking; Port Gravina, Alaska; August 27, 2019; no fatalities or injuries.
- TV *Kristin Faye* (US) flooding; SW Pass (Mississippi River), Louisiana; no fatalities or injuries.
- Small passenger vessel *Conception* (US) fire and sinking; off Channel Islands, Ventura, California; September 2, 2019; 34 fatalities, 1 injured.
- TV *Savage Voyager* (US) contact with lock; Jamie Whitten Lock, Tenn-Tom Waterway near Denis, Mississippi; September 8, 2019; no fatalities or injuries.
- MV *Golden Ray* (MI) car carrier, capsizing/listing; Brunswick, Georgia; September 8, 2019; no fatalities or injuries.
- Barges (US) strike I-10 bridge; San Jacinto River, Channel View (Houston), Texas; September 19, 2019; no fatalities or injuries.
- TV *G.M. McAllister* (US), assist tug for MV *Ijssel Confidence* (PT), contact with NGL Energy Partners LNG pier; Elizabeth River, Chesapeake, Virginia; September 23, 2019; no fatalities or injuries.
- TV *Susan Lynn* (US) shipyard fire/explosion; Lafitte, Louisiana; October 8, 2019; no fatalities or injuries.
- Barge *IB1940* (US) fire/explosion; Lemont, Illinois; November 4, 2019; no fatalities or injuries.
- Offshore supply vessel *Cheremie Bo Truc No 22* (US) and articulated tug barge *Mariya Moran-Texas* (US) collision; Sabine Pass, Port Arthur, Texas; November 14, 2019; no fatalities or injuries.
- Deck barge *YD71* (US) contact; Hampton, Virginia; November 17, 2019; no fatalities or injuries.
- FVs *Iris Marie* and *Triton* (US) fire/explosion; Mayport, Florida; December 3, 2019; no fatalities or injuries.
- MV *Levant* (MI) contact with pier; Ferndale, Washington; December 15, 2019; no fatalities or injuries.
- Yacht *Andiamo* (MI) fire/explosion; Island Garden Marina, Miami, Florida; December 19, 2019; no fatalities or injuries.



- FV *Miss Annie* (US) contact; Calicoes Sound, Hilton Head, South Carolina; December 19, 2019; no fatalities or injuries.
- Commercial fishing vessel *Scandies Rose* (US) icing/capsizing; 170 nm southwest of Kodiak Island, Alaska; December 31, 2019; 5 fatalities.

Figure 41. MS investigator Barton Barnum oversees the recovery of the *Conception* wreckage.

Ongoing International Investigation

PV Viking Sky Molde, Norway (18 injured)

On March 23, 2019, the *PV Viking Sky* (NO) experienced machinery/equipment damage with loss of power off the coast of Molde, Norway. After a mayday call advising that the vessel was drifting close to shore off Norway's western coast, Norwegian national rescue services began evacuating the *Viking Sky's* 1,300 passengers and crew amid stormy seas and heavy winds in a high-risk helicopter rescue operation. There were no fatalities; however, 18 people were injured. Once the vessel reached port, NTSB and Coast Guard investigators joined Norway's Accident Investigation Board to interview crew and examine the machinery failures. The investigation is ongoing; once Norway completes its report, we will submit our comments on it.

Other Significant Product

Safer Seas Digest 2018: Lessons Learned from Marine Accident Investigations

Our *Safer Seas Digest* is a review of concise summaries from the previous year's accident investigations and represents our continuing commitment to sharing the lessons that we learn through our investigations.



Figure 42. The *Safer Seas Digest 2018* pictured above highlighted lessons learned from marine accidents including the *Caribbean Fantasy* fire that occurred off the coast of Puerto Rico in August 2016.

Safety Workshop

On July 11, 2019, we hosted the second session of the "Seafloor Investigations Workshop" at the NTSB Training Center in Ashburn, Virginia. The workshop brought together representatives of US government agencies, international ship registries, and industry to discuss developments in marine and aviation accident investigations at the ocean floor. After four presentations from commercial deep-salvage providers, panels covered various aspects of operations and planning to address the unique challenges posed by such cases as the *El Faro*. Future workshops will share best practices and assist organizations responsible for these investigations.



Figure 43. The Seafloor Investigations Workshop brought attendees from around the world to the NTSB Training Center in July 2019.



Figure 44. The promotional poster for the Seafloor Investigations Workshop pictured equipment used for the deep sea recovery of submerged vessels.



Office of Railroad, Pipeline, and Hazardous Materials Investigations

Table 10. Office of Railroad, Pipeline, and Hazardous Materials Investigations Statistics

Recommendations Issued	Railroad	45
	Pipeline	18
Recommendations Closed "Acceptable"	Railroad	29
	Pipeline	11
Recommendations Closed "Unacceptable"	Railroad	7
Urgent Recommendations Closed "Acceptable"	Railroad	3
	Pipeline	4
Urgent Recommendations Closed "Unacceptable"	Railroad	1
Major Reports	Railroad	5
	Pipeline	2
	Hazardous Materials	1
Accident Briefs	Railroad	6
	Pipeline	4
Major Accident Launches	Railroad	7
	Pipeline	2
	Hazardous Materials	2
International Accident Launches	Railroad	2
Safety Alerts	Railroad	1
Safety Accomplishments		4
Advocacy and Outreach Events		27

The Office of Railroad, Pipeline, and Hazardous Materials Investigations (RPH) investigates accidents in two modes of transportation—railroad and pipeline—as well as accidents involving the release of hazardous materials in all modes of transportation, particularly those that result in fatalities or that cause major disruptions to a community.

Most railroad investigations involve freight train accidents, such as collisions and derailments, but the office also places special emphasis on train accidents that involve the traveling public, such as passenger train and rail transit accidents. The criteria used to prioritize the investigation of a railroad accident includes whether it resulted in fatalities or substantial damages.

RPH investigates pipeline accidents involving a release of natural gas, hydrocarbon liquid, ammonia, or carbon dioxide that result in fatalities or substantial property damage. Pipeline accident investigations focus on the cause of the release, the emergency response, and actions taken to mitigate the spill.

Hazardous materials investigations focus on the effects of the materials released, the emergency response, and the adequacy of federal standards. When an accident involves the bulk transportation of hazardous materials, the investigation focuses on the performance of the containers, the preparation for and handling of the material during transport, the health and safety hazards of the material, the labelings and hazard communications for the shipments, and the effectiveness of the emergency response.

Based on the findings of our investigations, the NTSB issues safety recommendations to federal and state regulatory agencies, industry and safety standards organizations, railroads, rail transit agencies, rail labor organizations, pipeline operators, equipment and container manufacturers, hazardous materials producers and shippers, and emergency response organizations.

RPH investigates accidents in railroad and pipeline and accidents involving the release of hazardous materials in all modes of transportation.

Completed Major Investigations

RAILROAD

Amtrak Passenger Train 501 Derailment DuPont, Washington (3 fatalities, 65 injured)

On December 18, 2017, southbound Amtrak passenger train 501, consisting of 10 passenger railcars, a power railcar, a baggage railcar, and a locomotive at either end, derailed from a bridge near DuPont, Washington.

When the train derailed, it was on its first revenue service run on a new single main track (Lakewood Subdivision) at milepost 19.86; one run for special guests had already taken place the week before the accident. Several passenger railcars fell onto Interstate 5 and hit multiple highway vehicles. At the time of the accident, 77 passengers, 5 Amtrak employees, and a Talgo Inc. technician were on the train. Of these, 3 passengers were killed and 57 passengers and crewmembers were injured. Additionally, 8 people in highway vehicles were injured.



Source: Washington State Police

Figure 45. This aerial photograph shows the derailed locomotives and rail cars.

We determined that the probable cause of the accident was Central Puget Sound Regional Transit Authority's failure to provide an effective mitigation for the hazardous curve without PTC in place, which allowed the Amtrak engineer to enter the 30 mph curve at too high of a speed, as a result of his inadequate training on the territory and inadequate training on the newer equipment. Contributing to the accident was the Washington State Department of Transportation's decision to start revenue service without

ensuring that safety certification and verification had been completed to the level determined in the preliminary hazard assessment. Contributing to the severity of the accident was the FRA's decision to permit railcars that did not meet regulatory strength requirements to be used in revenue passenger service, resulting in the loss of survivable space and the failed articulated railcar-to-railcar connections. This failure enabled secondary collisions with the surrounding environment, which caused severe damage to railcar-body structures; the structures then failed to provide occupant protection, resulting in passenger ejections, injuries, and fatalities.

As result of this investigation, we issued 26 safety recommendations. The recipients included the Secretary of Transportation; the FRA; the US Department of Defense Fire and Emergency Services Working Group; the Washington State Department of Transportation; Amtrak; the Oregon Department of Transportation; and the Central Puget Sound Regional Transit Authority. We also reiterated four safety recommendations to the FRA.

Amtrak Passenger Train Head-on Collision With Stationary CSX Freight Train Cayce, South Carolina (2 fatalities, 91 injured)

On February 4, 2018, southbound Amtrak train P91, operating on a track warrant, was diverted from the main track through a reversed hand-thrown switch into a siding, where it collided head-on with stationary CSX Transportation Corporation local freight train F777. The accident occurred on CSX's Florence Division, Columbia Subdivision in Cayce, South Carolina. The engineer and conductor of the Amtrak train were fatally injured, and 91 passengers and crewmembers on the Amtrak train were transported to medical facilities.

The normal method of operation on this segment of track was by wayside signal indications of a traffic control

system. On the day prior to the accident, CSX signal personnel began upgrading signal system components to implement PTC on the subdivision. Signal personnel ceased work for the day prior to completing the planned work. The signal suspension remained in place, resulting in the continued use of track warrants to move trains through the affected area of signal suspension.



Figure 46. The Cayce, South Carolina, train collision resulted in 2 fatalities and injuries to 91 people.

We determined the probable cause of this collision was the failure of CSX to assess and mitigate the risk associated with operating through a signal suspension, which eliminated system redundancy for detecting a switch in the wrong position. The CSX conductor failed to properly reposition the switch for the main track, which allowed the Amtrak train to be routed onto the Silica Storage track where the standing CSX train was located. Contributing to the accident was the FRA's failure to implement effective regulation to mitigate the risk of misaligned switch accidents. Also contributing to the accident was Amtrak's failure to conduct a risk assessment prior to operating during a signal suspension.

As a result of this investigation, we issued one urgent safety recommendation and three additional safety recommendations. Recommendation recipients included the FRA, CSX, and all host railroads. We also reiterated four safety recommendations to the FRA and one to Amtrak. In addition, we classified two safety recommendations to the FRA.

PIPELINE

Building Explosion and Fire Silver Spring, Maryland (7 fatalities, 68 injured)

On August 10, 2016, a 14-unit apartment building in Silver Spring, Maryland, partially collapsed following a natural gas-fueled explosion and fire. The explosion and fire also heavily damaged an adjacent apartment building with which it shared a common wall. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital.

We determined that the probable cause of the explosion was the failure of an indoor mercury service regulator with an unconnected vent line that allowed natural gas into the meter room, where it accumulated and ignited from an unknown ignition source. Contributing to the accident was the location of the mercury service regulators, which rendered the leak's odor undetectable.



Source: Public Service Commission of Maryland

Figure 47. Buildings 8703 (left) and 8701 (right) Arliss Street, Silver Spring, Maryland, sustained heavy damage from the explosion and fire.

As a result of this investigation, we issued 13 safety recommendations. Recipients included the Pipeline and Hazardous Materials Safety Administration (PHMSA); the Public Service Commission of Maryland; the Commonwealth of Virginia State Corporation Commission Division of Public Utility Regulation; the Public Service

Commission of the District of Columbia; the International Academies of Emergency Dispatch, International Code Council; the National Fire Protection Association; the Gas Technology Institute; and Washington Gas Light Company.

Overpressurization of Natural Gas Distribution System, Explosions, and Fires Merrimack Valley, Massachusetts (1 fatality, 29 injured)

On September 13, 2018, a series of structure fires and explosions occurred after high-pressure natural gas was released into a low-pressure natural gas distribution system in the northeast region of the Merrimack Valley in Massachusetts. The natural gas distribution system was owned and operated by Columbia Gas of Massachusetts (CMA), a subsidiary of NiSource Inc, which delivers natural gas to about 325,000 customers in Massachusetts. One person was killed and 22 people, including 3 firefighters, were transported to local hospitals with injuries; 7 other firefighters incurred minor injuries. The fires and explosions damaged 131 structures, including at least 5 homes that were destroyed in the city of Lawrence and the towns of Andover and North Andover. Most of the damage occurred from fires ignited by natural gas-fueled appliances; several of the homes were destroyed by natural gas-fueled explosions. Fire departments from the three municipalities were dispatched to the fires and explosions. First responders initiated the Massachusetts fire-mobilization plan and received mutual aid from neighboring districts in Massachusetts, New Hampshire, and Maine. Emergency management officials ordered the electric utility to shut down power in the area, the state police closed local roads, and freight and passenger railroad operations in the area were suspended. CMA shut down the low-pressure natural gas distribution system, affecting 10,894 customers, including some outside the area whose service was halted as a precaution.

We determined that the probable cause of the overpressurization of the natural gas distribution system

and the resulting fires and explosions was CMA's weak engineering management, which did not adequately plan, review, sequence, or oversee the construction project that led to the abandonment of a cast iron main without first relocating regulator-sensing lines to the new polyethylene main. Contributing to the accident was a low-pressure natural gas distribution system designed and operated without adequate overpressure protection.

We issued one urgent safety recommendation to the Commonwealth of Massachusetts and four to NiSource Inc. in November 2018. As a result of our investigation, we issued five additional safety recommendations upon adoption of our final report. Recommendation recipients included PHMSA; the states of Alabama, Alaska, Arizona, Arkansas, California, Colorado, Connecticut, Florida, Georgia, Idaho, Illinois, Iowa, Kentucky, Louisiana, Maine, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New York, North Carolina, Pennsylvania, South Carolina, South Dakota, Texas, Utah, Virginia, and Wyoming; the Commonwealth of Massachusetts Executive Office of Public Safety and Security; and NiSource Inc.

Figure 48. Only remnants of this house remained after the explosion and fire in Merrimack Valley, Massachusetts, in which 1 person was killed and 22 people were severely injured.



HAZARDOUS MATERIALS

Rupture of a DOT-105 Rail Tank Car and Subsequent Chlorine Release at Axiall Corporation New Martinsville, West Virginia (8 injured)

On August 27, 2016, a 42-inch-long crack manifested in a 17,388-gallon DOT 105 tank car's tank shell shortly after the tank car was loaded with 178,400 pounds of liquefied compressed chlorine at the Axiall Corporation Natrium plant in New Martinsville, West Virginia. Over the next 2.5 hours, the entire load of chlorine was released and formed a large vapor cloud that migrated south along the Ohio River Valley.

We determined that the probable cause of the chlorine release was an undetected preexisting crack near the inboard end of the stub sill cradle pad that propagated to failure with the changing tank shell stresses during the thermal equalization of the car after loading with low temperature chlorine. Contributing to the failure was Axiall's insufficiently frequent stub sill inspection interval that did not detect the crack, the low fracture resistance of the nonnormalized steel used in the tank car construction, and the presence of residual stresses associated with Rescar Companies' tank wall corrosion repairs and uncontrolled local postweld heat treatment.

As a result of this investigation, we issued five safety recommendations. Recommendation recipients included PHMSA, the Association of American Railroads, and American Railcar Industries Inc. We also classified one safety recommendation to the FRA.

Figure 49. These images show a section of rail in New Martinsville, West Virginia, before and after the development of the chlorine vapor cloud.



Air Products and Chemicals, Inc. Tube Trailer Module Hydrogen Release and Subsequent Fire Diamond Bar, California (no fatalities or injuries)

On February 11, 2018, compressed hydrogen was released and a subsequent fire occurred during the transportation of an Air Products and Chemicals Inc. Mack truck-tractor with a mounted CT-250 tube trailer module. The tube trailer module contained 25 non-DOT-specification, fully wrapped, carbon-fiber reinforced, aluminum-lined cylinders, 24 of which were fully loaded with compressed hydrogen. Pressure relief devices, which actuated on 12 of the cylinders, released about 120 kilograms of hydrogen that was likely consumed in the fire. The Los Angeles County Fire Department estimated that between 1,400 and 2,000 people were evacuated from the adjacent business district and a nearby residential area. Equipment damages were estimated at \$175,000.

We determined that the probable cause of the tube trailer module fire was the requalification technician's installation of an incorrectly rated pressure-relief device in cylinder No. 14, which actuated during normal transportation and released high-pressure hydrogen, and the tube trailer module assembly contractor's failure to sufficiently tighten compression fittings on the pressure relief device vent lines that disassembled under the pressure of escaping gas, allowing a fire to develop inside the module and impinge on adjacent cylinders. Contributing to the incident was the lack of a requirement for requalification inspectors to verify the pressure-relief device pressure rating and to inspect for vent line assembly securement.

As a result of this investigation, we issued six safety recommendations. Recipients included PHMSA, the US Department of Energy, Pacific Northwest National Laboratory, and the Compressed Gas Association.



Figure 50. The circled area above shows the sections of the tube trailer module that suffered the greatest thermal damage in the Air Products and Chemicals Inc. truck-tractor fire.

Completed Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and primarily determine probable cause. These briefs may be issued by the office director under delegated authority or may be adopted by the Board.

RAILROAD

New York City Transit Train Strikes Two Flagmen Brooklyn, New York (1 fatality, 1 injured)

On November 3, 2016, New York City Transit (NYCT) subway train 2328G, operating underground in a tunnel between the Fort Hamilton Parkway and Church Avenue stations, struck two NYCT employees on the F Line in Brooklyn, New York. The employees were setting up flagging protection for a contractor who needed to cross the track to access an instrument control room in the tunnel. One employee was killed, and the other was seriously injured. After the accident, 23 passengers were evacuated while the crew remained with the train. The transit equipment and the track structure did not sustain any damage.

We determined that the probable cause of the accident was the failure of the Rail Control Center to communicate to the train dispatcher and tower operator that flaggers were on the track.

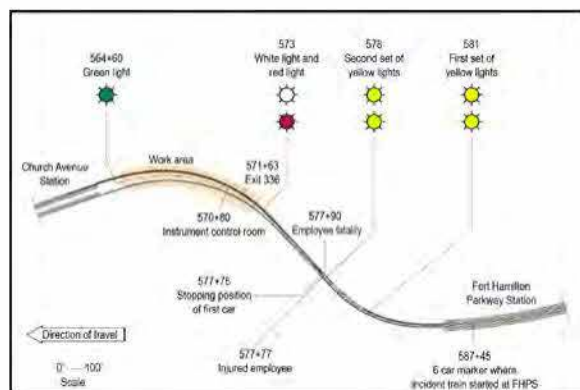


Figure 51. This diagram shows the planned flagging protection and the location of the two employees who were struck by the train.

Also contributing to the accident was NYCT's absence of a risk assessment when planning its flagging operations and permitting train movements into unprotected work zones.

As a result of this investigation, we issued three safety recommendations to the Metropolitan Transportation Authority, the parent company of the NYCT.

Derailment of Metro-North Railroad Commuter Train Rye, New York (16 injured)

On May 18, 2017, westbound Metro-North Railroad commuter train 1373 derailed at milepost 24.55 near catenary bridge 215 on main track 3 of the Metro-North New Haven Line in Rye, New York. Train 1373 originated from Stamford, Connecticut, and was destined for Grand Central Terminal in Manhattan, New York, when 5 of the 12 cars in the consist derailed. Train 1373 had

185 passengers, of which 12 suffered minor injuries. Four crewmembers (one conductor and three assistant conductors) also reported minor injuries.

We determined that the probable cause of this derailment was the engineer of Metro-North commuter train 1373 failing to remember the 10-mph temporary speed restriction and operating his train at 55.9 mph into a 10-mph speed-restricted area. Contributing to the accident was the engineer's failure to communicate the temporary speed restriction to the conductor, who could have reminded the train engineer of the upcoming speed restriction. Also contributing to the accident was the lack of a fully operational PTC system, which would have stopped the train in advance of the speed-restricted area.

As a result of this investigation, we issued two safety recommendations to Metro-North Railroad.

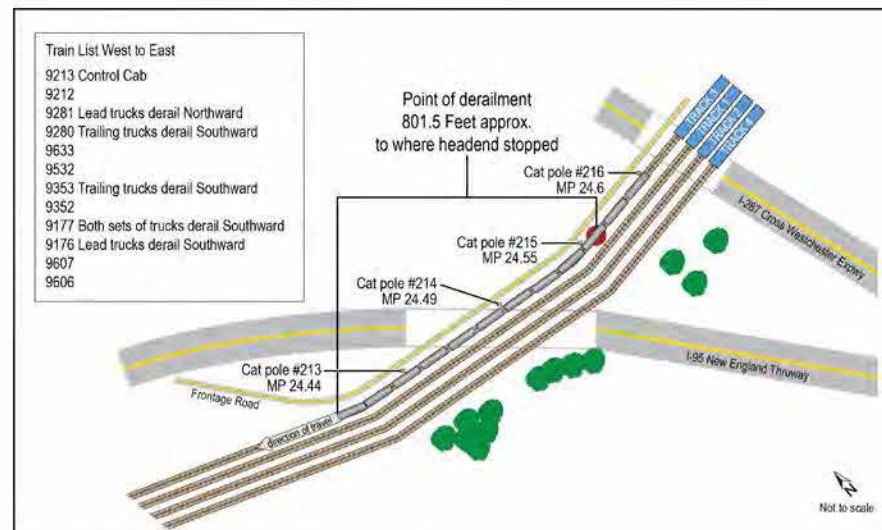


Figure 52. The diagram at left depicts the area of the Metro-North train derailment.

PIPELINE

■ Natural Gas Explosion at Family Residence Firestone, Colorado (2 fatalities, 2 injured)

On April 17, 2017, a single-family home in Firestone, Colorado, was destroyed by an explosion. A resident and a plumber who was working at the house died in the explosion, and two other residents were injured. At the time of the explosion, the fatally injured resident and plumber were replacing a water heater in the basement. The explosion also damaged the adjacent house, which later was demolished.

We determined that the probable cause of the explosion and fire was the ignition of fugitive natural gas that had migrated from the Coors V6-14Ji well through a pipeline that was not abandoned by Patina Oil and Gas Corporation but had most likely been severed in 2015 during the construction of the house. Contributing to the accident was the approval by local authorities to allow occupied structures to be built on land adjacent to, or previously part of, oil and gas production fields without complete documentation from the operator, Anadarko Petroleum Corporation, on the location and status of its gathering system pipelines.



Source: Pipeline and Hazardous Materials Safety Administration

Figure 53. Two people died and two others were injured when an explosion destroyed a family's residence, pictured above, in Firestone, Colorado, in April 2017. A second home was so damaged that it had to be demolished.

Completed Safety Recommendation Report

RAILROAD

■ Train Emergency Brake Communication Granite Canyon, Wyoming (2 fatalities)

On October 4, 2018, an eastbound Union Pacific (UP) freight train collided with the rear of a stationary UP freight train. The striking train consisted of 3 leading locomotives and 105 railcars. The engineer and conductor of the striking train were killed, 3 locomotives and 57 railcars of the striking train derailed. Nine railcars of the stationary train also derailed. Prior to the accident, the crew of the striking UP freight train reported problems with the train's air brake system and radioed the UP Harriman Dispatch Center to advise that they had accelerated to 50 mph and were unable to stop.

As a result of this investigation, we issued three safety recommendations to all Class I Railroads and the American Short Line and Regional Railroad Association.



Source: UP

Figure 54. The November 2018 train collision in Granite Canyon, Wyoming, killed 2 crewmembers and derailed 3 locomotives and 66 railcars. This picture shows damage to the brake rigging of one of the railcars.

Ongoing Investigations

RAILROAD

- Long Island Railroad train struck track worker; Queens Village, New York; June 10, 2017; 1 fatality.
- CSX tank cars derailed and a propane car cracked, breached, and caught fire; Hyndman, Pennsylvania; August 2, 2017; no fatalities or injuries.
- SEPTA light rail train collided with another SEPTA train; Upper Darby, Pennsylvania; August 22, 2017; 39 injured.
- UP remote-control locomotive in UP railroad yard killed UP employee; Arlington, Texas; September 22, 2017; 1 fatality.
- CSX truck struck and killed maintenance-of-way worker; Wartrace, Tennessee; March 12, 2018; 1 fatality.
- Amtrak passenger train struck and killed an Amtrak maintenance-of-way worker; Bowie, Maryland; April 4, 2018; 1 fatality.
- CSX freight train derailed on bridge; Alexandria, Virginia; May 19, 2018; no fatalities or injuries.
- BNSF train struck a work train; Kingman, Arizona; June 5, 2018; 1 fatality, 1 injured.
- UP train collided with a stationary UP freight train, which then derailed, killing two crewmembers; Granite Canyon, Wyoming; October 4, 2018; 2 fatalities.
- CSX train struck and killed CSX track welder; Estill, South Carolina; November 30, 2018; 1 fatality.
- NYCT train passenger fell while standing between cars; Bronx, New York; December 5, 2018; 1 fatality.
- Norfolk Southern Railroad conductor died while performing switching operations; Baltimore, Maryland; February 7, 2019; 1 fatality.
- CSX remote-control locomotive struck a mechanical employee; Chattanooga, Tennessee; April 13, 2019; 1 fatality.
- UP train carrying denatured alcohol derailed; Fort Worth, Texas; April 24, 2019; no fatalities or injuries.
- SEPTA train struck two track workers; Philadelphia, Pennsylvania; July 8, 2019; 1 fatality.
- CSX freight train struck another CSX freight train from the side; Carey, Ohio; August 12, 2019; 2 injured.
- Sacramento Regional Transit District Light Rail train struck another Sacramento Regional Transit District Light Rail train; Sacramento, California; August 22, 2019; 27 injured.

PIPELINE

- Single-family residence exploded as a result of Atmos Energy gas leak and two previous explosions 48 hours before, causing 300 residence evacuations; Dallas, Texas; February 23, 2018; 1 fatality, 4 injured.
- Pacific Gas & Electric natural gas main damaged during excavation, causing a fire in a busy thoroughfare; San Francisco, California; February 6, 2019; no fatalities or injuries.
- Enbridge Inc. natural gas pipeline rupture and fire; Danville, Kentucky; August 1, 2019; 1 fatality, 6 injured.

HAZARDOUS MATERIALS

- Lithium-ion battery caught fire in a delivery truck; Brampton, Ontario, Canada; June 3, 2016; no fatalities or injuries.
- Anhydrous ammonia release from a nurse tank trailer; Beach Park, Illinois; April 25, 2019; 41 injured.

International Assistance

- Lithium-ion battery fire; Ontario, Canada; June 3, 2016; no fatalities or injuries (see above).
- Train carrying crude oil derailed 37 tank cars; St. Lazare, Manitoba, Canada; February 16, 2019; no fatalities or injuries.
- Canadian National Railroad train carrying hazardous materials derailed in a tunnel; Sarnia, Ontario, Canada; June 28, 2019; no fatalities or injuries.

Safety Alert

Fouling¹² Other Railroad Tracks (SA-078)

This safety alert provides information for working safely on rails at locations with multiple tracks.



Figure 55. This Safety Alert was issued as a result of a railroad accident in June 2017 in which two rail workers were struck and killed by an Amtrak train.

12

Fouling means being close enough to a track to be struck by a moving train or, in any case, within 4 feet of the nearest rail.



Office of Research and Engineering

Table 11. Office of Research and Engineering Statistics

Safety Research Published	5
Safety Data Analyses Completed	275
Readouts of Vehicle Recorders and Other Electronic Devices Completed	447
Materials Laboratory Exam Reports Completed	174
Vehicle Performance Reports and Animations Completed	41
Medical Investigation Reports Completed	170
Journal Publications	2
Advocacy and Outreach Events	63

RE provides technical expertise to NTSB accident investigations in all modes of transportation. The office also conducts safety research, generates periodic statistical reviews of aviation accidents, and provides medical and toxicology expertise for investigations in all modes of transportation.

RE includes four divisions: Safety Research, Materials Laboratory, Vehicle Recorder, and Vehicle Performance; and two program areas: Physician Consult Section and Chief Data Scientist.

RE conducts safety research, generates periodic statistical reviews of aviation accidents, and provides medical and toxicology expertise for investigations in all modes.

Safety Research Division

The Safety Research Division examines transportation accidents, accident trends, and technological changes to identify problems and associated remedial actions that will reduce risk and improve the safety of the transportation system. Division staff includes transportation safety research and data analysts, who systematically examine risks or hazards in the transportation environment that may influence accidents or injury, accident investigation techniques and methods, and the effectiveness of various safety countermeasures, such as policies, programs, and technologies. The division also provides data science, data visualization, and statistical expertise to support accident launches and investigations, assist with safety recommendation development, and publish annual statistical reviews for the NTSB, Congress, and the public.

In 2019, the division published one safety research study report on **bicycle crash risk factors** that resulted in 10 safety recommendations; two notice-of-proposed-rulemaking responses focused on fatigue risk management programs in commercial trucking; and two **annual reviews of aviation accident statistics**. In addition, division staff generated 9 rapid reports and 14 data reports and geospatial products to support major accident investigations in aviation, highway, marine, and rail, and completed 261 aviation data report and statistical analysis requests. Division staff also led and participated in multiple presentations and training sessions for internal and external organizations. Staff completed numerous data-collection trips and interviews with national and regional air carriers, meteorological and air traffic control facilities, and other government and industry stakeholders in support of an ongoing research study on turbulence-related injury in air carrier operations.

Materials Laboratory Division

The Materials Laboratory Division performs expert multidisciplinary engineering and scientific analyses to determine whether material and structural performance are related to the cause or severity of an accident. Engineers also analyze wreckage to determine the causes of fires and explosions. The division provides chemical and forensic science expertise, as well as technical advice and resources for experimental testing and research in the physical sciences.

In 2019, the division completed 174 reports for 138 accident cases, launched to two accident sites, and supported numerous NTSB reports and recommendations. The division supported the investigation of a fire on the 75-foot commercial diving vessel **Conception off the coast of Ventura, California**, studying the origin, cause, and tenability of the fire. The *Conception* investigation is ongoing, and the division continues to support the development of a Board report and Board meeting. The division also supported the investigation of a **natural gas pipeline rupture in Danville, Kentucky**, conducting the root cause failure analysis of the pipeline fracture. The investigation is ongoing, and the division continues to support the development of a Board report and Board meeting.

Figure 56. Frank Zakar of the Materials Laboratory Division examines the pipeline fracture in Danville, Kentucky.



Vehicle Recorder Division

The Vehicle Recorder Division extracts, formats, and analyzes data from aircraft flight data recorders and cockpit voice recorders, and from recorders installed in locomotives, large ships, and some highway vehicles. Engineers also examine recorded electronic audio and video information captured by aircraft, ship, train, and support communication systems; provide electronic engineering expertise for all accident investigation modes in examining communication and control systems; provide time synchronization to correlate voice, data, and video recorder outputs; use advanced digital and analog filtering and signal representation techniques to extract critical recorder information; and perform forensic examinations of personal electronic devices and other computer hardware.

In 2019, the division received 352 devices; completed 447 readouts, transcripts, and studies in support of aviation, railroad, marine, and highway investigations; and launched in support of five accidents. Of the recorders received, 28 were from foreign accidents and 4 were in support of US military investigations. Most notably, the division supported the read-out of the recorders from Ethiopian Airlines Flight 302, sending a recorder specialist to Ethiopia and France for nearly a month to download and analyze the flight data recorders and cockpit voice recorders. Engineers supported the development of numerous NTSB reports and safety recommendations, including Safety Recommendation R-19-7 from the **DuPont, Washington Amtrak accident**, which addresses inward-facing image and audio recorders. The division hired four new engineers in 2019, bolstering the NTSB's capacity to download and analyze digital evidence.



Figure 57. Charles Cates of the Vehicle Recorder Division disassembles and inspects the recorder recovered from the Atlas Air crash into Trinity Bay that occurred in February 2019.

Vehicle Performance Division

The Vehicle Performance Division provides specialized aeronautical, mechanical, structural, and biomechanical engineering expertise; three-dimensional laser scanning and accident reconstruction; photogrammetry and video analysis; and animation and graphics development for all modes. Engineers use computational and visualization technology to provide accurate time-motion histories of the sequence of events, and evaluate data from multiple sources to determine vehicle and occupant motion and the underlying causes of that motion. Engineers also develop video animations of accident scenarios, evaluate occupant injury mechanisms, and participate in and direct research into special projects, as required.

In 2019, the division staff completed 38 products in support of accident investigations (aircraft and surface vehicle performance studies, laser scanning reports, biomechanics studies, and video/photograph studies). Among the products completed were an evaluation of the airplane flight path and aerodynamic stall of a **crash of a Learjet 35A on approach to Teterboro, New Jersey**; the division also developed an animation depicting the sequence of events in that accident, which was shown at the Board meeting in March 2019. In addition, the division assisted in contracting for brake testing to develop data that can be used in a simulation to analyze the **crash of a limousine in Schoharie, New York**. Finally, division staff produced three accident reconstruction animations and video compilations for NTSB events.

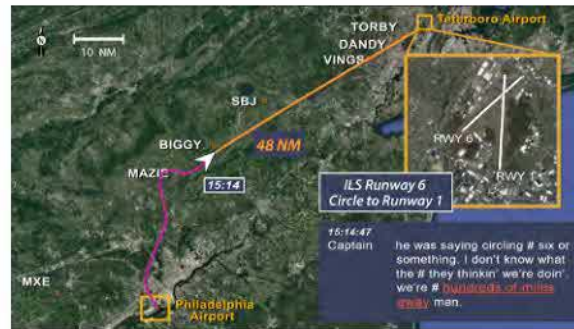


Figure 58. Vehicle Performance Division staff created an animation to illustrate the crash of a Learjet 35 on approach to Teterboro, New Jersey. This is a still image and [YouTube link](#) for the animation.

Program Areas

Physician Consult Section

RE medical staff evaluates the medical aspects of investigations, including medical fitness, pathology, toxicology, injury causation, and biomechanics. Examples of medical issues addressed include operator incapacitation, injury prevention, night vision, hypoxia, substance impairment, obstructive sleep apnea, and impairing effects from the use of prescription and over-the-counter medications and illicit substances.

During 2019, the Physician Consult Section's three physicians participated in more than 113 NTSB accident investigations and completed 170 reports in all transportation modes. This included evaluating and addressing medical issues through formal factual and analytical reports, safety recommendations, coordination with other agencies, and formal presentations to the NTSB and external audiences.

Chief Data Scientist

The chief data scientist supports the agency-wide effort to better utilize data for strategic decision-making, and is designated as the agency's chief data officer, as required by the Foundations for Evidence-Based Policymaking Act of 2018. He is also responsible for applying machine learning and advanced data science methods and techniques to agency investigations and research, analysis, and emerging transportation safety trend reporting.

During 2019, the chief data scientist, along with representatives from the NTSB Offices of the Chief Information Officer and Aviation Safety, led the development of a multimodal database for NTSB investigations, as directed by Congress in the NTSB's 2018 budget reauthorization. He also led the NTSB's initial implementation of requirements detailed in the Foundations for Evidence-Based Policymaking Act of 2018, including forming an agency data-governance body.

Completed Safety Research Report

Bicyclist Safety on US Roadways: Crash Risks and Countermeasures

This safety research report examined the prevalence of, and risk factors for, bicycle crashes involving motor vehicles on US roadways and assessed the most applicable countermeasures. Using a combination of quantitative and qualitative methods (countermeasure and research literature review; crash and injury data analysis; and interviews of national, state, and local traffic safety stakeholders), we identified three bicyclist safety issue areas: (1) improving roadway infrastructure for bicyclists, (2) enhancing conspicuity, and (3) mitigating head injury. The report also discusses other safety issues that repeatedly emerged during stakeholder interview sessions.

As a result of this safety research report, we issued 10 recommendations to the DOT's Intelligent Transportation Systems Joint Program Office; NHTSA; the Federal Highway Administration; the US Consumer Product Safety Commission; the 50 states, the District of Columbia, and the Commonwealth of Puerto Rico; and American Association of State Highway and Transportation Officials. We also reiterated 10 recommendations to NHTSA.¹³



Figure 59. Dr. Ivan Cheung from the Office of Research and Engineering presents findings of the safety research report “Bicyclist Safety on US Roadways: Crash Risks and Countermeasures” to the Board Members during a public meeting.

Ongoing Safety Research Report

Safety Research Report: *Preventing Turbulence-Related Injuries in Part 121 Air Carrier Operations*

Turbulence-related accidents are the most common type of accident involving air carrier aircraft operating under Title 14 *CFR* Part 121. From 2008 through 2016, the NTSB found turbulence to be a causal or contributory factor, or designated it as the defining event, in 36 percent of Part 121 accidents. This study will examine the details of the turbulence problem and develop safety recommendations to reduce the risk of turbulence on Part 121 operations. Specifically, the study will attempt to summarize the types and causes of turbulence, detail the safety impacts of turbulence on Part 121 operations, and examine methods to reduce the likelihood of Part 121 turbulence encounters and their consequences.

¹³ Additional information about this safety research can be found in the NTSB [Docket Management System](#), using the NTSB ID DCA18SS002. For more information about NTSB safety recommendations, see the [Safety Recommendation Database](#) at www.ntsb.gov.



Office of Administrative Law Judges

Table 12. Office of Administrative Law Judges Statistics

Total Cases Received	257
Total Cases Closed	225
Emergency Cases Received	137
Emergency Cases Closed	137
Challenges to Emergency Determinations	16
Hearings Held	29
Board Opinions and Orders	11
Advocacy and Outreach Events	4

Since 1967, the NTSB has served as the court of appeals for holders of pilot, mechanic, air carrier, and mariner certificates when the FAA or the Coast Guard suspends or revokes a certificate and when a certificate application is denied.

The judges within the agency's Office of Administrative Law Judges (ALJ) hear and consider the cases of, and issue initial decisions on, administrative appeals of FAA aviation enforcement actions. Under the Equal Access to Justice Act, the judges also adjudicate claims from certificate holders for legal fees and expenses incurred in defending against FAA certificate actions and adjudicate appeals from civil penalty actions assessed against any individual by the FAA. The certificate holder, the person being assessed, or the FAA may appeal an ALJ decision. The Board's review of such an appeal is based on the record of the proceeding, which includes the transcript of the hearing testimony, exhibits, the judge's decision, and appeal briefs submitted by the parties.

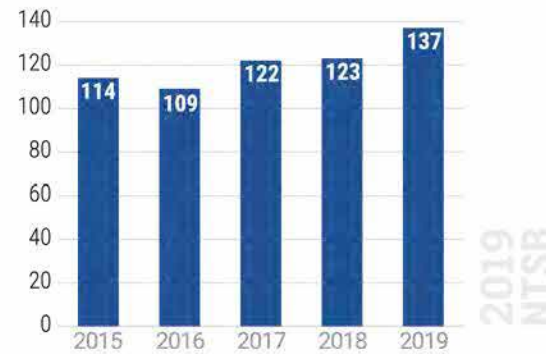
Marine certificate actions are heard first by Coast Guard administrative law judges and may be appealed to the Vice Commandant of the Coast Guard. The Vice Commandant's ruling may then be appealed to the NTSB. The same appellate process is followed for marine certificate actions.

The Board's review of appeal of an administrative law judge's decision is based on the record of the proceeding, which includes the transcript of the hearing testimony, exhibits, the judge's decision, and appeal briefs submitted by the parties.

We currently have four judges, all assigned to headquarters in Washington, DC. One judge is stationed in Dallas-Fort Worth, Texas, and one judge is stationed in Denver, Colorado. Which hearings a judge holds is determined by his or her circuit assignment.

- In 2019, ALJ disposed of 88 percent of its caseload.
- 281 appeals were filed with the NTSB's administrative law judges.
- The judges held 29 hearings and closed 225 cases.
- The office received 137 emergency cases¹⁴ (see figure 60); statute requires that such cases receive expedited handling and hearing.
- Twenty-one of the judges' decisions were appealed to the Board, which decided 11 appeals on the merits, affirming the judge in 10 cases, and reversing the judge in 1 case.

Figure 60. The chart below shows the history of emergency cases heard by the NTSB administrative law judges over the past 5 years.



¹⁴ Emergency cases are those in which the certificate, because of a serious concern for aviation safety, is immediately taken from the certificate holder by the FAA during the pendency of the case.



NTSB Training Center

Table 13. NTSB Training Center Statistics

Courses, Programs, Seminars Offered (Total)	128
Workforce Development Courses	101
Total Attendance	6,111
NTSB Participants	4,842
External Participants	1,269
International Participants (representing 40 countries)	187
Participants from Other Federal Agencies	409

Figure 61. Weighing about 60,000 pounds and consisting of almost 1,600 pieces, the 93-foot section of the center fuselage of TWA flight 800 was transported to and reassembled at the NTSB Training Center in 2003. Since then, it has been used to train thousands of investigators from around the world.



Figure 62. Marine accident investigator Adam Tucker demonstrates the proper way to wear protective equipment in Hazardous Waste Operations and Emergency Response training for fellow MS staff Jon Furukawa (seated) and Michael Kucharski. Instructor Dan Young looks on from right.



The NTSB Training Center (TC), located in Ashburn, Virginia, provides opportunities for NTSB employees and others from the transportation community through a variety of course offerings to improve attendees' knowledge of accident investigation techniques and their ability to respond to transportation disasters. The program includes courses that focus on key competencies to enhance the safety in all modes of transportation.

The mission of the TC is to promote safe transportation by—

- **ENSURING** and **IMPROVING** the quality of accident investigation through critical thought, instruction, and research.
- **COMMUNICATING** lessons learned, fostering the exchange of new ideas and new experience, and advocating operational excellence.
- **PROVIDING** a modern platform for accident reconstruction and evaluation.
- **USING** its high-quality training resources to facilitate family assistance and first-responder programs, sister-agency instruction, and other compatible federal activity.

The TC's laboratory area contains the reconstruction of **TWA Flight 800**, as well as other wreckage and materials that are used in investigative courses, enabling participants to gain hands-on experience with real-world examples. The Workforce Development curriculum offers NTSB employees access to additional courses focused on career development and management, leadership, and other mission-critical skills. Vacant seats are offered to other small federal agencies on a reciprocal basis to maximize training opportunities and knowledge management for the federal workforce and to provide the best stewardship of taxpayers' training dollars. Investigators from the NTSB and other organizations in the domestic and international transportation communities use the TC to improve their accident investigation competencies.

The Training Center improves the investigation competencies of the domestic and international transportation communities.

Training Center Offerings

In 2019, the TC continued to upgrade and refine a comprehensive array of training courses focusing on mission-related skills for NTSB staff as well as other domestic and international participants. Staff concentrated on improving investigative programs and courses, which ranged in length from 1 day to 2 weeks and offered wide applicability to the investigative field, including Cognitive Interviewing Techniques for Accident Investigators, Investigating Human Fatigue Factors, Managing Communications Following a Transportation Disaster, and Coordinating Family Assistance.

Most course attendees are from the transportation and emergency response communities. To meet their needs, TC staff ensured that courses relied heavily on case studies, demonstrations, and when appropriate, hands-on training. For example, NTSB Helicopter Accident Investigation classes were able to examine a fully intact

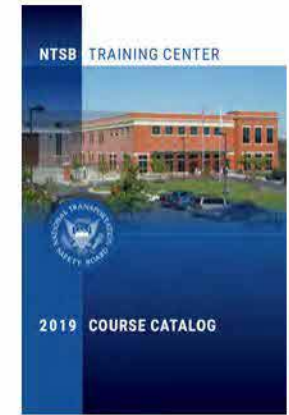
UH 1 Iroquois (“Huey”) helicopter that we had obtained from the US Army.

The TC added new courses to its standard curriculum, including Refresher Training for Experienced Supervisors and Executive Coaching, which increased learning opportunities for managers. Improved access to on-demand webinars and other online classes expanded opportunities for staff learning, as well. This increased availability of online technical and soft-skills training provided flexibility for all NTSB staff—both those launched on “Go Teams” and others located outside the metropolitan Washington, DC, area—to train at their convenience without increasing agency travel costs.

By continually assessing the needs of external and internal customers, TC staff ensures that course offerings not only address skills and abilities needed today, but also

anticipate those that will be needed in the future. Some examples of courses that focus on key current and future needs include these:

- Accident Site Photography
- Accident Site Documentation Using Unmanned Aerial Vehicles
- Advanced Interviewing Techniques
- Mobile Device Forensics
- Civil Treatment
- Comprehensive Project Management
- Critical Incident Stress Management
- Media Relations



Transportation Community and Partnerships

Furthering its commitment to meeting the training needs of those in other areas of government, the transportation safety community, and the security and emergency response communities, we continue to build upon our alliances with private organizations and federal agencies. One example of these alliances is the partnership between the TC and the Coast Guard. We have held 4 courses each year to train Coast Guard aviation and marine safety operations personnel to investigate mishaps involving Coast Guard assets and personnel. Additionally, the TC continues to attract attendees from many foreign governmental agencies and transportation entities. For example, we worked with the Army National Guard Safety Center at Fort Rucker to develop and present a 2-week aircraft accident investigation course, exclusively tailored for the National Guard. The course was so well received that the National Guard requested an additional 1-week helicopter accident investigation course. Whenever

possible, we work with our investigative partners to offer classes to larger groups at other locations, eliminating travel costs as a barrier to training. For example, our course on Managing Communications During a Transportation Disaster was presented to Air Methods Corporation, Cathay Pacific Airlines, Dallas–Fort Worth International Airport, Delta Airlines, and Air New Zealand, and received outstanding reviews.

The TC also presents several **general aviation safety seminars** each year, partnering with the FAA and other interested groups to develop seminars that focus on the safety, regulatory, and training aspects of general aviation. These safety seminars are designed for pilots, flight instructors, and other members of the general aviation community, and pilots participating in the FAA’s **WINGS Program** receive credit for attendance. In 2019, we delivered our second annual **Inspection Authorization Renewal**



Safety Seminar for airplane mechanics to receive 8 hours of training to fulfill their annual certification requirements. We also delivered a seminar on night flying safety.



INTEGRITY
TRANSPARENCY
INDEPENDENCE
EXCELLENCE
DIVERSITY &
INCLUSION

2020 Presidential Transition Agency Briefing Materials

- 1) Welcome letter from Chairman (TBD)
- 2) 2019 Annual Report to Congress:
<https://www.nts.gov/about/reports/Documents/2019-NTSB-Annual-Report-to-Congress.pdf>
- 3) FY2020-2024 Strategic Plan:
<https://www.nts.gov/about/reports/Documents/2020-2024-Strategic-Plan.pdf>
- 4) FY21 Budget Request:
<https://www.nts.gov/about/reports/Documents/FY2021-Budget-Submission.pdf>
- 5) 2019 Federal Employee Viewpoint Survey:
<https://www.nts.gov/about/reports/Documents/2019-FEV-Results.pdf>
- 6) 2019-2020 Most Wanted List webpage:
<https://www.nts.gov/safety/mwl/Pages/default.aspx>
- 7) Office structure and organization chart:
<https://www.nts.gov/about/organization/Pages/default.aspx>
<https://www.nts.gov/about/organization/Documents/NTSB-orgchart-2020.pdf>



National Transportation Safety Board

Strategic Plan Fiscal Years 2020–2024



INTEGRITY ♦ TRANSPARENCY ♦ INDEPENDENCE ♦ EXCELLENCE

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Chairman's Message

I am pleased to present the National Transportation Safety Board's (NTSB's) Strategic Plan for fiscal years 2020 to 2024. As we look toward the future, it is important that we adapt to the changes occurring in the transportation industry and address new safety concerns. This plan describes our strategic goals to improve our processes and products, to ensure we are more efficient and effective and remain relevant, to engage productively with our employees, and to improve transportation safety for the American people.



Our strategic goals are the following:

1. Improving processes: Evaluating and identifying ways to enhance the effectiveness and efficiency of our investigative and business processes
2. Improving products: Evaluating and identifying ways to enhance the effectiveness and efficiency of our products
3. Improving employee engagement, diversity, and inclusion: Implementing actions to ensure we sustain a culture that is fair, diverse, and provides opportunities for all employees to excel

Studies of organizational excellence have demonstrated the value of alignment in enhancing a safety culture, but the lessons of alignment go far beyond safety. In every organization, people, processes, and products can support one another when management and frontline workers are aligned. The NTSB is no exception.

Employees engaged in the mission and organization and aligned with the organization's goals provide the fuel for continuous process improvement. Improved processes yield improved products. Improved processes and products, in turn, keep employees more engaged.

How do organizations know that they are improving? They measure.

At the NTSB, new tools for collecting and analyzing data, which are part of our newly implemented multimodal investigative management program, enhance our ability to more fully learn about, and improve, our work.

I look forward to working closely with agency leadership and staff to achieve these goals.



Robert L. Sumwalt, III
Chairman

NTSB at a Glance

About the NTSB

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters.

We also conduct safety studies focused on broader safety questions and topic areas. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

Mission

Making transportation safer by conducting independent accident investigations, advocating safety improvements, and deciding pilots' and mariners' certification appeals.

Legislative Mandate

Maintaining our congressionally mandated independence and objectivity.

Conducting objective accident investigations and safety studies.

Performing fair and objective pilot and mariner certification appeals.

Advocating for safety recommendations.

Assisting victims of transportation accidents and their families.



Core Values

Our core values guide our daily actions, our internal conduct, and our relationships with our stakeholders. They provide the solid foundation upon which our hardest decisions are made. Aligning one's actions with the agency's core values is a fundamental part of being an NTSB employee.

- ❖ **Integrity:** We hold ourselves and each other to the highest ethical standards and are committed to being fair, honest, respectful, inclusive, and objective in our work and in our treatment of others.

- ❖ **Transparency:** We encourage openness, collaboration, and feedback to ensure clarity and trust.

- ❖ **Independence:** We are impartial and objective.

- ❖ **Excellence:** We are thorough, rigorous, and accurate; we continuously seek diverse perspectives in all that we do.



About this Plan

This plan is the result of meetings held in mid-2019 with agency leaders, which challenged them to find strategies to improve our work in three areas: processes, products, and people. As a result of these meetings, agency leadership devised the objectives outlined in this plan. These objectives move beyond output measures and the data that are collected as part of annual office plans and move toward improving the way in which our people, processes, and products are managed. They also propose new ways of looking at these three areas that will improve the relevancy and effectiveness of our work.

Strategic Goal 1: Improving Processes

Evaluating and redesigning processes—whether investigative or business-related—promotes efficiency and responsiveness. In accordance with the [Foundations for Evidence-Based Policymaking Act of 2018](#) and the [Office of Management and Budget’s Memorandum M-19-23](#), we are increasing our use of data to allocate resources and achieve program objectives. Our increased capability in data analytics and access to new sources of data will help us improve our investigative and agency operations. For example, we are already seeing a positive impact on processes with our new multimodal accident database and its robust query tool. In the area of business processes, we continue to make strides in reducing the time to respond to Freedom of Information Act (FOIA) requests, a challenge on which we will continue to focus.

Strategic Objective 1.1: Improve the timeliness of investigations through data analysis

We aim to improve the efficiency and quality of our accident investigations by applying data-driven tools and structured techniques that improve the investigative process. We will evaluate current investigation processes to determine inefficiencies, optimal case distribution and complexity, appropriate investigation scope, report review bottlenecks, project management, remote workforce management, and human capital management. A data-focused review of general aviation investigations and a new investigative case management system are allowing us to better understand where timeliness can be improved. As we learn from this process, we will apply the lessons learned to other investigative processes across all modal offices.

Strategic Objective 1.2: Improve the timeliness of agency operations through data analysis

We will continue to review our FOIA process. Reviewing and processing FOIA requests in a comprehensive and timely manner reflects our core value of transparency. Other business practices will be added in the future.

Strategic Goal 2: Improving Products

The investigative and business products we develop are the keystones of our work. They are critical to ensuring our relevancy and are the primary sources by which the transportation industry, government, and the public understand our work. One improvement we recently made in this area was to standardize our investigative reports, bringing consistency to our investigative products across the modes and improving the reader experience

Strategic Objective 2.1: Improve the effectiveness of agency products

Our primary products to improve transportation safety are our safety recommendations. Recommendations can be issued at any time during an investigation and are carefully tracked within the agency. However, organizations involved in our investigations often implement safety improvements within days of an accident as a result of our initial investigative activities. These implemented safety improvements, as well as other aspects of how we accomplish our safety mandate, are not currently documented in a comprehensive and standardized way. This objective will require us to evaluate current processes and the overall impact of these improvements and will allow us to reach a consensus on what we document. The resulting measures will more accurately reflect the impact of the agency's work.

We will also review one of our most important means of delivering our products: our public Board meetings. Board meetings are an opportunity for the public to see the actual deliberations between the Board and investigative staff regarding a draft accident report or safety study. Board meetings are required under the Government in the Sunshine Act and are critical to our advocacy for safety improvements relative to the accident being examined. The availability of webcasting and the rapid pace of news are causing us to rethink how we select accidents for Board meetings, as well as how the meetings are conducted. Studying the effectiveness of Board meetings as a way to communicate with the public, industry, and lawmakers; to advocate for safety improvements; and to reach those citizens affected by the tragedies we investigate will improve our use of that platform.

To best serve the transportation industry, the public, lawmakers, and those impacted by transportation accidents, we will refresh our external agency website. This update will improve users' ability to search for and analyze data. The revised website will include a new query tool that allows users access to the full spectrum of public data related to our investigations. The new site

will more readily show the breadth of our work on issues such as fatigue, distraction, impairment, and other factors that cross modal lines.

Strategic Goal 3: Improving Employee Engagement, Diversity, and Inclusion

Our highly skilled workforce is most effective when its members are motivated, engaged, and trained. Our work is better when we support a culture of diversity, awareness, inclusion, and mutual respect. Strengthening our human capital management program will attract and retain talent, especially in high-demand, high-skill areas. Within our workforce, we will seek to develop future leaders, foster high levels of employee engagement, and provide continuous learning and development. We will focus on recruiting, retaining, and training staff with the right mix of skills and expertise. Promoting diversity, inclusion, and mutual respect allows every staff member an equal opportunity to contribute and succeed.

Strategic Objective 3.1: Improve the engagement of agency staff

A new employee intranet site will increase employee engagement and the flow of in-house information to all staff, regardless of their duty station. This new interactive intranet site will allow leadership to increase communication with all staff, and will feature news regarding agency activities, employee-specific information, and cross-agency initiatives.

Employee engagement is key to us meeting our goal of becoming the number one small agency in the federal government.¹ We will gauge our success using various employee surveys (via our intranet site) and the annual Federal Employee Viewpoint Survey (FEVS). The FEVS includes questions that measure employee engagement and the relationship an employee has with his or her organization. The Partnership for Public Service recently conducted focus group discussions with NTSB staff to assess employee engagement, and we are implementing a number of actions as a result.

Strategic Objective 3.2: Attract, develop, and retain a high-performing, diverse, and inclusive workforce

Our main asset is our workforce, and we will focus on talent management as well as on promoting diversity, awareness, inclusion, and mutual respect.

Revising our strategic human capital plan will allow us to build and maintain the effective, highly skilled workforce that is critical to the agency's future. The revision will focus largely on

¹ The [Best Places to Work in Federal Government](#) is administered by the Partnership for Public Service. Currently, we are listed as number 6 in the best places to work [small agency rankings](#).

improving talent management: recruiting, retaining, and training employees with the right mix of skills and expertise to successfully execute our mission. The revised plan will describe the agency's leadership and workforce needs for the future and present strategies to meet those needs.

A diverse and inclusive workforce is critical to maintaining our high level of technical and business operations. We want every staff member to have an equal opportunity to contribute and succeed. Employee surveys—including the FEVS, which determines a diversity and inclusion index score—will allow us to better understand staff perspectives on diversity and inclusion.

Key Challenges Affecting Achievement of Strategic Goals

Our ability to achieve our strategic goals may be influenced by the changing balance of industry; other federal, state, and local government activities; national priorities; and resource availability. The following challenges may affect our ability to achieve our goals:

- Recruiting, retaining, and developing highly skilled and diverse staff, particularly when competing against the private sector
- Ensuring that we understand new technologies in all modes of transportation and hire and train accordingly
- Budgetary constraints, including fluctuations in the amount and timing of appropriations

Addressing Goal Achievement Challenges

Effective long-range planning, open communication with lawmakers and industry, a talent-management process that is responsive to the needs of agency human capital trends, and improved employee engagement are ways we hope to address the challenges noted above. Long-range planning in acquisition requirements, human capital management, and core operations ensures that we are ready to deal with future investigative needs. Effective communication with lawmakers and industry helps us keep these stakeholders informed of our challenges. Thinking strategically, promoting employee engagement, and encouraging staff development will allow these strategic goals and priorities to be successful.

Measuring our Success

In accordance with the [Government Performance and Results Act of 2010 and the Office of Management and Budget's Circular A-11, Part 6](#), our strategic management process and performance framework starts with this strategic plan, which establishes long-term priorities and performance goals, objectives, and metrics to gauge our success. Over the past several fiscal years, we have cultivated a performance-based culture, which remains a focus of agency management and staff. This strategic management process helps us demonstrate progress toward our performance goals and priorities, which will be measured using quarterly reviews and data analysis

for future decision-making. See [Appendix C](#) for more discussion on our strategic management process cycle.

We will define our performance goals and evaluate our progress annually using our determined metrics. We regularly collect and analyze performance metric data to inform decisions through quarterly reviews with senior leadership and staff. This focus promotes active management and staff engagement across the agency.

Appendixes

Appendix A: Summary of Goals, Objectives, and Metrics

Table 1: Summary of Goals, Objectives, and Metrics

Strategic Goal	Strategic Objective	Performance Metric
Goal 1: Improving Processes	1.1 Improve the timeliness of investigations through data analysis	1.1.1 Study and implement an improved investigation timeliness process
Goal 1: Improving Processes	1.2 Improve the timeliness of agency operations through data analysis	1.2.1 Study and reduce the backlog of FOIA responses
Goal 2: Improving Products	2.1 Improve the effectiveness of agency products	2.1.1 Establish a safety actions program to document all safety actions resulting from investigations
Goal 2: Improving Products	2.1 Improve the effectiveness of agency products	2.1.2 Establish agency-wide Board meeting criteria
Goal 2: Improving Products	2.1 Improve the effectiveness of agency products	2.1.3 Refresh agency external website to improve search capabilities
Goal 3: Improving Employee Engagement, Diversity, and Inclusion	3.1 Improve the engagement of agency staff	3.1.1 Implement an interactive employee intranet site
Goal 3: Improving Employee Engagement, Diversity, and Inclusion	3.1 Improve the engagement of agency staff	3.1.2 Improve employee engagement as measured by employee surveys
Goal 3: Improving Employee Engagement, Diversity, and Inclusion	3.2 Attract, develop, and retain a high-performing, diverse, and inclusive workforce	3.2.1 Revise the Strategic Human Capital Plan
Goal 3: Improving Employee Engagement, Diversity, and Inclusion	3.2 Attract, develop, and retain a high-performing, diverse, and inclusive workforce	3.2.2 Improve diversity and inclusion as measured by employee participation and survey feedback

Appendix B: NTSB Structure and Locations

Organizational Structure

We are authorized five [Board members](#), each nominated by the president and confirmed by the Senate to serve 5-year terms. One member is nominated by the president and confirmed by the Senate as chairman, and another is designated by the president as vice chairman, each for a 3-year term. When there is no designated chairman, the vice chairman serves as acting chairman. Currently, we have three Board members. The figure below shows our organizational structure. For more information about our offices and their functions, visit the [organization page of our website](#).

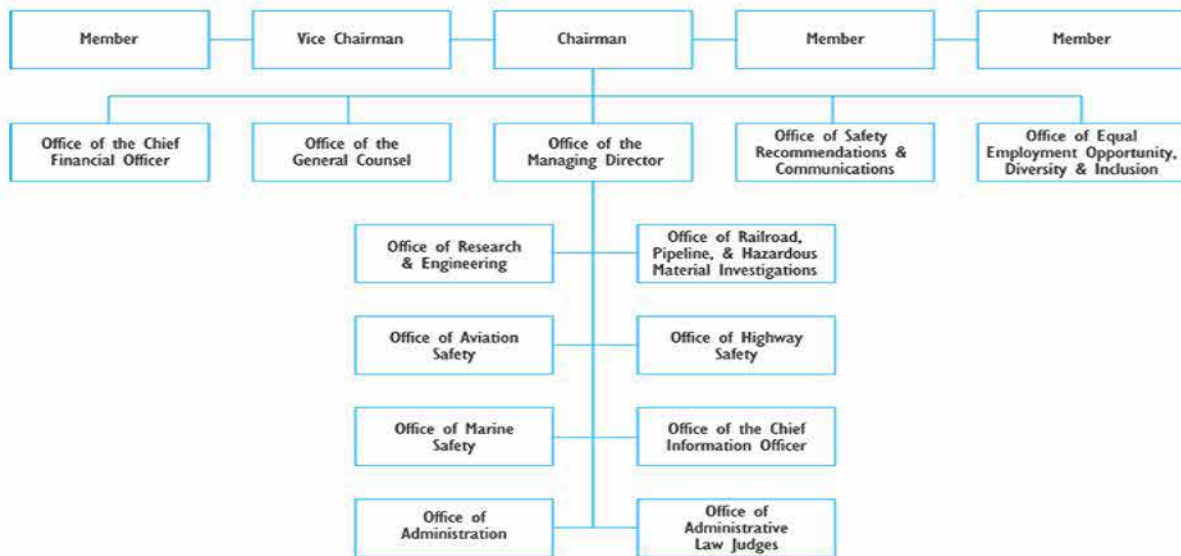


Figure 1: NTSB Organization Chart

Our Locations

We are headquartered in Washington, DC, and have staff working remotely throughout the country and in regional offices in Ashburn, Virginia; Denver, Colorado; Anchorage, Alaska; and Federal Way, Washington (figure 2 shows the NTSB’s US regional presence).

NTSB Regional Field Offices



Figure 2: NTSB Regional Presence

Appendix C: Strategic Management Process

This performance-based culture has remained a focus of agency management and staff over the past several fiscal years, and it continues to be enhanced through this plan as we develop and evaluate our performance metrics and target levels each year. As we continually improve this process, we will be able to demonstrate more outcome-related performance results and make the best use of the resources entrusted to the agency. We are optimistic that our results-oriented culture will continue to evolve and promote better governance in the future, leading to further improvements in transportation safety. The figure below depicts a cyclical process map of how we measure success.

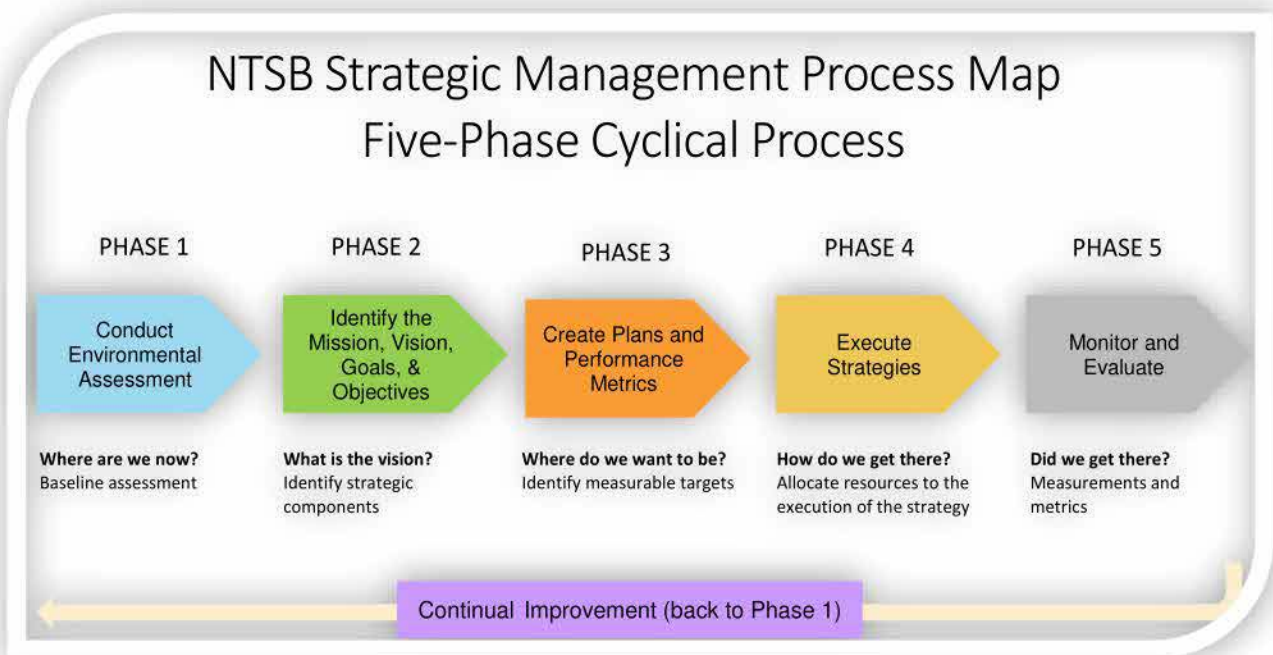


Figure 3: NTSB Strategic Management Process Map

NATIONAL TRANSPORTATION SAFETY BOARD

FISCAL YEAR 2021 BUDGET REQUEST





National Transportation Safety Board

Washington, DC 20594

Office of the Chairman

February 10, 2020

The Honorable Michael R. Pence
President
United States Senate
Washington, DC 20510

The Honorable Nancy Pelosi
Speaker
United States House of Representatives
Washington, DC 20515

Dear Mr. President and Madam Speaker:

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters. We also conduct safety studies focused on broader safety questions and topic areas. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The enclosed budget submission reflects the President's request of \$116.4 million for fiscal year (FY) 2021. This funding level is an increase of \$6.0 million from the FY 2020 enacted appropriation level of \$110.4 million and funds 412 full-time equivalent positions (FTEs).

We are proud of the products and initiatives highlighted in this submission. They reflect not only accomplishments in the past year, but outline initiatives that will propel us to continue to improve processes and products into the future. These efforts are made possible by the expertise, experience and diligence of our highly skilled employees. Personnel compensation and benefits account for over 70 percent of our expenses. Pay raises and increases in agency contributions to benefits such as retirement have driven up these expenses, and we appreciate the recognition given to our needs through the \$6.0 million increase in the President's budget request. This funding increase will help stabilize staffing and will provide for modest progress toward full staffing levels.

It will also support our continued success in improving the quality and quantity of investigation-related data, refining processes around safety recommendations, and allowing administrative functions to fully support mission requirements, in addition to a host of other critical activities.

As an agency, we are excited to invest our resources in people and processes that help make transportation safer for the public. Full funding at the requested level of \$116.4 million provides sustained support of this mission.

Sincerely,

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

Robert L. Sumwalt, III
Chairman

Enclosure

cc: The Honorable David Price
Chairman
Subcommittee on Transportation, HUD, and
Related Agencies
Committee on Appropriations
US House of Representatives

The Honorable Mario Diaz-Balaart
Ranking Member
Subcommittee on Transportation, HUD, and
Related Agencies
Committee on Appropriations
US House of Representatives

The Honorable Susan Collins
Chairman
Subcommittee on Transportation, HUD, and
Related Agencies
Committee on Appropriations
US Senate

The Honorable Jack Reed
Ranking Member
Subcommittee on Transportation, HUD, and
Related Agencies
Committee on Appropriations
US Senate

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ACRONYMS AND ABBREVIATIONS

ADAS	advanced driver assistance systems
ADS-B	Automatic Dependent Surveillance-Broadcast
AS	NTSB Office of Aviation Safety
ARTP	Aviation Report Timeliness Project
ASI	aviation safety investigator
<i>CFR</i>	<i>Code of Federal Regulations</i>
CFV	commercial fishing vessel
CHP	California Highway Patrol
CPAP	continuous positive airway pressure
CSD	NTSB Computer Services Division
CSX	CSX Transportation
CVR	cockpit voice recorder
dba	doing business as
DEF	diesel exhaust fluid
DGAC	(Mexican) Directorate General of Civil Aviation
DHS	US Department of Homeland Security
DOT	US Department of Transportation
DS	NTSB Digital Services Division
DVR	digital video recorder
EAD	NTSB Enterprise Architect Division
EEO	Equal Employment Opportunity
EEODI	NTSB Office of Equal Employment Opportunity, Diversity, and Inclusion
FAA	Federal Aviation Administration

FDR	flight data recorder
FERS	Federal Employees Retirement System
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTE	full-time equivalent
FV	fishing vessel
FY	fiscal year
GA	NTSB Government and Industry Affairs Division
GEU	Glendale, Arizona Municipal Airport
GIS	geographic information system (GIS)
GPS	global positioning system
GSA	General Services Administration
HOV	high-occupancy vehicle
HR	NTSB Human Resources Division
HS	NTSB Office of Highway Safety
HSPD-12	Homeland Security Presidential Directive 12
ICAO	International Civil Aviation Organization
IIC	investigator-in-charge
IMO	International Maritime Organization
IT	information technology
LAS	Las Vegas, Nevada International Airport
MCAS	Maneuvering Characteristics Augmentation System

MAIIF	Marine Accident Investigators’ International Forum
MR	NTSB Media Relations Division
mph	miles per hour
MV	motor vessel
MS	NTSB Office of Marine Safety
MWL	Most Wanted List
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
NYCT	New York City Transit
OCFO	NTSB Office of the Chief Financial Officer
OCIO	NTSB Office of the Chief Information Officer
OEM	Original Equipment Manufacturer
OES	Original Equipment Supplier
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
OSHP	Occupational Safety and Health Program
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIC	pilot-in-command
PIV	personal identity verification
PTC	positive train control
PV	passenger vessel
RE	NTSB Office of Research and Engineering
RMD	NTSB Records Management Division
RPH	NTSB Office of Railroad, Pipeline and Hazardous Materials Investigations

SA	NTSB Safety Advocacy Division
SAFTI	System for Analysis of Federal Transportation Investigations
SEPTA	Southeastern Pennsylvania Transportation Authority
SES	Senior Executive Service
SIC	second-in-command
SIS	substantially interested state
SL	senior level
SOP	standard operating procedures
SR	NTSB Safety Recommendations Division
SRC	NTSB Office of Safety Recommendations and Communications
SUV	sport utility vehicle
SSA	Safe Skies for Africa
SSD	NTSB Systems Support Division
sUAS	small unmanned aircraft system
TDA	NTSB Transportation Disaster Assistance Division
TSB	Transportation Safety Board
UAS	unmanned aircraft system
UBM	United Bikers of Maine
UP	Union Pacific
<i>U.S.C.</i>	<i>United States Code</i>
USS	United States Ship (US Navy–commissioned vessel)

EXECUTIVE SUMMARY

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters. We also conduct safety studies focused on broader safety questions and topic areas. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The enclosed budget submission reflects the President’s request of \$116.4 million for fiscal year (FY) 2021. This funding level is an increase of \$6.0 million from the FY 2020 enacted appropriation level of \$110.4 million and funds 412 FTEs. This is an increase of eight FTEs from the staffing level supported by the FY 2020 enacted appropriation level.

People are our primary resource, and personnel and payroll costs consume most of our funding. The increase in funding is beneficial to the agency as we strive to achieve and maintain staffing levels that fully support our strategic goals. Pay raises and increases in retirement contributions have a substantial impact on us, as do additional workload requirements contained in the FY 2018 NTSB Reauthorization bill. Among these are requirements for additional support and discussion of our recommendations that impact the modal offices as well as our Safety Recommendations, Safety Advocacy and Transportation Disaster Assistance divisions. This funding increase will help stabilize staffing and provide for modest progress toward full staffing levels.

The agency has made strong progress in the area of improving the quality and quantity of investigation-related data. Formerly known as the Multi-Modal Accident Data Management System, the System for Analysis of Federal Transportation Investigations (SAFTI) became functional across all modes in the fall of FY 2019. This system, along with other supporting analysis tools, will be critical in meeting our strategic objectives of improving the timeliness of investigations through data analysis and improving the effectiveness of agency products. Resources continue to be required to fully optimize this initiative, as well as to update and upgrade such systems as the docket management system and the agency website, which facilitate information needs of the public and stakeholders.

This budget request submission highlights some of our many accomplishments achieved in FY 2019. It includes information on a variety of our safety related products—Accident Reports, Accident Briefs, Safety Recommendation Reports, Safety Alerts, Safety Seminars, and our participation in international investigations, which proved to be substantial during the fiscal year. It notes our efforts advocating for adoption of our recommendations and discusses our continued emphasis on emerging transportation technologies, including unmanned aircraft (drones), automated vehicles, and alternatively fueled vehicles.

As an agency, we are excited to invest our provided resources in the employees and systems that allow the NTSB to work constantly to improve transportation safety for the American people.

MISSION AND ORGANIZATION OVERVIEW

Since its creation in 1967 as an accident investigation agency within the newly created US Department of Transportation (DOT), the NTSB's mission has been to determine the probable cause of transportation accidents and incidents and to formulate safety recommendations to improve transportation safety. Our authority currently extends to these types of accidents:

- All US civil aviation accidents and certain public aircraft accidents.
- Select highway accidents.
- Railroad accidents involving passenger trains or select freight train accidents that result in fatalities or significant property damage.
- Major marine accidents and any marine accident involving both a public and a nonpublic vessel.
- Pipeline accidents involving fatalities, substantial property damage, or significant environmental damage.
- Select accidents resulting in the release of hazardous materials in any mode of transportation.
- Select transportation accidents that involve problems of a recurring nature or that are catastrophic.

In 1974, Congress passed the Independent Safety Board Act, which severed the NTSB's ties to the DOT and authorized the agency to take these additional actions:

- Evaluate the effectiveness of government agencies involved in transportation safety.
- Evaluate the safeguards used in the transportation of hazardous materials.
- Evaluate the effectiveness of emergency responses to hazardous material accidents.
- Conduct special studies on safety problems.
- Maintain an official US census of aviation accidents and incidents.
- Review appeals from individuals and entities who have been assessed civil penalties by the Federal Aviation Administration (FAA).
- Review appeals from airmen and merchant seamen whose certificates have been revoked or suspended by the FAA and the US Coast Guard (Coast Guard), respectively.

The NTSB also leads US teams assisting in foreign airline accident investigations conducted by foreign authorities under the provisions of International Civil Aviation Organization (ICAO) agreements. In 1996, the Aviation Disaster Family Assistance Act

further assigned the NTSB the responsibility of coordinating federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to address the concerns of accident survivors and family members following air carrier accidents that have occurred in the United States or its territories resulting in a loss of life (Title 49 *United States Code* [U.S.C.] § 1136). The rail passenger disaster family assistance provisions of the Rail Safety Improvement Act of 2008 assigned the NTSB similar responsibilities for rail passenger disasters resulting in a loss of life (49 U.S.C. § 1139). In 2018, the agency’s family assistance responsibilities expanded as a result of our reauthorization, which includes a new section that obligates the agency, to the maximum extent practicable, to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accidents we investigate in advance of the media (49 U.S.C. § 1140). Currently, the primary focus of agency efforts is to ensure compliance for accidents involving fatalities.

To date, the NTSB has investigated more than 146,000 aviation accidents and thousands of surface transportation accidents. On call 24 hours a day, 365 days a year, our investigators have traveled throughout the United States and to every corner of the world to perform investigations. Because of this dedication, we are recognized as the world’s leading accident investigation agency.

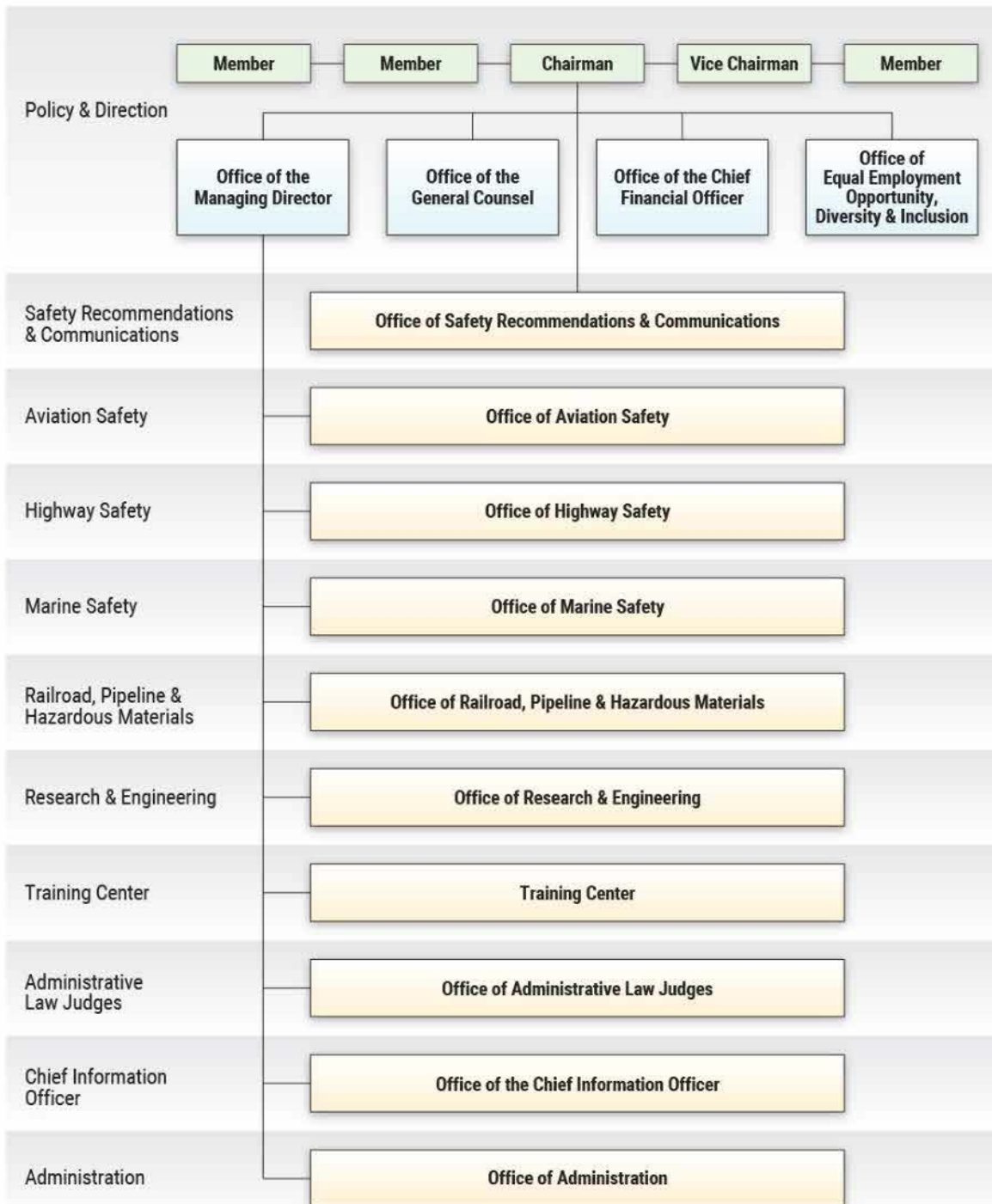
We have issued close to 15,000 safety recommendations resulting from NTSB investigations to more than 2,400 recipients in all transportation modes. Since 1990, we have published the Most Wanted List (MWL) of Transportation Safety Improvements, which highlights safety-critical actions that the DOT modal administrations, the Coast Guard, the states, and other entities should take to help prevent accidents and save lives. Further information concerning the MWL appears in Appendix A.

We are not authorized to regulate transportation equipment, personnel, or operations or to initiate enforcement action. However, because of our reputation for objectivity and thoroughness, many safety features currently incorporated into airplanes, helicopters, automobiles, commercial motor vehicles, trains, pipelines, and marine vessels had their genesis in NTSB safety recommendations. Further information concerning the status of our safety recommendations appears in Appendix B.

Our five-member Board is composed of appointees nominated by the President and confirmed by the Senate. A Chairman (one of the five members, also nominated by the President and confirmed by the Senate) serves as the chief executive officer of the NTSB. The President designates one of the Members as Vice Chairman.

The NTSB is headquartered in Washington, DC. We also have investigators located in offices in Ashburn, Virginia; Denver, Colorado; Anchorage, Alaska; and Federal Way, Washington; as well as investigators located throughout the country who telework. The NTSB’s training center is in Ashburn, Virginia.

Organization and Program Structure



RESOURCE REQUIREMENTS

Appropriations Language

Salaries and Expenses - 950310

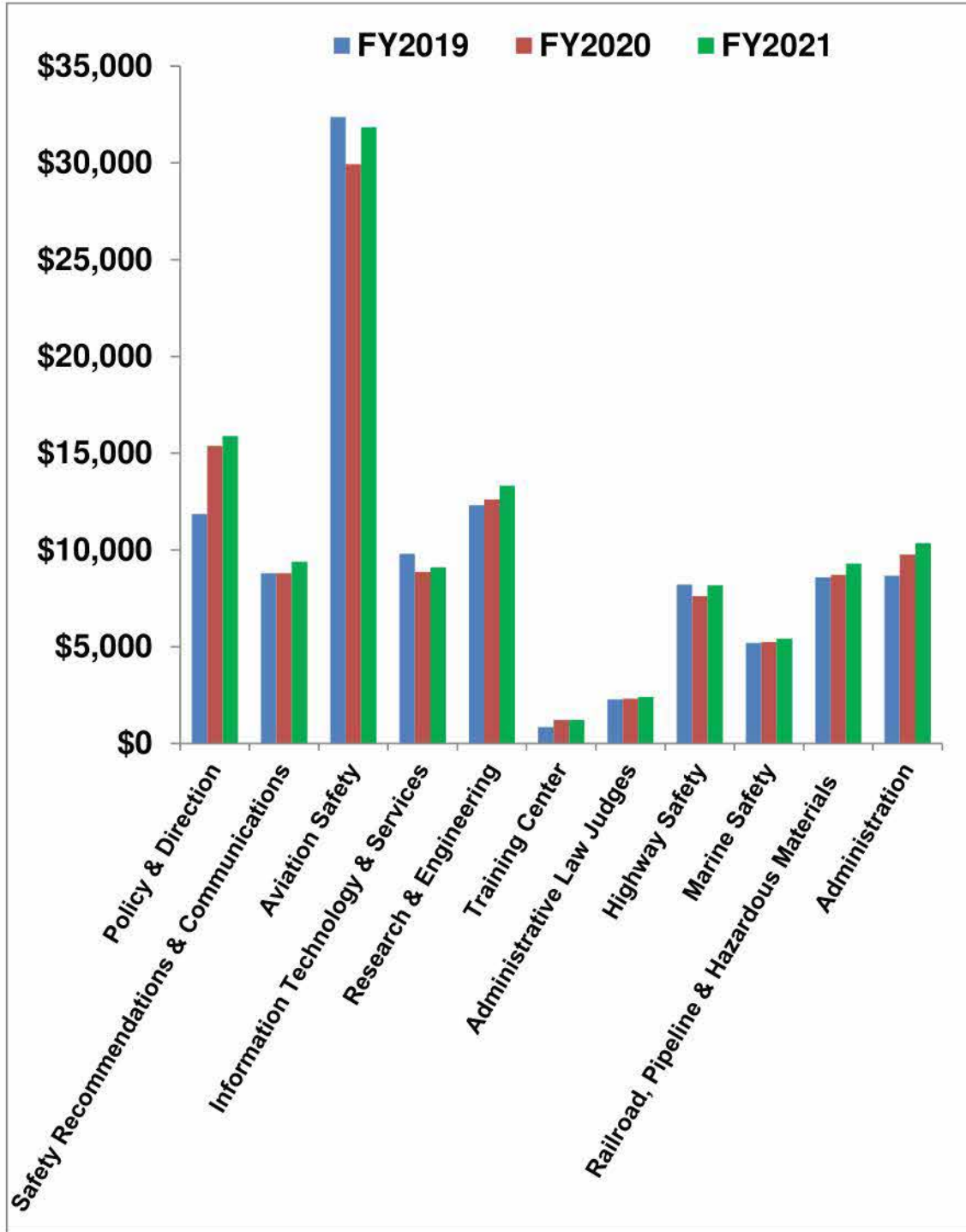
“For necessary expenses of the National Transportation Safety Board, including hire of passenger motor vehicles and aircraft; services as authorized by 5 U.S.C. 3109, but at rates for individuals not to exceed the per diem rate equivalent to the rate for a GS-15; uniforms or allowances therefor, as authorized by law (5 U.S.C. 5901-5902), \$116,400,000 of which not to exceed \$2,000 may be used for official reception and representation expenses. The amounts made available to the National Transportation Safety Board in this Act include amounts necessary to make lease payments on an obligation incurred in FY 2001 for a capital lease.”

Emergency Fund - 950311

No new funding is being requested for the Emergency Fund in FY 2021.

NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Obligations by Program Activity (\$000s)



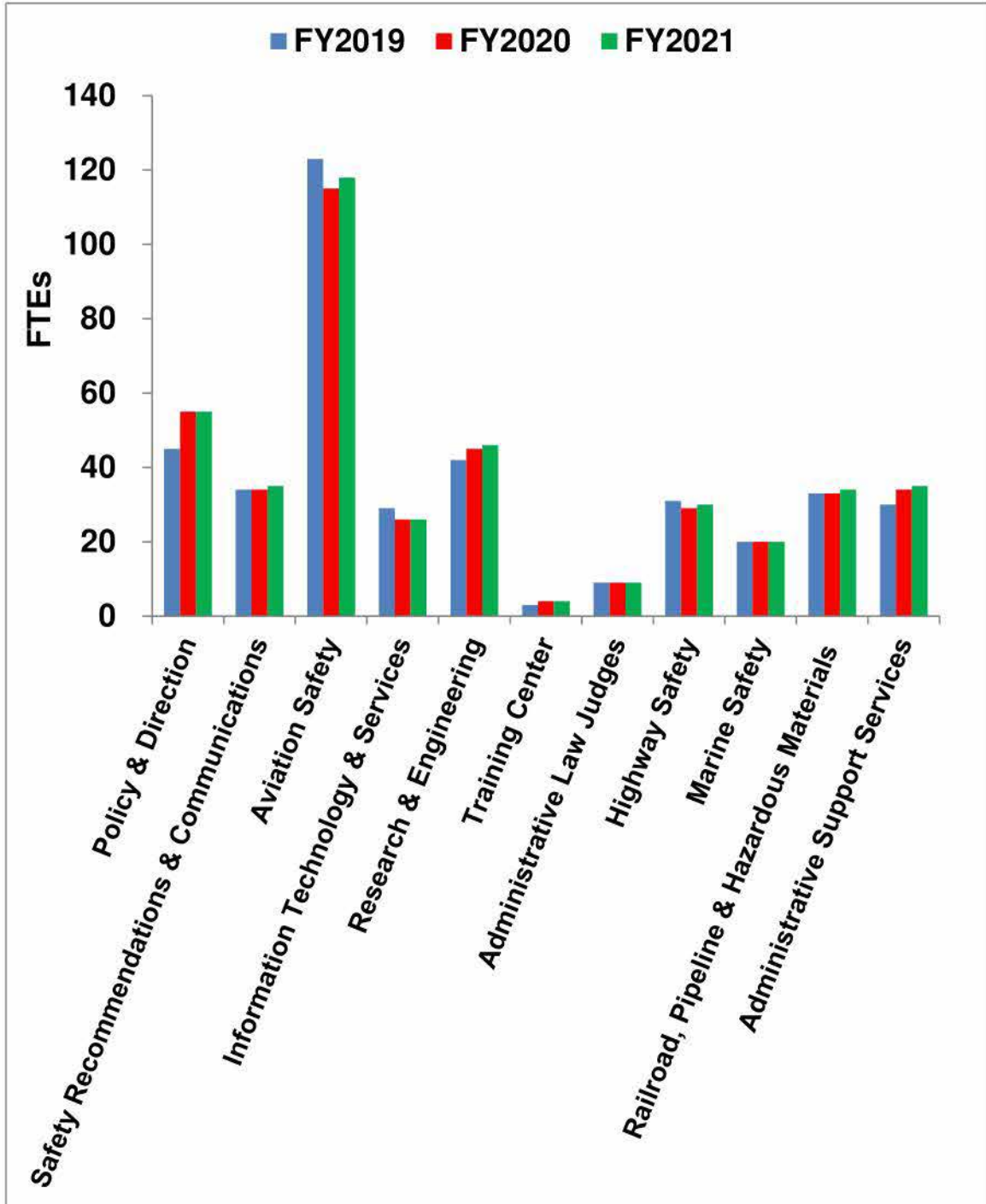
NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Obligations by Program Activity (\$000s)

Identification Code: 95-0310-0-1-407	FY 2019	FY 2020	FY 2021
Policy and Direction	11,851	15,367	15,880
Safety Recommendations and Communications	8,797	8,790	9,389
Aviation Safety	32,372	29,930	31,850
Information Technology and Services	9,801	8,863	9,105
Research and Engineering	12,316	12,606	13,310
Training Center	846	1,207	1,216
Administrative Law Judges	2,278	2,313	2,397
Highway Safety	8,208	7,619	8,172
Marine Safety	5,188	5,240	5,426
Railroad, Pipeline and Hazardous Materials Investigations	8,579	8,706	9,296
Administration	8,663	9,759	10,359
Total	108,899	110,400	116,400

NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Staffing by Program Activity



NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

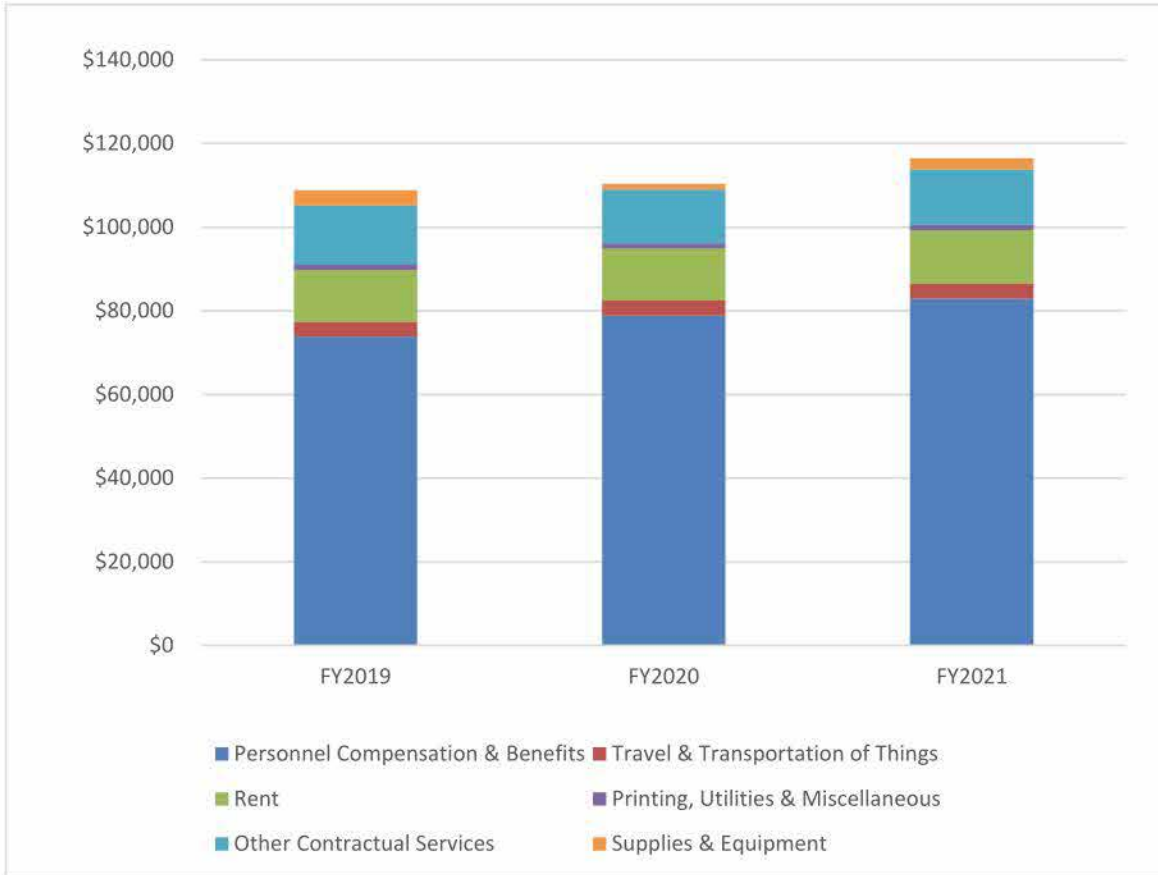
Staffing by Program Activity

Identification Code: 95-0310-0-1-407	FY 2019	FY 2020	FY 2021
Policy and Direction	<u>45</u>	<u>55</u>	<u>55</u>
Chairman, Vice Chairman, Board Members*	11	15	15
Office of the Managing Director	14	14	14
Office of the General Counsel	6	9	9
Office of the Chief Financial Officer	12	14	14
EEO, Diversity & Inclusion Office	2	3	3
Safety Recommendations and Communications	34	34	35
Aviation Safety	123	115	118
Information Technology and Services	29	26	26
Research and Engineering	42	45	46
Training Center	3	4	4
Administrative Law Judges	9	9	9
Highway Safety	31	29	30
Marine Safety	20	20	20
Railroad, Pipeline and Hazardous Materials Investigations	33	33	34
Administration	30	34	35
Total	399	404	412

* FY 2020 and FY 2021 assume full Board staffing.

NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Obligations by Object Classification (\$000s)



NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Obligations by Object Classification (\$000s)

Identification Code: 95-0310-0-1-407		FY 2019	FY 2020	FY 2021
Personnel Compensation and Benefits:				
11.1	Permanent Positions	51,538	53,397	55,544
11.3	Positions Other Than Permanent	2,192	3,180	3,238
11.5	Other Personnel Compensation	2,339	2,441	2,942
	Total Personnel Compensation	56,069	59,018	61,724
12.1	Personnel Benefits	17,718	19,858	21,182
	Subtotal, Personnel Compensation and Benefits	73,787	78,876	82,906
Other Than Personnel Compensation and Benefits:				
21.0	Travel and Transportation of Persons	3,574	3,497	3,637
22.0	Transportation of Things	65	66	69
23.1	Rental Payments to GSA	9,581	9,670	9,848
23.2	Rental Payments to Others	2,744	2,815	2,871
23.3	Communications, Utilities, and Miscellaneous Charges	1,153	1,130	1,176
24.0	Printing and Reproduction	105	108	112
25.0	Other Contractual Services	14,154	12,855	13,248
26.0	Supplies and Materials	587	578	601
31.0	Equipment	3,149	805	1,932
99.9	Total Obligations	108,899	110,400	116,400
Personnel Summary:				
	Full Time Equivalent Employment (FTE)	399	404	412

NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

Analysis of Changes - FY 2020 to FY 2021

\$ 2,185 Staffing Changes

The requested funding level provides for an FTE level of 412, an increase of 8 FTEs from the count of 404 supported by the FY 2020 enacted appropriation.

\$ 1,753 Pay and Benefits

Funds cover the pro-rated impact of the FY 2020 3.1 percent pay raise effective January 1, 2020, as well as increases in the FERS contribution rate.

\$ 468 Awards

Funds cover the 1.0 percent increase in the non-SES, non-SL awards program from FY 2020.

\$ 381 Non-Pay Inflation

Inflation of 2.0 percent is used for non-pay inflation based on economic assumptions for discretionary programs.

\$ 1,213 Program Investments

Continued investment in systems and equipment supporting the investigative mission of the agency.

\$ 6,000 Total

Summary of Changes

\$ 110,400 FY 2020 level (supports 404 FTEs)

\$ 6,000 Total Increase/Decrease

\$ 116,400 FY 2021 Discretionary Level (supports 412 FTEs)

POLICY AND DIRECTION

	(\$000s)	FTEs
FY 2020 Estimate	\$15,367	55
FY 2021 Request	\$15,880	55
Increase/Decrease	\$513	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

Policy and Direction program resources fund the offices of the Chairman, Vice Chairman, and Members of the Board, as well as the offices of the Managing Director; General Counsel; Chief Financial Officer; and Equal Employment Opportunity, Diversity, and Inclusion. Collectively, these offices provide overall leadership, management, and direction for the NTSB.

Chairman, Vice Chairman, and Board Members

The Chairman serves as the chief executive officer for the agency. The Chairman, Vice Chairman, and Board Members preside at NTSB Board meetings; review and approve NTSB reports, safety studies, and safety recommendations; provide appellate review of FAA certificate and certain civil penalty actions, as well as Coast Guard license actions; and act as spokespersons at accident scenes. They also advocate for specific safety recommendations with the transportation community, other federal agencies, state and local governments, and the public.

Office of the Managing Director

The Office of the Managing Director assists the Chairman in the discharge of executive and administrative functions. The office coordinates activities of the entire staff, manages the day-to-day operation of the agency, and develops and recommends plans to achieve program objectives. The Managing Director is responsible for the overall leadership, direction, and performance of the agency, as well as its communications and organizational efficiency, including oversight of the NTSB Response Operations Center. The center provides support 24 hours a day, 365 days a year, for agency-wide operational requirements, including accident launches and the collection and dissemination of information related to transportation accidents and incidents.

Additionally, two organizational units reside within the Office of the Managing Director. The Training Center manages workforce development and external training functions. The Executive Secretariat is responsible for managing the voting process for Board Members and for the processing and archiving of external correspondence.

Office of the General Counsel

The Office of the General Counsel provides advice and assistance on legal aspects of policy matters, legislation, testimony, NTSB rules, and ethics. The office also provides objective review of airman appeals of certificate actions and certain civil penalties and seaman license actions, acting on behalf of the agency on particular procedural aspects of enforcement cases; makes decisions as to the release of official information pursuant to the requests or demands of private litigants, courts, or other authorities for use in litigation not involving the United States; ensures compliance with statutes concerning public access to information through publication of NTSB decisions and releases under the Freedom of Information Act (FOIA); drafts all rulemaking and interpretive guidance; provides counsel and staff assistance to the US Department of Justice when the NTSB is a party to judicial proceedings; and provides internal legal assistance and guidance regarding accident and incident investigations, hearings, appearances as witnesses, the acquisition of evidence by subpoena and other means, and the taking of depositions.

Office of the Chief Financial Officer

The Office of the Chief Financial Officer (OCFO) manages NTSB financial resources, develops the agency's budget requests for submission to the OMB and Congress, and executes the budget for resources appropriated to the NTSB by Congress. The OCFO also prepares the agency's financial statements as required by the Accountability of Tax Dollars Act, oversees property and inventory control programs, and analyzes the fee structure for services that the agency provides on a reimbursable basis. Additionally, the OCFO is responsible for ensuring compliance with the Federal Managers' Financial Integrity Act.

Office of Equal Employment Opportunity, Diversity, and Inclusion

The Office of Equal Employment Opportunity, Diversity, and Inclusion (EEODI) advises and assists the Chairman and NTSB office directors in carrying out their responsibilities related to Title VII of the Civil Rights Act of 1964, as amended, and other laws, executive orders, and regulatory guidelines affecting diversity development, and the processing of Equal Employment Opportunity (EEO) complaints. These services are provided to managers, employees, and job applicants through a combination of full-time staff, collateral-duty employees, and volunteer managers of our special emphasis programs. To maintain the integrity and impartiality of the agency's EEO complaints resolution program, external EEO counselors and investigators are contracted to help employees and job applicants who file formal or informal complaints of alleged discrimination. In addition, the office manages an alternative dispute resolution program. EEODI services also include providing required educational training to NTSB staff, raising diversity awareness at the

agency, engaging in targeted outreach, helping with internal recruitment initiatives, and providing career enhancement advisory services.

SAFETY RECOMMENDATIONS AND COMMUNICATIONS

	(\$000s)	FTEs
FY 2020 Estimate	\$8,790	34
FY 2021 Request	\$9,389	35
Increase/Decrease	599	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Safety Recommendations and Communications (SRC) comprises six divisions: Media Relations (MR), Government and Industry Affairs (GA), Safety Advocacy (SA), Transportation Disaster Assistance (TDA), Safety Recommendations (SR), and Digital Services (DS). SRC ensures that information regarding NTSB investigations, activities, advocacy, and safety recommendations is accurately and effectively communicated to a range of stakeholders, including elected officials and their staff at the federal, state, and local levels; industry representatives; media; victims of transportation accidents and their families; and the public. SRC's mission begins at the scene of an accident, continues through the NTSB accident investigation and the resulting issuance of one or more safety recommendations, and is maintained through advocacy efforts to secure favorable action on safety recommendations. In addition to traditional communication methods, the office uses digital and social media to facilitate robust public and stakeholder engagement.

Media Relations Division

This division is responsible for the following:

- Serving as national spokespersons for the NTSB.
- Serving as the primary point of contact for all MR activities and disseminating information about NTSB activities to the public via mass media. This includes collaborating with other SRC divisions to ensure the integrated, coordinated, and synchronized release of information, including imagery, MR products (such as news releases and feature releases), and social media content, with the goal of building public understanding of and support for the agency's mission.

- Providing MR support for Board members and investigators, including developing key messages and supporting talking points, facilitating interviews, preparing personnel for media briefings, coordinating media briefings, and providing MR training.
- Identifying opportunities to engage the media to communicate key messages to identified audiences.
- Providing counsel to senior leadership regarding public and media perceptions of NTSB actions and policies.
- Creating and maintaining a library of public affairs guidance for issues of media interest to align messaging and promote unity of effort within the agency.
- Responding to media inquiries, including facilitating interviews with NTSB subject matter experts, developing responses to queries, and crafting key messages.
- Providing strategic and tactical MR support for forums, meetings, roundtables, and other special investigative events.
- Providing MR guidance and training to the transportation industry to align their communications with the NTSB party agreement for NTSB investigations.

Government and Industry Affairs Division

This division is responsible for the following:

- Informing Congress, other federal agencies, and state and local governments about NTSB activities and advising the Chairman, Vice Chairman, Board members, and staff on congressional and legislative matters.
- Coordinating responses to requests for information and assistance from Congress, the White House, the Government Accountability Office, other federal agencies, and state and local governments through correspondence and briefings.
- Supporting the Chairman, Vice Chairman, Board members, and staff with legislative testimony.
- Providing launch support to the Chairman, Vice Chairman, Board members, and accident investigators.
- Monitoring federal and state legislative activity related to NTSB safety recommendations.
- Coordinating the development of NTSB legislative proposals and providing technical assistance to Congress and states in drafting legislation.
- Supporting modal offices in planning and executing forums and roundtables.
- Helping staff identify appropriate resources in state and local government to support investigations and other projects.

- Collaborating with the SA division in support of its advocacy programs.

Safety Advocacy Division

This division is responsible for the following:

- Developing and administering the NTSB’s (MWL) of transportation safety improvements, based, in part, on open safety recommendations. The MWL is the agency’s preeminent advocacy tool and highlights issues whose resolution would significantly impact transportation safety at the national and state levels. A new list is announced biennially at a press conference. Although the NTSB actively advocates for all its safety recommendations to be implemented, follow-up efforts are generally more aggressive for the recommendations supporting MWL issues.
- Developing the MWL advocacy strategy and working with Board members and NTSB staff to promote MWL issues.
- Developing and implementing the agency’s advocacy program to highlight state-related safety recommendations.
- Collaborating with the GA division to obtain support for programs and legislation at state and local levels consistent with agency recommendations.
- Disseminating safety information and increasing public awareness of NTSB activities in transportation safety through the “Safety Compass” blog, other social media venues, and conference presentations.
- Developing and maintaining contact with SA organizations and providing information on NTSB activities and safety recommendations.

Transportation Disaster Assistance Division

This division is responsible for the following:

- Ensuring the NTSB meets its statutory obligations under the Aviation Disaster Family Assistance Act (49 *USC* section 1136) and the rail passenger disaster family assistance provisions of the Rail Safety Improvement Act of 2008 (49 *USC* section 1139). This involves responding to all major aviation accidents and rail accidents investigated by the NTSB to coordinate federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to address the concerns of survivors, families, and friends.
- Ensuring that the agency meets its obligation to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accident investigated by the agency to the maximum extent practicable in advance of the media (Title 49 *U.S.C.* section 1140).

- Serving as the primary resource for survivors of transportation accidents, as well as families and friends of those involved in accidents, regarding NTSB investigations. TDA specialists provide information regarding the NTSB investigative process, and, to the maximum extent practicable, updates on the status of existing investigations. TDA specialists also help transportation accident survivors and families and friends of those involved in accidents access available resources through the appropriate organizations.
- Supporting NTSB investigative staff by facilitating data collection through direct interaction with accident survivors and the families and friends of those involved in transportation accidents.
- Serving as a resource for local, state, and federal agencies; nongovernmental and private organizations; and transportation carriers during the preparedness phase of the disaster management cycle to assist with planning an effective family assistance response following transportation accidents. TDA specialists collaborate with the family assistance response community to ensure that key concepts and operational aspects of a family assistance operation are understood and implemented during a response.

Safety Recommendations Division

This division is responsible for the following:

- Evaluating responses from safety recommendation recipients and drafting classification response letters for Board member review and approval.
- Working with modal offices to develop new safety recommendations that are actionable, effective, and measurable, based on the findings of accident investigations.
- Supporting and tracking safety recommendation implementation.
- Maintaining the safety recommendation database, which includes information on recommendation recipients, status, adoption, and implementation.
- Analyzing safety recommendation status and implementation and generating summary reports.

Digital Services Division

This division is responsible for the following:

- Engaging the public and stakeholders via digital media.
- Implementing digital strategies to highlight the NTSB's investigative and safety advocacy messages.

- Managing digital communications programs and platforms (website, social media, and visual media) to ensure consistent messaging across various digital channels and agency compliance with digital government policies and orders.
- Providing leadership and guidance regarding digital technology adoption for agency communications programs.
- Producing videos and animations, providing photography support, producing original graphics, and editing images in support of agency activities such as accident launches, investigative product development, and advocacy, among others.

Accomplishments and Ongoing Efforts

Media Relations Division

In FY 2019, MR staff efforts generated more than 164,500 print, online, and broadcast media mentions. Significant launches during the period included the Schoharie, New York, limo crash; the Jacksonville, Florida, runway excursion; the San Francisco, California, natural gas explosion and fire; the Merrimack Valley, Massachusetts, natural gas explosion and fire; the Yorba Linda, California, Cessna crash; the New York City rooftop helicopter crash; and the Ketchikan, Alaska, midair collision.

A total of 421 unique hyperlinks were created and used in 50 news releases, 21 media advisories, and 705 tweets to drive web traffic to NTSB online products. Those links received more than 132,700 clicks.

MR published 103 images to the NTSB Flickr account, which earned a total of 453,049 views, demonstrating the value of the division's inclusion of compelling imagery in its products.

MR news releases and media advisories continue to earn an above-average open rate, with a 24 percent rate for the year, slightly above the 21 percent accepted industry standard for government communications. MR staff processed more than 3,250 media inquiries and supported 9 documentary/infotainment projects focused on NTSB investigations and the agency's investigative process.

MR continues to provide high-quality and highly effective MR training to NTSB staff and transportation industry communicators. In 2019, we trained 1,175 people in 23 training sessions held domestically and internationally.

Government and Industry Affairs Division

GA initiated outreach to congressional, federal, state, and local officials who expressed an interest in improving transportation safety, arranging numerous briefings and responding to requests for information regarding NTSB investigations and safety issue areas.

In FY 2019, staff prepared Board members to testify at 10 congressional hearings regarding the agency’s investigation into the Merrimack Valley natural gas explosions, the foreign investigations of aviation accidents involving the Boeing 737 MAX (two hearings), pipeline safety (two hearings), aviation safety, rail safety, highway safety (two hearings), and confirmation hearings for Board members. The division also supported Board member testimonies and legislative advocacy efforts before state legislatures, including testimony regarding highway safety issues in Massachusetts and Connecticut.

The division further supported seven accident launches on scene and the remaining major launches and general aviation regional investigations from headquarters. As each of these investigations continue, the division is the main point of contact for additional outreach to and inquiries from Congress and state and local officials.

Safety Advocacy Division

In FY 2019, SA funded and supported 61 advocacy and outreach activities on issues related to the MWL and other critical recommendations. The division also supported 26 Board member trips and presentations. Staff developed legislative testimony related to MWL issue areas and delivered presentations to state representatives regarding occupant protection, impairment, and distraction.

In the first quarter, division staff directed most of their efforts into researching, planning, and announcing the 2019–2020 MWL, which was issued on February 4, 2019.

In the second quarter, the SA team began to implement advocacy strategies to address the new MWL issues. These efforts included engaging with internal and external stakeholders, with a focus on achieving measurable outcomes. For example, the SA team participated in several conferences and other similar meetings leading up to and following the MWL release, including events hosted by the following groups: Lifesavers’ Highway Safety Priorities, Flight Safety Foundation, National Black Caucus of State Legislators, the American Trucking Associations, Network of Employees for Transportation Safety, International Road Federation, and the American Academy of Forensic Sciences. Staff also collaborated with Jetco Delivery, StopDistraction.org, Impact Teen Drivers, and the California Highway Patrol to host distracted driving roundtables in Texas and California.

To broaden the reach and impact of the issues on the MWL, the SA team coordinated with the National Safety Council, Mothers Against Drunk Driving, Students Against Destructive Decisions, and various state legislators to encourage states to implement a .05-percent blood alcohol concentration (BAC) limit. The SA team coordinated several highway coalition meetings and, in April, hosted a webinar with the heavy-duty trucking industry and associations to discuss the benefits of collision avoidance technologies, another issue on the 2019–2020 MWL.

In the third quarter, SA conducted outreach and social media activities in support of Motorcycle Safety Awareness Month, supported presentations at helicopter conferences, participated in the AAA Western and Central New York Impaired Driving Summit, briefed

transportation officials about NTSB school bus safety recommendations, and participated in a variety of youth and teen driving events and activities.

In the fourth quarter, SA published and promoted an updated list of the safety recommendations associated with the 2019–2020 MWL; exhibited at the Experimental Aircraft Association’s AirVenture event, helping investigators prepare and deliver more than 15 presentations to general aviation pilots and enthusiasts; presented at the final symposium of the US DOT’s Safe Skies for Africa Program; worked with agency leadership to host a roundtable in Alaska focused on improving Part 135 flight operations safety; addressed the National Council of Examiners for Engineering and Surveying Annual Conference about hazmat recommendations; developed various social media summer and back-to-school highway-related campaigns; and participated in impairment and distraction-related events.

Division staff produced two *Advocacy Spotlight* e-newsletters that shared NTSB advocacy information and activities and highlighted progress on MWL items.

SA staff continued to significantly expand the agency’s use of social and digital media platforms to highlight investigative findings, share MWL safety messages and lessons learned, and promote the implementation of NTSB recommendations. Division staff posted hundreds of social media messages via the NTSB blog, Twitter, Facebook, LinkedIn, Instagram, YouTube, and Flickr. The division also became more fully engaged with the agency’s corporate LinkedIn page, developing and posting a biweekly safety message from the Chairman, highlighting the work of agency staff, publishing job announcements, and promoting key advocacy events.

SA staff produced several episodes of the “Behind the Scene @ NTSB” podcast, which highlights agency activities, staff, and programs. Since the podcast’s inception in 2018, 28 episodes have been released, and the number of podcast followers has grown monthly. Additionally, in FY 2019, SA staff produced four webinars on MWL topics specific to unique audiences and recommendation recipients. In all, SA webcasts have reached more than 1,000 industry and government stakeholders.

Using the division’s e-mail distribution platform, staff sent 157 notifications related to events, reports, investigative findings, and MWL-related information that resulted in an above-average “open” rate. The number of stakeholders receiving such notifications has increased by about 23 percent since FY 2018.

Transportation Disaster Assistance Division

In FY 2019, TDA launched to eight aviation accidents (three of which met the criteria established in 49 U.S.C section 1136), four highway accidents, and one marine accident. Staff provided support for an additional 454 domestic aviation accidents, 12 international aviation accidents, 15 rail accidents, 21 highway accidents, 4 pipeline accidents, 1 hazmat accident, and 10 marine accidents, managing an average of 55 cases per week. Staff provided information and offered disaster assistance services to approximately 2,198

accident survivors, family members, and other family contacts associated with these investigations.

TDA staff collaborated with NTSB senior leadership and modal offices to develop an implementation strategy for the new family assistance requirements included with the 2018 NTSB reauthorization (Title 49 *U.S.C* section 1140). This effort culminated in a guidance document for investigative and TDA staff to facilitate compliance with the section 1140 requirements. Staff continue to seek opportunities to refine processes, including applying Lean Six Sigma principles to case management. The NTSB's expanded responsibilities per Title 49 *U.S.C* section 1140 have increased TDA's caseload by 76 percent compared to FY 2018.

TDA participated in 60 outreach events, resulting in direct contact with approximately 3,580 participants. Staff responded to inquiries from 16 international agencies; 45 federal agencies and departments; 64 state and local agencies; 139 industry organizations; and 79 professional organizations, educational institutions, and other aid organizations. Staff engaged in an average of 25 outreach activities per week requiring either travel or remote interaction.

In collaboration with the NTSB Training Center, TDA organized a 2 1/2-day course to provide an overview of family assistance operations following transportation disasters. This course was offered twice in FY 2019 and was attended by 94 representatives from the transportation industry; local, state, and federal agencies; and other organizations. TDA staff also served as instructors during six other training courses held at the NTSB Training Center, engaging with 274 participants.

TDA staff developed a training program for aviation accident investigators focused on enhancing communications with accident survivors and the family members and friends of those involved in transportation accidents. This course was offered twice in FY 2019, with 43 accident investigators participating. Staff developed a similar training program for NTSB Board members.

Staff engaged internationally in several initiatives to develop and enhance family assistance operations. Staff represented the United States as the appointed representative during the ICAO's 13th Air Navigation Conference Special Session on family assistance, and served as part of the US delegation during ICAO's 40th Assembly Meeting, participating in training events in Austria, Brazil, Hong Kong, Italy, Nigeria, and the United Arab Emirates designed to build international family assistance response capabilities. For international agency representatives interested in developing or enhancing their country's family assistance programs, the NTSB offered complimentary registration to the 2 1/2-day family assistance course.

TDA engaged in an initiative to revise guidance to meet the criteria established in 49 *U.S.C.* section 1136 for the distribution and control of passenger lists and manifests following an aviation accident. Staff hosted a workshop that assembled 40 key stakeholders from domestic and foreign air carriers, passenger rail carriers, airport authorities, emergency management offices, public safety agencies, federal agencies, and nongovernmental

organizations. The workshop was intended to facilitate discussion and ensure that various perspectives were considered in the draft document. Final guidance was distributed to the broader family assistance response community in July 2019.

Safety Recommendations Division

In FY 2019, SR staff reviewed and analyzed 132 responses from recommendation recipients and developed recommendation classification responses to those letters for Board review and approval. The division also assisted the modal offices in developing and issuing 157 new safety recommendations.

SR developed numerous reports and data summaries on specific recommendation topics to support NTSB Board members, agency staff, the media, and the public during the same period. Staff provided input on recommendations during the report-planning phase of 26 NTSB accident investigations conducted by the modal offices.

SR outreach activities included 34 meetings with government and industry organizations, including the FAA, the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), the Federal Transit Administration (FTA), the Coast Guard, and NiSource to discuss previously issued recommendations.

In FY 2019, the division initiated a program to collect information on actions taken by states in response to NTSB safety recommendations. The information collected includes legislation that has been either enacted, or introduced but not yet enacted, and such administrative actions as design specification and maintenance inspection programs for roads, bridges, and tunnels.

Digital Services Division

In FY 2019, DS staff supported 20 major accident launches, 9 Board meetings, and 8 other NTSB-led safety-focused events. The division completed over 400 graphics and illustrations for use in reports and other materials; managed more than 30 print publication requests; produced more than 50 videos, podcasts, and live video streams; and fulfilled more than 1,500 website update requests.

DS staff worked with the Office of the Chief Information Officer (OCIO) to implement a digital signage system at headquarters, providing up-to-date and timely topical information to NTSB staff. DS staff is also leading the creation of a new internal employee engagement intranet site, with the objectives of increasing the agency's internal communications effectiveness, highlighting staff stories, and fostering more robust two-way communications between staff and senior leadership.

AVIATION SAFETY

	(\$000s)	FTEs
FY 2020 Estimate	\$29,930	115
FY 2021 Request	\$31,850	118
Increase/Decrease	\$1,920	3

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 3 FTEs is supported by this funding level. No other program changes are planned.

Program Description

The mission of the Office of Aviation Safety (AS) is to—

- Investigate all air carrier, commuter, and air taxi accidents and certain serious incidents; fatal and nonfatal general aviation accidents and serious incidents; unmanned aircraft systems (UAS) and public aircraft accidents and serious incidents; and commercial space launch/reentry accidents.
- Participate in the investigation of aircraft accidents that occur in foreign countries involving US carriers, US-manufactured or -designed equipment, or US-registered aircraft to fulfill US obligations under ICAO agreements.
- Investigate safety issues that extend beyond a single accident to examine specific aviation safety problems from a broader perspective.

AS conducts investigative activities through five specialty divisions based in Washington, DC, and a regional investigation management structure consisting of four regions. Investigators are located throughout the country. International aviation activities are coordinated from the Washington, DC, office.

Major Investigations Division

The Major Investigations Division of AS performs these functions:

- Provides an investigator-in-charge (IIC) for air carrier domestic aircraft accident and incident investigations, certain public aircraft accidents and incidents, commercial space launch/reentry accidents, and UAS accident and incident investigations.

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- Coordinates the preparation of comprehensive aviation accident and incident reports and manages aviation investigative hearings, forums, and conferences related to air carrier operations.
 - Coordinates and supervises the efforts of NTSB group chairmen and external investigation participants provided by industry, other government agencies, and foreign authorities (for US investigations involving foreign-operated, -registered, -manufactured, or -designed aircraft).
 - Provides accredited representatives to assist in the investigation of civil aviation accidents that occur in other countries. (The accredited representative informs domestic aviation interests of the progress of an investigation, while providing needed technical expertise, as requested, to foreign accident investigation counterparts, and informs FAA and US industry representatives of issues that may affect US aviation safety, or the safety of aircraft or aircraft components manufactured in the United States.)
 - Develops NTSB investigative capabilities and agency strategy in new and innovative transportation industries to improve safety. Current areas of development include increasing NTSB comprehensive and technical proficiency in UAS accident and incident investigation, use of small unmanned aircraft system (sUAS) technology for accident scene documentation, commercial space launch/reentry accident investigation, and urban air mobility vehicle operations in the US National Airspace System.

As applicable for domestic accident and incident investigations, a specialist in operational factors, aviation engineering, human performance, survival factors, or other organizational element may act as a group chairman on a major investigation to examine issues in his or her specialty area. Group chairmen lead their respective groups in the technical investigation of an accident under the direction of the IIC and produce a factual report that is placed in the agency's public docket. They also produce analytical reports that are used in developing the draft accident report and proposed safety recommendations. NTSB technical specialists may also provide specialized assistance through the US-accredited representative in foreign accident and incident investigations.

Operational Factors Division

The Operational Factors Division examines issues related to air traffic control, flight operations, and meteorology, such as—

- Air traffic control facilities, procedures, and flight handling, including developing flight histories and animations from air route traffic control centers and terminal facility radar records.
- Operations of the air carrier or the UAS operator; training, experience, and operational performance of flight crews or UAS pilots; and FAA surveillance of flight operations.

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- Meteorological/environmental conditions that may have caused or contributed to an accident, and pertinent meteorological products, procedures, and services provided by government and industry.
 - Commercial space crewmember training, experience, and operational performance.

Aviation Engineering Division

The Aviation Engineering Division examines all issues related to powerplants, structures, systems, system safety, and maintenance, such as—

- Powerplant components, including the airworthiness of aircraft engines and propellers.
- Integrity of aircraft structures and flight controls, including the adequacy of design and certification.
- Airworthiness of aircraft flight controls and electrical, pneumatic, hydraulic, and avionics systems.
- Hazards and associated safety risks introduced by aircraft equipment failures, including the adequacy of design and certification.
- Service history and maintenance of aircraft systems, structures, and powerplants.
- Airworthiness of helicopters, including powerplants, structures, and control systems.
- Commercial spacecraft engines, structure, and systems.

Human Performance/Survival Factors Division

AS human performance specialists assess the knowledge, experience, training, and physical abilities of those whose actions may have caused or contributed to an accident or incident. They review the adequacy of established procedures, examine work habit patterns and interrelationships among crewmembers and managers to assess organizational factors and safety culture, and investigate the ergonomics of equipment design and the potential effects of that design on operator performance. A human performance investigation may also include an assessment of sleep and rest cycles and drug or alcohol use.

Survival factors specialists examine factors that affect the survival of those involved in accidents, including the causes of injuries sustained by occupants of the aircraft or by others. They also examine safety procedures, search-and-rescue operations, crashworthiness, equipment design, emergency response and escape, crewmember emergency procedures training, and airport operations and certification.

Writing and Editing Division

The Writing and Editing Division manages the development of, and writes, major aviation reports; staff also writes, analyzes, and edits accident briefs, safety recommendation reports, special investigation reports, safety alerts, responses to notices of proposed rulemaking, and general correspondence related to aviation. In addition, the division manages the NTSB’s aviation accident database.

Regional Offices

Although regional accident/incident investigations may be much smaller in scope than those led by IICs at the Washington, DC, headquarters, they are conducted in a similar manner. Often, a single aviation safety investigator (ASI) conducts the investigation, gathering detailed information and working with party representatives. During each investigation, ASIs consider ways to prevent similar accidents from occurring in the future through a more immediate and informal solution (known as a safety accomplishment) or through the formal safety recommendation process. In addition, ASIs often provide support to major accident investigations and may identify accidents that have broader safety issues to be addressed in a forum, at a Board meeting, or through a special investigation report. In these cases, additional staff from headquarters are often assigned to assist ASIs in gathering the facts, developing the analysis, and drafting the final report.

See Appendix C for AS regional office coverage.

General Aviation Accident Investigations Division

The General Aviation Accident Investigations Division staff comprises recent college graduates selected from the Federal Pathways Program. They are responsible for investigating and documenting minor accidents (data collection investigations) and conducting some nonfatal limited investigations and engine teardowns. This division has reduced the workload of more senior journeymen and senior accident investigators so that they can better focus on investigating more complex accidents, developing safety recommendations, conducting external industry safety outreach, and advocating safety initiatives.

Administrative Support Division

The Administrative Support Division is responsible for processing budget, travel, payroll, personnel and timekeeping, procurement, contracting, and purchase card actions for AS.

Accomplishments and Ongoing Efforts

This office’s accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Departure From Controlled Flight Trans-Pacific Air Charter, LLC Learjet 35A Teterboro, New Jersey May 15, 2017

On May 15, 2017, about 3:29 p.m. local time, a Learjet 35A, N452DA, departed controlled flight while on a circling approach to runway 1 at Teterboro Airport, Teterboro, New Jersey, and impacted a commercial building and parking lot. The pilot-in-command (PIC) and the second-in-command (SIC) died; no one on the ground was injured. The airplane was destroyed by impact forces and a postcrash fire. The airplane was registered to A&C Big Sky Aviation, LLC, and was operated by Trans-Pacific Air Charter, LLC, under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as a positioning flight. The flight had departed from Philadelphia International Airport, Philadelphia, Pennsylvania, about 3:04 p.m. local time destined for Teterboro.

The NTSB determined that the probable cause of this accident was the PIC's attempt to salvage an unstabilized visual approach, which resulted in an aerodynamic stall at low altitude. Contributing to the accident was the PIC's decision to allow an unapproved SIC to act as pilot flying, the PIC's inadequate and incomplete preflight planning, and the flight crew's lack of an approach briefing. Also contributing to the accident were Trans-Pacific Jets' lack of a safety program that would have enabled the company to identify and correct patterns of poor performance and procedural noncompliance and the FAA's ineffective Safety Assurance System procedures, which failed to identify these company oversight deficiencies.

Safety issues identified and evaluated as part of the investigation and report included the need for flight data monitoring programs (and supporting recording devices) for 14 *CFR* Part 135 operators, the need for safety management systems for Part 135 operators, the need for the FAA to develop and implement procedures to identify Part 135 operators whose pilots do not comply with standard operating procedures (SOPs), the need for Part 135 operators to monitor pilots with performance deficiencies, inadequate FAA guidance for Part 135 crew resource management training, the need for leadership training for Part 135 PICs, and the lack of approach speed wind additive guidance in Trans-Pacific SOPs.

Safety recommendations were issued to the FAA.

Recommendations: 3 new, 6 reiterated
Report Adopted: March 12, 2019

**Runway Overrun During Rejected Takeoff Ameristar Air Cargo, Inc., [doing business as] dba Ameristar Charters, flight 9363 Boeing MD-83
Ypsilanti, Michigan
March 8, 2017**

On March 8, 2017, about 2:52 p.m., Ameristar Air Cargo, Inc., dba Ameristar Charters, flight 9363, a Boeing MD-83 airplane, N786TW, overran the departure end of runway 23L at Willow Run Airport, Ypsilanti, Michigan, after the captain executed a rejected takeoff. The 110 passengers and 6 flight crewmembers evacuated the airplane via emergency escape slides; however, one slide failed to inflate and could not be used. One passenger received a minor injury, and the airplane sustained substantial damage. The airplane was operated under the provisions of 14 *CFR* Part 121 as an on-demand charter flight and was destined for Washington Dulles International Airport, Dulles, Virginia.

The NTSB determined that the probable cause of this accident was the jammed condition of the airplane's right elevator, which resulted from exposure to localized, dynamic wind while the airplane was parked and rendered the airplane unable to rotate during takeoff. Contributing to the accident were (1) the effect of a large structure on the gusting surface wind at the airplane's parked location, which led to turbulent gust loads on the right elevator sufficient to jam it, even though the horizontal surface wind speed was below the certification design limit and maintenance inspection criteria for the airplane, and (2) the lack of a means to enable the flight crew to detect a jammed elevator during preflight checks for the Boeing MD-83 airplane. Contributing to the survivability of the accident was the captain's timely and appropriate decision to reject the takeoff, the check airman's disciplined adherence to standard operating procedures after the captain called for the rejected takeoff, and the dimensionally compliant runway safety area where the overrun occurred.

Safety issues identified and evaluated as part of the investigation and report included the lack of a means to enable flight crews of Boeing DC-9/MD-80 series and 717 model airplanes to verify before takeoff that the elevators are not jammed, the need for lower ground gust criteria for elevator physical inspections and operational checks by maintenance personnel for these airplanes, the lack of procedures for operators of these airplanes to monitor the wind that affects parked airplanes, the potential inadequacy of ground gust limit loads for the certification of all transport category airplanes, the lack of certain procedures for weather observers during a facility evacuation, and evacuation slide malfunction.

Safety recommendations were issued to the FAA and The Boeing Company.

Recommendations: 6 new
Report Adopted: February 14, 2019

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause.

Some of the briefs result in safety action (without the need for recommendations) by the FAA, the manufacturer, or an operator based on the information that we gather during the course of the investigation. Our investigations provide the parties with timely access to evidence essential to identifying an actionable problem and needed safety action. These briefs may be adopted by the Office Director under delegated authority or, in certain cases, may be adopted by the Board. In FY 2019, AS completed a total of 1037 delegated briefs. The below accident and incident briefs highlight some of the accidents and incidents that resulted in critical safety changes as a result of our investigation.

Engine Fire During Takeoff**September 6, 2017****Las Vegas, Nevada**

On September 6, 2017, about 12:19 a.m. local time, a Delta Air Lines Boeing 757-232, registration N686DA, equipped with two Pratt & Whitney PW2037 turbofan engines, experienced a No. 1 (left) engine undercowl fire during takeoff from McCarran International Airport (LAS), Las Vegas, Nevada. The flight crew reported a left engine fire indication and associated aural fire alert at rotation/initial climb. The crew completed the quick reference handbook procedures, declared an emergency, shut down the left engine and discharged one of the fire bottles; the fire warning momentarily was cleared. They then initiated engine-out procedures to return to LAS airport. During the downwind leg of the airplane's flight pattern, the fire warning indication re-illuminated, and the second fire bottle was discharged, which cleared the fire warning a second time. The airplane made an uneventful overweight landing at LAS and was met by aircraft rescue and firefighting (ARFF) on the runway. ARFF sprayed fire retardant into the engine and confirmed that the fire was extinguished. The airplane was cleared to taxi to the gate under its own power. There were no passengers or crew injuries reported. The flight was being operated in accordance with 14 *CFR* Part 121 and was a regularly scheduled flight from LAS to John F. Kennedy International Airport, Queens, New York.

The NTSB determined that the probable cause of this incident was a No. 1 (left) engine undercowl fire caused by a fuel nozzle installation error during engine overhaul at Delta TechOps. A fuel nozzle b-nut was cross threaded, which allowed fuel to leak on hot engine case surfaces and subsequently ignite.

As a result of this investigation, Delta Airlines updated the diffuser and combustor assembly work instruction card to add an inspector sign off requirement during the pneumatic leak check step of the fuel system assembly to avoid future installation errors.

Recommendations: None

Brief Approved: September 30, 2019

Inflight Wing Separation on Piper PA-28R Airplane**Daytona Beach, Florida****April 4, 2018**

On April 4, 2018, about 9:53 a.m. local time, a Piper PA-28R-201, N106ER, collided with

terrain following an in-flight separation of the left wing near the wing root during climb after a touch-and-go maneuver at Daytona Beach International Airport, Daytona Beach, Florida. The airline transport pilot and private pilot were fatally injured, and the airplane was destroyed. The airplane was registered to and operated by Embry-Riddle Aeronautical University under the provisions of 14 *CFR* Part 91 as an instructional flight. Day visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the local flight.

The NTSB determined that the probable cause of this accident was extensive fatigue cracking in the left-wing main spar lower cap and doublers, which resulted in the in-flight separation of the left wing. The fatigue cracks initiated and grew to a critical size due to flight and ground loads associated with flight-training involving flight-training maneuvers, significant operation at low altitudes and frequent landing cycles. Previously established inspection criteria were insufficient to detect the fatigue crack before it grew to a critical size.

As a result of this investigation, Piper developed new inspection techniques, procedures, and tools to improve inspection accuracy, and the FAA issued an airworthiness directive for inspections and for owners to report findings.

Recommendations: None

Brief Approved: September 3, 2019

Runway Excursion During Takeoff

May 31, 2018

Parkin, Arkansas

On May 31, 2018, about 11:15 a.m. local time, a Thrush Aircraft S2R-H80, N6215P, received substantial damage during a runway excursion during takeoff on runway 18 from a private airstrip near Parkin, Arkansas. The pilot was not injured. The aircraft was registered to Mid Continent Aircraft Corp and operated by Air Aids, Inc., under the provisions of 14 *CFR* Part 137 as an aerial application flight. Visual meteorological conditions prevailed for the flight, which was operated without a flight plan. The local flight was originating at the time of the accident.

The NTSB determined that the probable cause of this accident was the improper operation of the rudder pedal adjustment mechanism for an undetermined period of time, which led to the failure of the rudder pedal adjustment track, the detachment of the rudder pedal, and the pilot's subsequent inability to maintain directional control.

As a result of this investigation, the airplane manufacturer (Thrush) issued a service letter to operators detailing proper use, rigging, and maintenance of the rudder system, including the rudder pedal adjustment mechanism.

Recommendations: None

Brief Approved: May 1, 2019

Engine Fire After Touchdown
August 22, 2017
Glendale, Arizona

On August 22, 2017, about 9:04 a.m. local time, an Enstrom F-28F helicopter, N52PD, experienced smoke coming from the engine cowling area after touchdown at the Glendale Municipal Airport (GEU) Glendale, Arizona. The certified flight instructor and student pilot were not injured, and the helicopter was not damaged. The helicopter was registered to and operated by Airwest Aviation Academy LLC under the provisions of 14 *CFR* Part 91, as an instructional flight. Visual meteorological conditions prevailed, and no flight plan had been filed. The local flight departed GEU about 8:20 a.m. local time.

The NTSB determined that the probable cause of this incident was an internal failure of the turbocompressor, which resulted in oil leaking into the turbocompressor's exhaust.

As a result of this investigation, the FAA issued a safety airworthiness information bulletin to alert owners, operators, maintenance technicians, and inspectors of an airworthiness concern, specifically failure of v-band couplings used in exhaust systems on turbocharged aircraft.

Recommendations: None
Brief Approved: March 18, 2019

Loss of Engine Power During Cruise Flight
August 11, 2017
Adrian, Michigan

On August 11, 2017, about 12:00 p.m. local time, a Navion G airplane, N249KC, impacted trees after a loss of engine power near Adrian, Michigan. The flight instructor and private pilot were seriously injured and the airplane sustained substantial damage. The airplane was registered to Kalea Co. LLC and operated by Sky Walker Flying under the provisions of Title 14 *CFR* Part 91 as an instructional flight. Visual meteorological conditions prevailed at the time of the accident and a flight plan had not been filed. The local flight departed Lenawee County Airport, Adrian, Michigan, about 10:00 a.m.

The NTSB determined that the probable cause of this accident was a leak in the gascolator, which allowed air to enter the fuel system and resulted in a partial loss of engine power.

As a result of this investigation, the FAA issued an aviation maintenance alert recommending that all that Navion model airplanes complete a gascolator test found in manufacturer service bulletins and take the proper corrective action if the gascolator fails either test.

Recommendations: None
Brief Approved: March 18, 2019

**Landing Gear Collapse After Touchdown
December 4, 2016
San Antonio, Texas**

On December 04, 2016, about 2:53 p.m. local time, an Embraer ERJ170 200L, operated by SkyWest Airlines, experienced an uncommanded retraction of the nose landing gear during rollout after landing on runway 4 at the San Antonio International Airport, San Antonio, Texas (SAT). After departure from the George Bush Intercontinental Airport, Houston, Texas, the crew heard a loud "thud/pop" just aft of the flight deck. On approach to SAT, the crew declared an emergency and performed a flyby of the control tower to verify landing gear position. The tower confirmed that the gear appeared to be in the down position. After touchdown on runway 4, during the landing rollout the nose gear retracted, without command, as the aircraft slowed to a stop. The crew and passengers evacuated the aircraft from the aft cabin doors via the evacuation slides; no one was injured. The airplane sustained minor damage. The flight was conducted under the provisions of 14 *CFR* Part 121. Visual meteorological conditions prevailed and a FAA flight plan had been filed for the flight.

The NTSB determined that the probable cause of this incident was a failure of the nose landing gear down lock spring which precluded normal downlock operation of the nose landing gear. The spring failure was due to the presence of too much retained austenite which led to the formation of progressive cracking and subsequent failure of the spring.

As a result of this investigation, Embraer released a retrofit letter, in conjunction with service bulletins for the E170/175 and E190/195 fleets addressing an inspection and possible replacement of the nose landing gear downlock springs manufactured from certain material batches. An additional service bulletin addressed the main landing gear downlock springs.

Recommendations: None
Brief Approved: November 15, 2018

Domestic Investigative Workload Summarized by State

The following table summarizes statistical information on domestic accident and incident investigations initiated from October 1, 2018, through September 30, 2019. Information is provided by state or territory and by investigation type. Investigation types are defined after the table.

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
ALABAMA	0	2	8	2	2	0	14
ALASKA	1	10	22	5	53	0	91
ARIZONA	0	3	11	3	28	0	45
ARKANSAS	0	4	4	0	6	0	14
CALIFORNIA	0	24	40	3	50	2	119
COLORADO	0	2	13	3	21	0	39

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
CONNECTICUT	0	0	3	0	4	0	7
DELAWARE	0	1	0	1	0	0	2
DISTRICT OF COLUMBIA	0	0	0	0	0		0
FLORIDA	1	17	45	12	41	1	117
GEORGIA	0	9	13	3	16	1	42
HAWAII	1	1	8	0	5	0	15
IDAHO	0	3	7	1	17	0	28
ILLINOIS	0	1	8	0	13	0	22
INDIANA	0	7	8	1	8	0	24
IOWA	0	2	2	0	6	0	10
KANSAS	0	3	4	0	13	0	20
KENTUCKY	0	1	4	2	2	0	9
LOUISIANA	0	5	5	2	4	0	16
MAINE	0	1	2	0	7	0	10
MARYLAND	0	1	9	1	4	0	15
MASSACHUSETTS	0	1	1	1	2	0	5
MICHIGAN	0	4	12	1	6	0	23
MINNESOTA	0	3	4	0	6	0	13
MISSISSIPPI	0	5	6	1	0	0	12
MISSOURI	0	3	6	1	12	0	22
MONTANA	0	2	5	0	6	0	13
NEBRASKA	0	1	6	0	5	0	12
NEVADA	0	2	8	3	13	0	26
NEW HAMPSHIRE	0	0	0	0	2	0	2
NEW JERSEY	0	2	4	2	10	0	18
NEW MEXICO	0	6	6	1	9	0	22
NEW YORK	0	6	7	0	10	0	23
NORTH CAROLINA	0	6	7	2	11	0	26
NORTH DAKOTA	0	1	4	0	2	0	7
NORTHERN MARIANAS	0	0	0	0	2	0	2
OHIO	1	8	7	0	9	0	25
OKLAHOMA	0	1	7	2	6	0	16
OREGON	0	9	18	2	17	0	46
PENNSYLVANIA	0	4	10	1	13	0	28
RHODE ISLAND	0	0	1	0	0	0	1
SOUTH CAROLINA	0	0	6	2	13	0	21
SOUTH DAKOTA	0	2	5	0	4	0	11
TENNESSEE	0	2	9	2	7	0	20
TEXAS	2	21	46	3	41	0	113
US VIRGIN ISLANDS	0	0	1	0	0	0	1
UTAH	0	5	6	0	12	0	23
VERMONT	0	0	0	0	1	0	1
VIRGINIA	0	5	7	4	13	0	29

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
WASHINGTON	0	5	15	0	19	0	39
WEST VIRGINIA	0	0	2	1	2	0	5
WISCONSIN	0	2	7	0	12	1	22
WYOMING	0	1	2	0	8	0	11
Total	6	204	441	68	573	5	1,297

Major Investigation: A major investigation is a significant event, involving the launch of a team consisting of an IIC and one or more NTSB investigators or the use of significant NTSB investigative resources. These accidents typically involve loss of life, multiple injuries, considerable property damage, a new aircraft design, or significant public interest.

Field Investigation: A field investigation requires at least one NTSB investigator to travel to the accident site and conduct a follow-up investigation. Field accidents typically involve at least one fatality in an airplane that is FAA certified in the “normal” category.

Limited Investigation: This category represents NTSB investigations in which investigators do not travel to the scene. An FAA inspector documents the accident site, and an NTSB investigator conducts the remainder of the investigation from the office or during a follow-up examination. These accidents typically do not involve fatalities.

Truncated Limited Investigation: This category represents limited investigations in which the investigator receives a statement describing the circumstances of the accident, there is low public visibility and interest, there is limited potential for a safety improvement, and no need for engine or component teardowns. Because the circumstances of the accident are generally known and little follow-up investigation is required, these investigations can be completed quicker than field or limited investigations.

Data Collection Investigation: This category of investigation does not involve investigator travel and does not require significant investigative efforts. A brief report is completed for these investigations. These accidents must meet the following criteria:

- No fatalities or “critical” serious injuries.
- Statement from the pilot documenting that no mechanical malfunctions or safety issues were known.
- Lack of any obvious safety issues.
- Minimal public or industry visibility.

Incident Investigation: This category defines occurrences involving one or more aircraft in which there is a hazard or potential hazard to safety, but the event is not classified as an accident because of the degree of injury or the extent of damage, or because the circumstances of the injury or damage fall outside the definition of *aircraft accident*

contained in 49 *CFR* 830.2. Incident investigations cover a broad range of events and may include the following:

- Damage to an aircraft that does not occur while passengers are on board.
- Runway incursion.
- Pilot deviation.
- Near midair collision.
- Aircraft malfunction.

When the NTSB conducts a full investigation of an incident, we determine probable cause. We focus on those incidents that involve safety issues of high potential consequence or those of a systemic, recurring nature. An incident investigation may involve investigator travel.

International Investigations

The United States is a signatory to the Chicago Convention on International Civil Aviation, which is administered by ICAO. The NTSB is charged with fulfilling the US obligation for accident and incident investigations in accordance with Annex 13 of this agreement in full coordination with the US Department of State.

The international investigative process is critical to maintaining aviation safety in the United States and throughout the world. When an aircraft operated by—or designed, manufactured, or registered to—a US company has been involved in an accident in a foreign state, NTSB participation in that investigation enables the United States to ensure the airworthiness and operation of its aircraft operated in this country as well as overseas. ICAO Annex 13 protocols also define the agency’s engagement with international authorities whose products or operations are involved in accidents within the United States. This international process of collaboration plays an important role in enabling us to identify safety concerns and issue appropriate recommendations. We have issued numerous safety recommendations that have resulted in safety improvements worldwide directly because of our participation in these foreign investigations.

In FY 2019, AS was notified of and assisted on 324 international investigations. Of these, investigators launched or traveled in support of 12 investigations. Several accidents, including these, required significant US involvement:

- On March 10, 2019, Ethiopian Airlines flight 302, a Boeing 737MAX, crashed shortly after takeoff from Addis Ababa Bole International Airport, Addis Ababa, Ethiopia. All 157 passengers and flight crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Ethiopian Civil Aviation Authority. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.

- On December 24, 2018, an Agusta 109S helicopter crashed about 8 minutes after takeoff from a private residence in Puebla, Mexico. The 2 pilots and 3 passengers onboard were fatally injured and the helicopter was destroyed. The accident is being investigated by the Mexican Directorate General of Civil Aviation (DGAC). At the request of the Mexican DGAC and the US State Department, the NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 to support the investigation.
- On November 9, 2018, Fly Jamaica Airways flight 256, a Boeing 757, overran the runway during landing at Georgetown-Cheddi Jagan International Airport, Georgetown, Guyana. Of the 128 passengers and crew onboard, 1 passenger was fatally injured and 5 others received minor injuries; the airplane was substantially damaged. The accident is being investigated by the government of Guyana. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.
- On October 29, 2018, Lion Air flight 610, a Boeing 737MAX, crashed into the sea shortly after takeoff from Jakarta-Soekarno-Hatta International Airport, Jakarta, Indonesia. All 189 passengers and crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Indonesia Komite Nasional Keselamatan Transportasi. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.

US Comments/Foreign Accident Reports

The NTSB completed comments on behalf of the United States on several international investigations in which the United States had significant involvement under Annex 13, in FY 2019. As a result, the Major Investigations Division provided comments on 21 foreign-led late-draft reports in FY 2019, including these:

**Boeing 737MAX
Jakarta, Indonesia
October 29, 2018**

On October 29, 2018, Lion Air flight 610, a Boeing 737MAX, crashed into the sea shortly after takeoff from Jakarta-Soekarno-Hatta International Airport, Jakarta, Indonesia. All 189 passengers and crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Indonesia Komite Nasional Keselamatan Transportasi. The NTSB US-accredited representative and technical advisors provided comments on a draft of the report in September 2019; the report was published in October 2019.

**Boeing 737, Russia
Rostov-on-Don Airport, Rostov-on-Don, Russia
March 19, 2016**

On March 19, 2016, Fly Dubai flight FZ981, a Boeing 737-800, crashed on the runway during a go around. The airplane was destroyed, and all 62 passengers and crew members onboard were fatally injured. The accident was investigated by the Korean Aviation and Railway Accident Investigation Board. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in February 2019. The report was published in November 2019.

**Boeing MD-11, South Korea
Incheon International Airport, Incheon, South Korea
June 6, 2016**

On June 6, 2016, UPS flight 61, a Boeing MD-11, N77UP, crashed during a high-speed rejected takeoff. The airplane was substantially damaged, and none of the 4 crew members onboard were injured. The accident was investigated by the Korean Aviation and Railway Accident Investigation Board. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in May 2019. The report was published in July 2019.

**Boeing 737, Peru
Jauja Airport, Jauja, Peru
March 28, 2017**

On March 28, 2017, Peruvian Air Line flight 112, a B737-300, crashed during landing. The airplane was substantially damaged, and none of the 150 passengers and crew members onboard were injured. The accident was investigated by the Peru Comisión de Investigación de Accidentes de Aviación. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in February 2019.

**Boeing 737, Cuba
Havana-José Martí International Airport, Havana, Cuba
May 18, 2018**

On May 18, 2018, Cubana de Aviación flight 972, a Boeing 737-200, crashed shortly after takeoff. The airplane was destroyed, and 112 of the 113 crew and passengers onboard were fatally injured. The accident was investigated by the Cuba Instituto de Aeronáutica Civil. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in March 2019. The report was published in May 2019.

Investigative Hearings

Investigative hearings are public hearings related to investigations in which the agency is authorized to obtain testimony under oath.

**CFM International Engine Failure on Southwest Airlines flight 1380, April 17, 2018
Investigative Hearing**

November 14, 2018

The one-day hearing focused on CFM International CFM56-7 series engine fan blade design, development, and inspection methods and procedures, as well as engine containment design and certification criteria.

Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations outside of a final report or brief. Safety recommendation reports, which may be issued at any time during an accident investigation, are used to make safety recommendations on such issues. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation is designated “Urgent.”

Assumptions Used in the Safety Assessment Process and the Effects of Multiple Alerts and Indications on Pilot Performance

These recommendations were derived from our participation in the ongoing investigations of two fatal accidents under the provisions of Annex 13 of the International Civil Aviation Organization. As the accident investigation authority for the state of design and manufacture of the airplane in these accidents, the NTSB has been examining the US design certification process used to approve the original design of the Maneuvering Characteristics Augmentation System (MCAS) on the Boeing Company (Boeing) 737MAX. We note that, since the PT Lion Mentari Airlines (Lion Air) accident on October 29, 2018, Boeing has developed a MCAS software update to provide additional layers of protection and is working on updated procedures and training. However, we are concerned that the process used to evaluate the original design needs improvement because that process is still in use to certify current and future aircraft and system designs.

Recommendations: 7 new

Report Adopted: September 19, 2019

Extended Duration Cockpit Voice Recorders

The NTSB has longstanding concerns about the availability of cockpit voice recorder (CVR) information following events that meet the reporting criteria of 49 *CFR* 830.5 and believes that 25-hour CVRs would be valuable to our investigations. Our ongoing experience with overwritten CVR recordings demonstrates the limitations of the current 2-hour recording requirement, particularly in cases in which relevant data were overwritten because of (1) a delay in reporting a safety event that was not immediately recognized to be of a serious nature until further data review; (2) a failure to immediately deactivate the CVR following arrival after a safety event; or (3) the time remaining in the flight after a

safety event, which exceeded the CVR's 2-hour recording duration. Safety recommendations were issued to the FAA.

Recommendations: 2 new
Report Adopted: October 2, 2018

Safety Alerts

Safety alerts are brief information sheets that pinpoint a specific safety issue. They are primarily used to alert the general aviation community, which may not otherwise be reached through safety recommendations, of safety issues identified during multiple investigations. Safety alerts provide information on the problem, examples of accidents, what pilots can do to avoid making the same mistakes, and references for pilots to find additional information. These alerts are posted on the NTSB website, and brochures are distributed at outreach events that staff attends throughout the year. This fiscal year, AS developed two safety alerts:

Fuel Providers: Prevent DEF Jet Fuel Contamination Diesel exhaust fluid (DEF) is a urea-based chemical that is added to ground vehicle emissions systems to reduce nitrogen oxide emissions. DEF is not designed, nor approved, for use in jet fuel. If it is inadvertently added to jet fuel, as has happened in several incidents over the last two years, DEF will react with certain chemical components to form crystalline deposits in the fuel system. The crystalline deposits can then accumulate on filters, engine fuel nozzles, and fuel metering components and result in a loss of engine power. (Adopted: July 2019)

Stabilized Approaches Lead to Safe Landings Failing to establish and maintain a stabilized approach, or continuing an unstabilized approach, could lead to landing too fast or too far down the runway, potentially resulting in a runway excursion, loss of control, or collision with terrain. Regardless of the type of aircraft, the level of pilot experience, or whether the flight is being conducted under instrument flight rules or visual flight rules, a stabilized approach is key to maintaining control of the aircraft and ensuring a safe landing. (Adopted: March 2019)

Other Efforts and Focus Areas

NTSB Most Wanted List Roundtable: Alaska Part 135 Operations – Charting a Safer Course September 6, 2019

The NTSB continues to investigate multiple accidents involving Part 135 flight operations in Alaska each year. Since 2008, we have investigated 182 accidents involving fixed-wing scheduled/non-scheduled Part 135 operations in Alaska, resulting in 74 fatalities. Unique terrain conditions, challenging weather, and congested airspace are factors, but the NTSB believes many of these accidents could have been avoided if operators had implemented safety management systems, installed flight data monitoring devices, and ensured that pilots received comprehensive controlled-flight into terrain avoidance training—all the subject of recommendations we have issued in the last few decades. The FAA does not

require Part 135 flight operators to meet the same safety requirements as airlines. If the FAA and industry do not address these safety gaps, we will undoubtedly see more accidents involving the traveling public in Alaska.

**Forum Presentation Series: Raise the Bar of Your Safety Culture
NTSB at Experimental Aircraft Association Airventure
July 22-28, 2019**

A contingent of NTSB aviation investigators, researchers, recorder specialists, and safety advocates presented and exhibited at one of the general aviation industry's largest aviation air shows in the world. As part of the NTSB Forum Presentation Series, we discussed all the ways general aviation pilots can "Raise the Bar of Your Safety Culture." We teamed up with plane crash survivors who told their stories of survival and lessons learned. Presenters also discussed the latest items on our Most Wanted List that address general aviation safety.

Aviation Report Timeliness Project

AS has initiated the Aviation Report Timeliness Project (ARTP) to improve the efficiency of our regional investigations using structured, data-driven management techniques and the implementation of incremental process changes. The ARTP objective is to streamline existing procedures to improve timeliness while maintaining or improving quality. The team is evaluating our current investigation process using data to identify barriers to timeliness as well as to establish standards and guidance needed for quality reports. Areas of evaluations include case distribution and complexity, scope of investigations, report review, project management, remote workforce management and opportunities, and human capital. By the end of calendar year 2019, the team will develop actionable items that will be implemented in all the regions in FY 2020 and we will monitor the implementation and evaluate the success of these changes.

Unmanned Aircraft Program

AS has continued to expand the two-pronged unmanned aircraft (drones) program. One prong is investigations, which has expanded the knowledge base and investigator training to effectively and comprehensively investigate accidents and incidents involving unmanned aircraft. The other prong is operations, which uses sUAS and advanced photogrammetry and geographic information system (GIS) image processing to document accident sites in support of all modes.

Under investigations, we have issued guidance to investigators on conducting examinations of unmanned aircraft spanning the spectrum of capability, from small quadcopter commercial operations to the latest technology, which includes drone delivery services. For example, AS investigators have been coordinating with Amazon and were aware of their drone delivery operations in advance of Amazon's announcement of their related plans. AS is well prepared to investigate any event involving modern unmanned technology, such as our June 2019 response to the crash of an urban air mobility prototype aircraft in Virginia.

Under operations, we have been supporting accident investigations for over 3 years and reached full operational capability in the fall of 2018 after receiving the authority for aircraft acquisition. The drone flight operations and the associated image processing have provided numerous investigations with greatly improved data that is quick to obtain, more accurate, and easier to visualize. In addition to highly detailed and accurate accident site diagram maps created on-scene, drone-based imagery can improve site safety by allowing investigators to examine hazardous areas from afar, or to aid in the search for missing wreckage without engaging in potentially dangerous foot searches. For example, drone data was used to document the wreckage layout of the Atlas Air B767 crash in Baytown, Texas; to provide a GIS road slope analysis for the Schoharie, New York, limousine accident; and to conduct a full three-dimensional examination of proximity and sightlines on an accident involving a powerline patrol helicopter.

The AS unmanned aircraft program will continue to keep up with this extremely dynamic and explosively growing segment of aviation by investigating significant accidents and incidents and growing in our knowledge of the industry. We will also maintain our leadership position in flight operations by conducting multimodal accident site documentation using drones, and we will continue to train and demonstrate proficiency well beyond FAA requirements by using the training standards established by the leading unmanned aircraft association. The NTSB unmanned aircraft program is a gold standard for government and industry, with staff members serving on numerous safety groups.

**Safety Seminar: Inspection Authorization Renewal
March 2, 2019**

This seminar provided mechanics the opportunity to renew their inspection authorization and encouraged attendees to analyze and evaluate the information to become more informed mechanics and inspectors. Current NTSB investigators and other staff presented accident case studies involving maintenance issues to provide attendees the opportunity to learn from these often-tragic events. Presentations also addressed current technology and best practices and procedures for mechanics and inspectors.

**Safety Seminar: Night Flying
December 15, 2018**

This seminar explored the benefits and risks of night flying, some of the causes of night flying accidents, and resources available to the pilot community. NTSB investigators shared how they investigate accidents and the lessons learned from these accident investigations. A guest speaker discussed the operational hazards, physical limitations, and regulations that govern night flying.

Ongoing Significant Aviation Accident and Incident Investigations

Location	Date	Description	Fatalities
Big Grand Cay, Bahamas	7/4/2019	Crash after takeoff	7
Mokuleia, HI	6/21/2019	Crash after takeoff	11
Addison, TX	6/10/2019	Crash after takeoff	10
Ketchikan, AK	5/13/2019	Mid-air collision between air tour planes	6
Jacksonville, FL	5/3/2019	Runway overrun during thunderstorm	0
Trinity Bay, TX	2/23/2019	Cargo airplane loss of control	3
Zaleski, OH	1/29/2019	Helicopter EMS weather encounter	3
Philadelphia, PA	4/17/2018	B737 uncontained engine failure	1
New York, NY	3/11/2018	Helicopter impact with water and rollover	5

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief upon the completion of each investigation.

HIGHWAY SAFETY

	(\$000s)	FTEs
FY 2020 Estimate	\$7,619	29
FY 2021 Request	\$8,172	30
Increase/Decrease	\$553	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Highway Safety (HS) investigates accidents that have significant safety implications nationwide, highlight national safety issues, involve a large loss of life, or generate high interest because of their circumstances. Such accidents may include collapses of highway/pedestrian bridges or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), and collisions at highway–railroad grade crossings. HS also investigates accidents that involve new safety issues or technologies (such as automated vehicles and alternatively fueled vehicles) and develops special reports based on trends emerging from NTSB investigations and from research and data that identify common risks or underlying causes of crashes, injuries, and fatalities.

The NTSB is the only organization that performs independent, comprehensive, and transparent multidisciplinary investigations to determine the probable causes of highway accidents, with the goal of making recommendations to prevent similar accidents. Our investigations result in recommendations that, if implemented, reduce or eliminate the risks identified in the investigations and provide policymakers with unbiased analysis.

HS comprises the Investigations Division and the Report Development Division.

Investigations Division

The HS Investigations Division manages the multidisciplinary go-teams launched to accident sites to collect the factual, and develop the analytical, information for investigations. Currently, major HS accident investigations are conducted by one of three teams, with six investigators on each team: an IIC and five other investigators with expertise in vehicle, highway, human performance, survival, and motor carrier factors. The teams are supported by a crash reconstructionist and a National Resource specialist, for a

total of 20 investigators. To enhance geographic coverage and reduce response time, team members are located throughout the country, including in California, Colorado, Delaware, Oregon, South Carolina, Tennessee, Texas, Washington, and Washington, DC.

HS staff is augmented by personnel from other NTSB offices who provide expertise in vehicle simulations, medical issues, occupant protection, fire science, metallurgy/materials, hazardous materials, statistical data analysis, video analysis, communications (accident notification), public/government/family affairs, legal issues, and recommendation follow-up.

Report Development Division

The HS Report Development Division manages the development of accident investigation reports. Project managers and technical writer-editors review the contents of the docket provided by the investigators for accuracy and completeness; research, analyze, and develop national highway safety issues based on this investigative information; and write and edit the report. This division is also responsible for managing investigative hearings and forums on national highway safety issues.

Accomplishments and Ongoing Efforts

This office's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

School Bus Run-Off-Road and Fire

Oakland, Iowa

December 12, 2017

On the morning of December 12, 2017, around 6:50 a.m. local time, a school bus operated by the Riverside Community School District backed into a ditch on a rural road outside Oakland, Iowa, after picking up its first passenger, a 16-year-old female student. While the driver tried to drive the bus out of the ditch, a fire began in the engine compartment and spread throughout the bus. The driver and passenger died in the fire.

The NTSB determined that the probable cause of the of the fatal school bus run-off-road and fire in Oakland, Iowa, was (1) the driver's failure to control the bus, backing it into a roadside ditch for reasons that could not be established; and (2) the failure of the Riverside Community School District to provide adequate oversight by allowing a driver to operate a school bus with a known physical impairment that limited his ability to perform emergency duties. The probable cause of the fire was ignition of a fuel source on the exterior of the engine's turbocharger due to turbocharger overload and heat production,

resulting from the blockage of the exhaust pipe by the bus's position in the ditch and the driver's attempts to accelerate out of the ditch. Contributing to the severity of the fire was the spread of flames, heat, and toxic gases from the engine into the passenger compartment through an incomplete firewall.

Safety issues addressed included school bus driver fitness for duty, school bus fire safety, and school bus emergency training.

As a result of the investigation, the NTSB made safety recommendations to the USDOT; the NHTSA; 44 states (including Iowa), the District of Columbia, and the territory of Puerto Rico; the state of Iowa; the Riverside Community School District; the National Association of State Directors of Pupil Transportation Services, the National Association for Pupil Transportation, and the National School Transportation Association; and school bus manufacturers Blue Bird Corporation, Collins Industries, Inc., IC Bus, Starcraft Bus, Thomas Built Buses, Inc., Trans Tech, and Van-Con, Inc. The report also reiterates one recommendation to NHTSA and reclassifies a previously issued recommendation to the three school transportation associations.

Recommendations: 10 new, 1 reiterated
Report Adopted: June 18, 2019

**Motorcoach Run-Off-the-Road and Overturn
Laredo, Texas
May 14, 2016**

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, and, as it moved through the curve, it drifted from its lane to the left. The driver reacted by steering to the right and applying the brakes, which resulted in a loss of control; the vehicle slid and yawed clockwise, departed the right side of the highway, entered the earthen right-of-way, and overturned onto its left side. Nine passengers died, 36 passengers experienced minor-to-serious injuries, and the motorcoach driver and trip coordinator suffered minor injuries. The injury severity for five passengers could not be determined.

The NTSB determined that the probable cause of the crash was the driver's failure to maintain the motorcoach fully within the northbound travel lane, due to a combination of fatigue from an acute sleep deficit and blurred distance vision due to hyperglycemia resulting from poorly controlled diabetes; then, as the motorcoach drifted left from the travel lane, the driver abruptly steered to the right and braked, causing the vehicle to leave the highway and roll over. Contributing to the driver's inability to regain control of the motorcoach was the low friction value of the wet pavement and the inoperable antilock braking system. Contributing to the severity of the passenger injuries was the failure of the left side passenger windows to keep passengers within the motorcoach.

The crash investigation focused on safety issues addressing inadequate federal oversight and guidance for commercial drivers with diabetes treated without insulin, inaccurate and

incomplete highway maintenance recordkeeping by the Texas DOT , the need for improved training for the department’s maintenance workers to ensure that roadway maintenance operations result in acceptable levels of surface friction, and the need for increased motorcoach crashworthiness through improvements to window glazing and retention.

New safety recommendations were issued to the Federal Motor Carrier Safety Administration (FMCSA) and the Texas Department of Transportation. Safety recommendations were reiterated to the Federal Motor Carrier Safety Administration and the NHTSA.

Recommendations: 5 new, 3 reiterated

Report Adopted: November 7, 2018

**Pickup Truck Centerline Crossover Collision With Medium-Size Bus on US Highway 83
Concan, Texas
March 29, 2017**

On March 29, 2017, about 12:20 p.m. local time, a 2007 Dodge Ram 3500 pickup truck, occupied by a 20-year-old driver, was traveling north on US Highway 83, near Concan, Texas, when it crossed into the southbound lane and collided with a medium-size bus. The crash occurred near milepost 553.4, near the end of a right-hand curve. The 2004 Ford E350 Turtle Top Van Terra medium-size bus was occupied by a 66-year-old driver and 13 passengers and operated by the First Baptist Church of New Braunfels, Texas. As a result of the crash, the bus driver and 12 passengers were fatally injured. The driver of the truck and one bus passenger were seriously injured.

The NTSB determined that the probable cause of the crash was the failure of the pickup truck driver to control his vehicle due to impairment from his use of marijuana in combination with misuse of a prescribed medication, clonazepam. Contributing to the severity of the injuries was the insufficient occupant protection provided by the lap belts worn by passengers seated in the rear of the medium-size bus.

The key safety issues addressed during this investigation included drug-impaired driving and medium-size bus seat belts systems.

The NTSB made new safety recommendations to NHTSA, the state of Texas, the Texas Department of Transportation, several medium-size bus manufacturers, and two seat manufacturers. The NTSB also reiterated one safety recommendation to NHTSA.

Recommendations: 8 new, 1 reiterated

Report Adopted: October 16, 2018

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These

briefs may be adopted by the Office Director under delegated authority or may be adopted by the Board.

**Rear-End Collision Between a Car Operating with Advanced Driver Assistance Systems and a Stationary Fire Truck
Culver City, California
January 22, 2018**

On January 22, 2018 at about 8:40 a.m. local time, a 2014 Tesla Model S P85 car was traveling in the high-occupancy vehicle (HOV) lane of southbound I-405 in Culver City, California. The Tesla was behind another vehicle. Because of a collision in the northbound freeway lanes that had happened about 25 minutes earlier, a California Highway Patrol (CHP) vehicle was parked on the left shoulder of southbound I-405, and a Culver City Fire Department truck was parked diagonally across the southbound HOV lane. The emergency lights were active on both the CHP vehicle and the fire truck. When the vehicle ahead of the Tesla changed lanes to the right to go around the fire truck, the Tesla remained in the HOV lane, accelerated, and struck the rear of the fire truck at a recorded speed of about 31 miles per hour (mph). At the time of the crash, the fire truck was unoccupied. The Tesla driver did not report any injuries. The car was equipped with advanced driver assistance systems (ADAS), including Autopilot. Based on the driver's statements and on performance data downloaded from the car after the crash, the Autopilot was engaged at the time of the collision.

The NTSB determined that the probable cause of the Culver City, California, rear-end crash was the Tesla driver's lack of response to the stationary fire truck in his travel lane, due to inattention and overreliance on the vehicle's ADAS; the Tesla's Autopilot design, which permitted the driver to disengage from the driving task; and the driver's use of the system in ways inconsistent with guidance and warnings from the manufacturer.

The safety issues addressed during this investigation included overreliance on vehicle automation and collision avoidance.

Recommendations: None
Brief Adopted: August 22, 2019

**Low-Speed Collision Between Truck-Tractor and Autonomous Shuttle
Las Vegas, Nevada
November 8, 2017**

On November 8, 2017, at about 12:07 p.m. local time, a minor collision occurred on South 6th Street in downtown Las Vegas, Clark County, Nevada, between a truck-tractor combination vehicle, operated by a 48-year-old driver, and a 2017 Navya Arma autonomous shuttle, carrying 7 passengers and a 38-year-old attendant. None of the vehicle occupants were injured in the crash. The shuttle, manufactured by Navya and operated by Keolis North America, was on a 0.6-mile designated loop beginning and ending at a downtown shopping center known as Container Park (the buildings are repurposed shipping containers or modular cubes). The combination vehicle, a 2006 International

truck-tractor pulling a 2010 Utility refrigerated trailer, was backing into an alley west of South 6th Street while on a delivery route for US Foods when it struck the shuttle.

The NTSB determined that the probable cause of the collision between the truck-tractor and the autonomously operated shuttle in Las Vegas, Nevada, was the truck driver's action of backing into an alley, and his expectation that the shuttle would stop at a sufficient distance from his vehicle to allow him to complete his backup maneuver. Contributing to the cause of the collision was the attendant's inability to take manual control of the vehicle in an emergency.

The safety issues addressed during this investigation included truck driver licensing and experience, visibility and driver expectations, and autonomous shuttle operation.

Recommendations: None

Brief Adopted: July 8, 2019

Motorcoach Roadway Departure and Crash into Ravine Loxley, Alabama March 12, 2018

About 5:28 a.m. local time on March 13, 2018, a 2018 Prevost 56-passenger motorcoach, occupied by a 65-year-old male driver and 46 passengers, was traveling westbound on Interstate 10 (I-10), a four-lane highway divided by an earthen center median at the crash location in Baldwin County near Loxley, Alabama. The motorcoach was one of a two-coach chartered tour operated by First Class Tours & Charters of Houston, Texas, transporting students from Channelview High School to Houston following a trip to Disney World in Orlando, Florida. The crash event began when the 2018 Prevost motorcoach departed the westbound lanes, crossed the center median, and traveled across the two opposing eastbound travel lanes and onto the shoulder, striking the guardrail adjacent to the south shoulder of the roadway. The guardrail redirected the motorcoach, which then crossed the eastbound travel lanes in the opposite direction, returning to the center median. While traveling in the median the motorcoach fell into a ravine, which was spanned by two separate bridges for the eastbound and westbound I-10 roadways. At the bottom of the ravine, the motorcoach came to rest on its passenger side with its roof wedged against a vertical bridge support. As a result of the crash, the motorcoach driver received fatal injuries, and all 46 motorcoach passengers were injured; 15 passengers sustained serious injuries and 31 passengers sustained minor injuries.

The NTSB determined that the probable cause of the crash was the incapacitation of the driver due to an unknown medical event.

Recommendations: None

Brief Adopted: May 10, 2019

**Motorcycle and Pickup Truck Crash During “Toy Run” Group Ride
Augusta, Maine
September 10, 2017**

About noon local time on September 10, 2017, an estimated 3,000 motorcyclists gathered at the Augusta Civic Center in Augusta, Kennebec County, Maine, to participate in the 36th annual United Bikers of Maine (UBM) Toy Run, a charity event in which motorcyclists join in a group ride, bringing a toy to the gathering. About 12:05 p.m., a 2007 Harley-Davidson XL 1200 motorcycle participating in the group ride suddenly moved out of the right lane, traveled across the center lane, and entered the left lane in front of a 2008 Ford F250 pickup truck traveling north on I-95 occupied by a 67-year-old male driver and a 99-year-old female passenger. The motorcycle was carrying a 25-year-old male operator and a 26-year-old female passenger. Based on skid mark evidence, the pickup truck driver attempted an evasive maneuver but collided with the motorcycle, losing control of his vehicle, in part because the pickup truck had “collected” the Harley-Davidson XL 1200 motorcycle, causing the pickup truck to rotate clockwise. The pickup truck veered out of the left lane to the right and traveled across the center and right northbound lanes, striking four other motorcycles. The pickup truck then went through the right guardrail, overturned, and came to rest on its passenger side. The 2007 Harley-Davidson motorcycle traveled through the guardrail and came to rest on its right side in a ditch beside the pickup truck. As a result of the crash, two motorcyclists died. One motorcyclist and the pickup truck passenger received serious injuries. The pickup truck driver and four motorcyclists received minor injuries.

The NTSB determined that the probable cause of the crash was the motorcycle operator’s unsafe maneuver in moving in front of the pickup truck. Contributing to this crash was the failure of the city of Augusta Police Department and the Toy Run event organizer, UBM, to identify and mitigate the risks associated with routing a group ride onto an interstate without providing supplemental traffic control or state police oversight.

The key safety issue identified was the safe planning for the routing of special events on streets and highways.

Two new recommendations were issued to the city of Augusta, Maine, and the UBM.

Recommendations: 2 new
Report Adopted: April 3, 2019

**Collision Between Passenger Train and Refuse Truck at Active Grade Crossing
Crozet, Virginia
January 31, 2018**

On January 31, 2018, about 11:16 a.m. local time, a 2018 Freightliner refuse truck operated by Time Disposal, LLC, was traveling south on Lane town Road near Crozet, Virginia. The truck was occupied by a 30-year-old driver and two passengers, who were en route to help another crew collect refuse. The truck’s route required traversing a highway–railroad grade crossing on Lanetown Road, at railroad milepost 195.85 of the Buckingham Branch

Railroad. The grade crossing is located on a curved segment of the track and is equipped with an active warning system consisting of flashing warning lights, bells, and gate arms that lower at a train's approach. The crash resulted in the death of one truck passenger, serious injuries to the second passenger, and minor injuries to the truck driver. Four train crew members and three train passengers sustained minor injuries.

The NTSB determined that the probable cause of the crash was the truck driver's decision to enter an active grade crossing and his inaction when he encountered obstacles while attempting to cross the railroad tracks, most likely due to his impairment from the combined effects of the drugs marijuana and gabapentin. Contributing to the severity of the injuries was the lack of seat belt use by the truck occupants.

Recommendations: None

Brief Adopted: March 11, 2019

Intersection Collision and Rollover Involving School Bus and Pickup Truck

Helena, Montana

November 27, 2017

About 7:13 a.m. local time on November 27, 2017, a 2011 Chevrolet Express 12-passenger school bus, equipped with passenger lap/shoulder belts and operated by First Student, Inc., was traveling east on John G. Mine Road, near Helena, Montana, when the driver stopped at Green Meadow Drive before proceeding into the intersection, where the bus was struck by a 1998 Dodge Ram 1500 pickup truck. The bus was occupied by the driver, an adult aide, and two student passengers. The pickup truck—occupied by the driver and one passenger—was towing a flatbed equipment trailer and traveling south on Green Meadow Drive, on which traffic was not controlled by a stop sign. All vehicle occupants transported themselves to medical facilities, where four persons were treated for minor injuries. The pickup truck driver and one additional bus occupant complained of minor pain, but no records of treatment were found.

The NTSB determined that the probable cause of the collision was the bus driver's failure to see the pickup truck, which was approaching the intersection, and the acceleration of the bus into the intersection in front of the pickup truck. The use of passenger lap/shoulder belts mitigated the severity of injuries to the school bus occupants.

The report addressed school bus passenger lap/shoulder belt use and evacuation.

Recommendations: None

Brief Adopted: February 13, 2019

Intersection Collision Involving Motorcoach and Transit Bus

Flushing, New York

September 18, 2017

On September 18, 2017, about 6:16 a.m. local time, a 2015 Motor Coach Industries 56-passenger motorcoach, operated by Dahlia Group Inc. and occupied only by the driver,

collided with a 2015 New Flyer 35-passenger transit bus, operated by the New York City Transit (NYCT) Authority and occupied by the driver and 16 passengers, in Flushing, New York. The crash occurred at the intersection of Northern Boulevard (New York State Route 25A) and Main Street, about 0.8 mile from the motorcoach carrier's base of operations. The motorcoach was traveling 60–61 mph when it struck the left rear side of the transit bus, causing the transit bus to rotate 120 degrees counterclockwise and then strike two cars parked along the right curb of Northern Boulevard. One of the parked vehicles was unoccupied; the other was occupied by a driver and a front passenger. The motorcoach then departed the south side of Northern Boulevard; crossed over the sidewalk; and struck a building on the southeast corner of the intersection, where it came to rest. Three pedestrians were on the sidewalk at the time of the collision, one of whom ran out of the way. The motorcoach driver, one passenger on the transit bus, and one pedestrian died. The transit bus driver and five bus passengers were seriously injured, and 10 bus passengers received minor or no injuries. One pedestrian and the two occupants of the parked car were also injured.

The NTSB determined that the probable cause of the crash was the driver's unintended acceleration of the motorcoach and inability to brake for reasons that could not be conclusively determined from the information available.

Recommendations: None

Brief Adopted: February 11, 2019

**Fatal Pedestrian Collision with Minivan
Thief River Falls, Minnesota
October 6, 2016**

About 7:00 a.m. local time on October 6, 2016, a school bus was coming to a stop southbound on State Highway 59 about 10 miles south of Thief River Falls, Pennington County, Minnesota. The bus was occupied by the driver and about 12 student passengers, who were on their way to Challenger Elementary School in Thief River Falls. The bus had been traveling north, but the driver missed a scheduled stop and turned around to pick up a 7-year-old boy and his two siblings (ages 13 and 11) who were waiting on the east side of the highway (ordinarily, the boarding side for their bus). At the same time, a 69-year-old female was driving a minivan north on the highway. As the school bus was coming to a stop and activating its flashing yellow lights, the 7-year-old started across the highway toward the bus and crossed in front of the minivan, which struck him. The pedestrian was fatally injured. The minivan driver and the pedestrian's two siblings were not injured.

The NTSB determined that the probable cause of the crash was a combination of the pedestrian running across the highway travel lane in the path of the oncoming minivan; the minivan driver's speed; and the low-light conditions, which would have limited the minivan driver's ability to see the pedestrian. Further contributing to the crash was the bus driver's failure to pick the students up at their designated stop.

Pedestrian safety and conspicuity were safety issues addressed in this report.

One new safety recommendation was issued to the NHTSA.

Recommendations: 1 new
Brief Adopted: October 17, 2018

Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations outside of a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation is designated “Urgent.”

Providing Occupant Protection for Limousine Passengers

The NTSB is investigating a collision involving a 2001 Ford Excursion stretch limousine, a 2015 Toyota Highlander sport utility vehicle (SUV), and two pedestrians that occurred in Schoharie, New York, on October 6, 2018. The limo driver, all 17 limo passengers, and two pedestrians received fatal injuries in the crash. In the course of our investigation, we have identified safety issues related to occupant protection, including the integrity of limousine seat and seat belt systems and the accessibility and use of seat belts by limousine passengers.

The NTSB will issue a final accident report at the completion of the Schoharie investigation, which will include the probable cause of the crash.

The key safety issue addressed in this safety recommendation report concerns occupant protection for limousine passengers. As a result of the investigation, the NTSB made safety recommendations to the NHTSA, to the New York State Department of Transportation, and to the National Limousine Association. In addition, the NTSB reiterated one recommendation to the state of New York.

Recommendations: 4 new, 1 reiterated
Report Adopted: September 13, 2019

Addressing Systemic Problems Related to the Timely Repair of Traffic Safety Hardware in California

The NTSB is investigating a fatal collision between a (SUV) and a previously damaged and nonoperational crash attenuator in Mountain View, California, on March 23, 2018. The driver and only occupant of the SUV was fatally injured in the crash. In the course of the investigation, we identified systemic problems within the California Department of Transportation that negatively affect the timely repair of traffic safety hardware.

The NTSB will issue a final accident report at the completion of the Mountain View investigation, which will include the probable cause of the crash.

The key safety issue addressed in this safety recommendation report concerns the timely repair of traffic safety hardware in California.

As a result of the investigation, the NTSB made one safety recommendation to the California State Transportation Agency.

Recommendations: 1 new
Report Adopted: August 12, 2019

Other Efforts and Focus Areas

Automated Vehicle Technologies

Automated vehicle systems and ADAS are on the nation's roadways today. We are investigating a variety of crashes to better understand these systems, their capabilities, and the associated data recorded during a crash. Further, we are focusing on developing staff for the complexity of automated vehicle technologies. In addition, we are working to enhance staff's technical capabilities to analyze systems data collected from automated vehicles.

Alternatively Fueled Vehicles

Electric vehicles, hydrogen fueled vehicles, and hybrid vehicles all operate on our roadways. These pose challenges to emergency responders and tow operators when a postcrash fire ensues. A greater understanding of these advanced systems is critical to transportation safety. The NTSB is focusing effort on investigating multiple electric vehicle crashes that have resulted in postcrash fires. The NTSB is further exploring recommendations to improve the outcome for these unique scenarios.

Ongoing Significant Highway Accident Investigations

Location	Date	Description	Fatalities
Bryce Canyon City, UT	9/20/2019	A medium size bus departed the roadway and as the driver attempted to regain control the vehicle rolled over.	4
SeaTac, WA	7/25/2019	A BMW passenger car crossed over a raised median and collided with a shuttle bus traveling in the opposite direction.	1

Location	Date	Description	Fatalities
Randolph, NH	6/21/2019	A pick-up truck towing a trailer collided with a group of motorcyclists on a two-lane highway.	7
Scooba, MS	6/3/2019	A box truck and a 15-passenger van traveling on a two-lane state highway each crossed the centerline and collided.	8
Delray Beach, FL	3/1/2019	A Tesla passenger vehicle collided with a combination vehicle at an intersection. The driver of the Tesla was killed as a result of the crash.	1
Alachua (Gainesville), FL	1/3/2019	A truck tractor crossed the center median of Interstate 75 and collided with a church van and another combination vehicle. Both CMV drivers and five occupants of the church van were fatally injured.	7
Rochester, IN	10/30/2018	Four children crossing a high-speed roadway to board a school bus were struck by a pickup truck. Three of the children died as a result of the collision.	3
Schoharie, NY	10/6/2018	A limousine occupied by a driver and 17-passengers drove through a T-intersection and collided with a parked car in a parking lot. Two pedestrians and all 18 occupants in the limousine were killed.	20
Thoreau, NM	8/30/2018	An eastbound truck tractor crossed the center median of Interstate 40 and collided with a motorcoach on the westbound side of the highway. Five occupants of the motor coach were fatally injured.	5
Boise, ID	6/16/2018	Multi-vehicle crash in a highway work-zone resulting in 4 fatalities.	4
Fort Lauderdale, FL	05/08/2018	An electric powered passenger car crashed into a wall resulting in a postcrash fire.	2
Mountain View, CA	3/23/2018	Following a crash into a previously damaged crash attenuator, an electric vehicle caught fire.	1
Tempe, AZ	3/18/2018	An Uber Technologies, Inc. test vehicle, based on a modified 2017 Volvo XC90 and operating with a self-driving system in computer control mode, struck a pedestrian.	1
Miami, FL	3/15/2018	An elevated pedestrian walkway collapsed onto several vehicles resulting in fatalities and injuries to vehicle occupants.	6

Location	Date	Description	Fatalities
Elmhurst, IL	3/1/2018	Six vehicles at the end of a traffic queue were struck from behind by a combination vehicle.	1
East Penn, PA	2/21/2018	A section of electrical conduit broke away from the ceiling of the Lehigh Tunnel in Washington Twp., PA, striking a combination vehicle and fatally injuring the driver.	1

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

MARINE SAFETY

	(\$000s)	FTEs
FY 2020 Estimate	\$5,240	20
FY 2021 Request	\$5,426	20
Increase/Decrease	\$186	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The Office of Marine Safety (MS) investigates and determines the probable cause of major marine casualties in US territorial waters, major marine casualties involving US-flagged vessels worldwide, and accidents involving both US public (federal) and nonpublic vessels in the same casualty. In addition, the office investigates select catastrophic marine accidents and those of a recurring nature.

The Coast Guard conducts preliminary investigations of all marine accidents and notifies the NTSB when an accident qualifies as a major marine casualty, which includes any one of the following:

- The loss of six or more lives.
- The loss of a mechanically propelled vessel of 100 or more gross tons.
- Property damage initially estimated to be \$500,000 or more.
- A serious threat, as determined by the Commandant of the Coast Guard and concurred in by the NTSB Chairman, to life, property, or the environment by hazardous materials.

For select major marine casualties, MS launches a full investigative team and presents the investigative product to the Board. For all other major marine casualties, the office launches a field team of marine investigators to the scene to gather information to develop a marine accident brief. Most of these brief investigation reports are issued by the MS Director through delegated authority; briefs involving public/nonpublic marine accidents and those briefs that result in safety recommendations are adopted by the Board.

MS is also responsible for the overall management of the NTSB’s international marine safety program, under which the office investigates major marine casualties involving foreign-flagged vessels in US territorial waters and those involving US-flagged vessels anywhere in the world. Accidents involving foreign-flagged vessels accounted for 29 percent of NTSB marine accident investigations over the past 5 years. Under the International Maritime Organization (IMO) *Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident* (Casualty Investigation Code), MS also participates with the Coast Guard as a substantially interested State in investigations of serious marine casualties involving foreign-flagged vessels in international waters. For example, the NTSB often participates in accident investigations that involve foreign-flagged cruise ships with US citizens on board. Every year, about 12 million US citizens travel on board these ships.

The MS international program involves reviewing US administration position papers related to marine accident investigations and participating in select IMO sub-committee meetings. During the past year, MS staff attended IMO meetings covering such topics as the review and classification of maritime accidents and accident reporting, the certification and training of mariners, ship design standards, and the technical standards and requirements for voyage data recorders.

As part of the international program, MS coordinates with other US and foreign agencies to ensure consistency with IMO conventions, most notably for joint US/flag-state marine accident investigations. MS also cooperates with other accident investigation organizations worldwide, such as the Marine Accident Investigators’ International Forum (MAIIF), and tracks developments related to marine accident investigations and prevention.

The NTSB is the only federal organization that performs independent, comprehensive, and transparent multidisciplinary investigations to determine the probable cause of marine accidents, with the goal of making safety recommendations to prevent similar accidents. The thoroughness and independence of our investigations maintain public confidence in marine transportation systems and provide policymakers with unbiased analysis.

MS comprises the Office of the Director (Director, Deputy Director, Program Management Officer, and Administrative Officer), the Marine Investigations Division, and the Product Development Division.

Marine Investigations Division

The Marine Investigations Division manages the multidisciplinary go-teams that launch to accident sites, collect information, and analyze collected information to determine probable cause. The division is managed by a Division Chief and Deputy Division Chief. Currently, major accident investigations are conducted by one of two teams with either five or six investigators on each team. Each team is led by an IIC and includes subject-matter experts in nautical operations, marine engineering and naval architecture, survival factors, and human performance.

Product Development Division

The Product Development Division administers the investigative quality management program. The division consists of a chief and technical writer-editors who are responsible for drafting and editing major marine accident reports, marine accident brief reports, safety recommendation reports, special investigation reports, the *Safer Seas Digest* publication, responses to notices of proposed rulemaking, and general correspondence. Staff also reviews the contents of the accident dockets provided by investigative specialists.

Accomplishments and Ongoing Efforts

This office's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Collision between US Navy Destroyer *John S McCain* and Tanker *Alnic MC* Singapore Strait, 5 Miles Northeast of Horsburgh Lighthouse, Republic of Singapore August 21, 2017

On August 21, 2017, the US Navy destroyer *John S McCain* was overtaking the Liberian-flagged tanker *Alnic MC* while both vessels were transiting the westbound lane in the Middle Channel passage of the Singapore Strait Traffic Separation Scheme. The destroyer's crew had a perceived loss of steering, and, while the crew attempted to regain control of the vessel, the *John S McCain* unintentionally turned to port into the path of the *Alnic MC*. At 5:24 a.m. local time, the vessels collided. As a result of the collision, 10 sailors on the *John S McCain* died, 48 were injured, and the vessel sustained over \$100 million in damage. No one was injured on the *Alnic MC*, and the vessel sustained about \$225,000 in damage. There was no report of pollution.

The NTSB determined that the probable cause of the collision between the destroyer *John S McCain* and the tanker *Alnic MC* was a lack of effective operational oversight of the destroyer by the US Navy, which resulted in insufficient training and inadequate bridge operating procedures. Contributing to the accident were the *John S McCain* bridge team's loss of situation awareness and failure to follow loss of steering emergency procedures, which included the requirement to inform nearby traffic of their perceived loss of steering. Also contributing to the accident was the operation of the steering system in backup manual mode, which allowed for an unintentional, unilateral transfer of steering control.

Safety issues identified in this accident include the following: the decision to transfer the location of thrust control on board the *John S McCain* while the vessel was in a congested

waterway, the lack of very high frequency radio communications between the vessels, the automatic identification system data transmission policy for Navy vessels, the procedures for the transfers of steering and thrust control on board the *John S McCain*, the training of Navy bridge watchstanders, the design of the destroyer's Integrated Bridge and Navigation System, Navy watchstanders' fatigue, and Navy oversight of the *John S McCain*.

As a result of this investigation, the NTSB makes new recommendations to the US Navy.

Recommendations: 7 new

Report Adopted: June 19, 2019

**Fire On Board US Small Passenger Vessel *Island Lady*
Pithlachascotee River Near Port Richey, Florida
January 14, 2018**

About 4:00 p.m. local time on the afternoon of January 14, 2018, a fire broke out in an unmanned space on the US-flagged small passenger vessel *Island Lady* near Port Richey, Florida, during a scheduled transit to a casino boat located about 9 miles offshore in the Gulf of Mexico. Fifty-three people were on board the *Island Lady*.

After receiving a high-temperature alarm on the port engine, the captain turned the *Island Lady* around to return to the dock. During the return trip, smoke began filling the lazarette, main deck, and engine room. The captain deliberately beached the vessel in shallow water near shore to evacuate the passengers. All crewmembers, employees, and passengers evacuated the vessel by entering the water and wading/crawling ashore. Fifteen people were injured and transported to local hospitals; one passenger died in the hospital several hours after the fire. The *Island Lady*, valued at \$450,000, was declared a constructive total loss.

The NTSB determined that the probable cause of the fire was Tropical Breeze Casino Cruz's ineffective preventive maintenance program and insufficient guidance regarding the response to engine high-temperature conditions, which resulted in the captain's continued operation of an engine that was overheating due to a cooling water pump failure, leading to ignition of the exhaust tubing and surrounding structure. Contributing to the spread of the fire was the lack of fire detection in the vessel's lazarette, which was not required by regulations and which allowed the fire to take hold without the crew's knowledge.

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- Lack of company guidance regarding engine high-temperature alarms
- Lack of fire detection in unmanned spaces with exhaust tubing
- Insufficient preventive maintenance
- Insufficient crew training and documentation

- Inappropriate material and design of fuel tank level-indicator system

On the basis of its findings, the NTSB issued new safety recommendations to Tropical Breeze Casino Cruz LLC and the Coast Guard. Also, the NTSB reiterated safety recommendations to the Coast Guard.

Recommendations: 4 new, 2 reiterated
Report Adopted: December 11, 2018

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These briefs may be issued by the office director under delegated authority or may be adopted by the Board. This report details 8 of the 33 briefs completed in FY 2019.

NTSB Lead Investigations of Public/Non-public Marine Casualties (Board Adopted) (Accidents involving Coast Guard; Navy and/or Army Corps of Engineers vessels with private vessels)

Barge Breakaway and Contact with the Emsworth Locks and Dams Ohio River, mile 6.2, Emsworth, Pennsylvania January 13, 2018

On January 13, 2018, at 6:30 a.m. local time, 27 dry cargo barges broke free from the Jacks Run barge fleeting area at mile 4 on the right descending bank of the Ohio River near Pittsburgh, Pennsylvania. The barges drifted uncontrolled downriver and, beginning at 7:12 a.m., struck the dams at the US Army Corps of Engineers Emsworth Locks and Dams complex, located at mile 6.2. Two Corps of Engineers workboats moored at the foot of the dam were also struck and driven into one of the dam's concrete piers, causing significant damage to both vessels. Nine barges and the Army workboats were declared constructive total losses in the accident. Total damage exceeded \$12.5 million.

The NTSB determined that the probable cause of the accident was the failure of the fleeting area owner, Allegheny County Sanitary Authority, and the operator, Industry Terminal and Salvage Company, to maintain the area's mooring cells and prevent shoaling, which resulted in inadequate mooring arrangements during highwater and ice conditions. Contributing to the accident was the Army Corps of Engineers and Coast Guard's lack of resources and authority to effectively inspect fleeting areas and ensure that they are maintained.

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- The breakaway of the barges occurred when the force of the river current acting on the extensive ice buildup at the front of the barge flotilla exceeded the capacity of the fleeting area's mooring cell fittings and the barge mooring wires.

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- Poor maintenance of the mooring cells and shoaling in the fleeting area prevented the towing vessel crews from establishing a suitable mooring arrangement for the barge fleet, which resulted in a failure of the moorings during highwater and ice conditions.
 - Neither the owner, the Allegheny County Sanitary Authority, nor the operator, Industry Terminal and Salvage Company, of the Jacks Run fleeting area was adequately maintaining the facility and its moorings.
 - Had the Pittsburgh area had a regulated navigation area with condition-based mooring requirements similar to those of the Mississippi River and Gulf Intracoastal Waterway regulated navigation areas, it is likely that the poor condition of the Jacks Run mooring cells would have been discovered and addressed.

As a result of its investigation, the NTSB issued new recommendations to the Coast Guard and the US Army Corps of Engineers.

Recommendations: 4 new
Brief Adopted: May 17, 2019

Board-Adopted Brief – NTSB participated in USCG Marine Board of Investigation (MBI) Public Hearing

**Explosion and Fire aboard Articulated Tug and Barge *Buster Bouchard/B. No. 255*
Port Aransas, Aransas Pass Fairway, Anchorage, Texas
October 20, 2017**

On October 20, 2017, at 4:30 a.m. local time, the crews of the articulated tug and barge *Buster Bouchard/B. No. 255* were preparing to get under way from anchorage to proceed into the Port of Corpus Christi, Texas, when an explosion and subsequent fire occurred on the bow of the barge. Two barge crewmembers who were on the bow were killed in the explosion. The fire was extinguished about 11:00 a.m. Approximately 2,000 barrels (84,000 gallons) of crude oil were released from the barge into the water or were consumed in the fire. The barge sustained over \$5 million in damage and was scrapped after the accident. There was no damage to the tugboat.

The NTSB determined that the probable cause of the explosion was the lack of effective maintenance and safety management of the barge by Bouchard Transportation, which resulted in crude oil cargo leaking through a corroded bulkhead into the forepeak void space, forming vapor, and igniting. Contributing to the accident were the ineffective inspections and surveys by the Coast Guard and the American Bureau of Shipping.

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- Bouchard Transportation’s safety management and maintenance processes failed to ensure proper maintenance of the company’s fleet of barges, including *B No. 255*.

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- Bouchard Transportation management failed to promote and ensure a safety culture in the company, which compromised the safety of both the vessel and crew.
 - Coast Guard marine inspectors who examined the *B. No 255* prior to the accident failed to identify unsafe conditions, which allowed the vessel to continue to operate at increased risk to the crews, the environment, and port facilities.
 - The American Bureau of Shipping’s survey program was ineffective in ensuring the safety of barge *B No. 255* and its crew.
 - The lack of communications between the American Bureau of Shipping and the Coast Guard limited each organization’s ability to assess the overall condition of *B No. 255* and identify hazardous conditions.

As a result of its investigation the NTSB issued new safety recommendations to Bouchard Transportation Company Inc., the Coast Guard, and the American Bureau of Shipping.

Recommendations: 3 new
Brief Adopted: April 18, 2019

Briefs Issued by the Office Director Under Delegated Authority

Pipeline Breach and Subsequent Fire aboard Cutter Suction Dredge *Jonathon King Boyd* and Towboat *Bayou Chevron*, Matagorda Bay, Texas April 17, 2018

On the evening of April 17, 2018, the cutter suction dredge *Jonathon King Boyd* punctured a submarine natural gas pipeline with a spud during dredging operations in Matagorda Bay, Texas. A gas plume ignited and engulfed the dredge and its accompanying towboat, the *Bayou Chevron*. All 10 crewmembers abandoned the vessels uninjured. Damage to the pipeline was estimated at \$1.7 million. The *Jonathon King Boyd* and the *Bayou Chevron* were constructive total losses, valued at \$5.5 million and \$125,000 respectively.

The NTSB determined that the probable cause of the fire aboard the cutter suction dredge *Jonathon King Boyd* was RLB Contracting’s failure to inform the crew about utilities in the area due to ineffective oversight, which led to a spud being dropped onto a buried submarine pipeline, causing natural gas to release and ignite.

Recommendations: None
Brief Adopted: July 16, 2019

Anchor Contact of Articulated Tug and Barge *Clyde S VanEnkevort / Erie Trader* with Underwater Cables and Pipelines Straits of Mackinac, about 2 miles west of Mackinac Bridge, Michigan April 1, 2018

At 5:32 p.m. local time on April 1, 2018, the articulated tug and barge *Clyde S VanEnkevort/ Erie Trader* was westbound with a crew of 14 in the Straits of

Mackinac, Michigan, when the barge's starboard anchor, which had released and was dragging on the bottom, struck and damaged three underwater electrical transmission cables and two oil pipelines. About 800 gallons of dielectric mineral oil leaked into the water from the cables; the oil pipelines sustained only superficial damage. Repair and replacement of the cables was estimated at more than \$100 million. No injuries were reported.

The NTSB determined that the probable cause of the accident with underwater electricity transmission cables and oil pipelines was the failure of the anchor detail to secure the barge's starboard anchor and the improper adjustment of the anchor brake band after the engineering crew replaced the brake liner, the combination of which allowed the anchor and chain to pay out under way.

Recommendations: None

Brief Adopted: May 21, 2019

**Engine Room Fire on Board Towing Vessel *Leland Speakes*
Greenville, Mississippi, at Mile Marker 520.6 Lower Mississippi River
February 21, 2018**

On February 21, 2018, at 7:40 a.m. local time, the towing vessel *Leland Speakes* was pushing 21 barges up the Lower Mississippi River when a fire broke out in the engine room at mile 520.6, south of Greenville, Mississippi. The nine crewmembers on board tried to fight the fire but, unable to control it, they abandoned the vessel to a skiff dispatched from a Good Samaritan towboat. The abandoned tow drifted 11 miles downriver until another towing vessel pushed it into a sandbar. The fire burned until later that evening before being extinguished by fire response teams and vessels. None of the crewmembers were injured, and no environmental damage was reported. The damage to the *Leland Speakes* was estimated at \$4.5– \$5 million.

The NTSB determined that the probable cause of the fire was a catastrophic failure and crankcase breach of the port main engine resulting from failure of the caps that secured two piston connecting rods to the crankshaft. Contributing to the severity of the fire was the vessel's lack of a fixed fire-extinguishing system for the engine room and lack of redundant fire pumps.

Recommendations: None

Brief Adopted: May 15, 2019

**Collision of Bulk Carrier *Yochow* with Articulated Tug and Barge *OSG Independence/OSG 243*
Houston Ship Channel, Houston, Texas
June 13, 2018**

At 2:50 a.m. local time on June 13, 2018, the inbound bulk carrier *Yochow* collided with the articulated tug and barge *OSG Independence/OSG 243*, which was moored at the TPC Group, Inc. facility on the Houston Ship Channel in Houston, Texas. *OSG 243*'s tanks were empty and awaiting a cargo of methyl tert-butyl ether. As a result of the collision, two of the barge's tanks and *Yochow*'s bulbous bow sustained holes, and the facility suffered extensive structural damage. There were no injuries among the crew of 18 on the *Yochow* or the 8 aboard the tug *OSG Independence*, nor was any pollution reported. Damage to the facility (\$20 million), the barge (\$1 million), and the bulk carrier (\$.3 million) amounted to an estimated \$21.2 million.

The NTSB determined that the probable cause of the collision was the mate's failure to effectively monitor the helmsman, contrary to the principles of good bridge resource management. Contributing to the accident was the lack of company and shipboard oversight to ensure that crewmembers adhered to work/rest guidelines, resulting in fatigue of the helmsman.

Recommendations: None

Brief Adopted: April 23, 2019

**Diesel Generator Failure Aboard Offshore Supply Vessel *Red Dawn*
Amchitka Island, Alaska
December 13, 2017**

About 3:44 p.m. local time on December 13, 2017, the offshore supply vessel *Red Dawn* was transiting through the North Pacific Ocean en route to resupply the radar station Sea-Based X-Band Radar. When the vessel was about 375 miles south-southwest of Amchitka Island, Alaska, its no. 2 main diesel engine suffered a mechanical failure that led to the ejection of components from the cylinder block, consequently destroying the engine. No pollution or injuries to the 12 crewmembers or the 33 passengers on board were reported. The estimated damage to the *Red Dawn* totaled \$1.0 million.

The NTSB determined that the probable cause of the mechanical failure was a connecting rod assembly on the no. 2 diesel engine that came loose and separated from the crankshaft due to improper tightening (torqueing) of the connecting rod bolts during the previous engine overhaul.

Recommendations: None

Brief Adopted: February 6, 2019

**Breakaway of Containership *Helsinki Bridge* and Subsequent Allision with Black Falcon Cruise Terminal
Conley Container Terminal, Reserved Channel, Boston, Massachusetts.
December 6, 2017**

On December 6, 2017, at 12:03 a.m. local time, the Panama-flagged containership *Helsinki Bridge* was moored in the Reserved Channel port side to the Paul W. Conley Container Terminal in Boston, Massachusetts. While the vessel was engaged in cargo operations at night, during a period of moderate-to-high winds, a mooring bollard to which five of the vessel's head lines were secured, failed. As a result, the wind caused the vessel to drift away from the terminal and the remaining nine mooring lines to part. The vessel's bow then swung across the channel and struck the Raymond L. Flynn Black Falcon Cruise Terminal pier. There were no reports of pollution and no injuries among the 24 crewmembers or the 10 longshoremen on board. The damage was estimated at \$570,000 for the vessel and \$40,500 for both terminals.

The NTSB determined that the probable cause of the accident was the failure of Massachusetts Port Authority to provide suitable berthing arrangements during ongoing construction at the Conley Container Terminal, which resulted in the overloading and failure of a single mooring bollard. Contributing to the accident was the lack of preparation by the vessel's master, who was aware of the less-than-suitable mooring arrangements and the deteriorating weather forecast but took no mitigating action to address the situation.

Recommendations: None

Brief Adopted: November 15, 2018

Investigative Hearings

Investigative hearings are public hearings related to investigations in which the agency is authorized to obtain testimony under oath.

**NTSB participated in USCG Formal Investigation - Public Hearing into the Collision Between the Liquid Propane Gas Carrier *Genesis River* and barges being pushed by the Towing Vessel *Voyager*
Galveston, Texas,
September 16-20, 2019**

On May 10, 2019 about 3:16 PM local time, the liquid propane gas carrier *Genesis River* collided with tank barges being pushed by the towing vessel *Voyager* in the Houston Ship Channel near Bayport, Texas. Cargo tanks in one of the barges were breached, spilling about 10,000 barrels of reformat, a gasoline blending stock, into the waterway. The second barge capsized. The Houston Ship Channel was shut down for two days after the accident during salvage operations and did not fully open for shipping traffic until Wednesday of the following week. There were no injuries in the accident. Damage to the *Genesis River* and the two barges was estimated at over \$600,000.

**NTSB participated in USCG Formal Investigation - Marine Board of Investigation (MBI) Public Hearing into the Allision of the Towing Vessel *Kristin Alexis* and Crane Barge *Mr Evin* With the Sunshine Bridge
St James Parish, Louisiana**

May 6 – 11, 2019

Late in the evening on October 11, 2018, the tug *Kristin Alexis* left a mooring facility, pushing the crane barge *Mr Ervin* ahead, heading for a dock located about 8 miles upriver. About 1:42 a.m. on October 12, 2018, the crane barge struck and became lodged under the Sunshine (LA route 70) Bridge that crossed the Mississippi River about 30 miles south-southeast of Baton Rouge, Louisiana. Damage to the crane was minimal. Damage to the bridge is estimated at \$3.5 million.

Safety Accomplishments

A safety accomplishment is defined as a positive measurable change within the transportation environment that is brought about through some direct action of an NTSB employee during an investigation. Such changes are considered safety accomplishments only if the action is taken voluntarily, without the issuance of a formal safety recommendation by the NTSB.

Safety accomplishment: Improvements to new towing vessel *Mendota*

The owner/operator changed the locations of emergency shutdown stations to safer locations that would keep the crew away from a possible engine room fire because of the events identified in a NTSB Marine Accident Brief.

Owner/operator Upper River Services, after reading the NTSB Marine Accident Brief “Engine Room Fire Aboard Towing Vessel *J.W. Herron*” (MAB1828, adopted December 2018), learned that the crew aboard that vessel had been unable to access the emergency shutdowns due to the heat and smoke during the fire. The owner, after discussions with MS investigators, made changes to a vessel in construction, the *Mendota*, to prevent a similar occurrence, based on lessons learned after reading MAB1828

Support to Foreign Accident Investigations

In FY 2019, MS participated with the Coast Guard as a Substantially Interested State (SIS) in the following completed investigation of a serious marine casualty involving a foreign-flagged vessel in international waters.

Location	Date	Description	Fatalities	Close-out Date
Exuma Island, Bahamas	06/30/2018	37-ft <i>Bahamas Tour Boat</i> (BH)	1	10/9/2018

Under the IMO Casualty Investigation Code, MS participated with the Coast Guard as a SIS in the following ongoing investigation of a serious marine casualty involving a foreign-flagged vessel in international waters:

Location	Date	Description	Fatalities
Molde, Norway	03/23/2019	Passenger Vessel (PV) <i>Viking Sky</i> (NO) – propulsion loss	0

Other Efforts and Focus Areas

Roundtables/Workshops

Seafloor Investigations Workshop July 11, 2019

MS hosted the second session of the “*Seafloor Investigations Workshop*” at the NTSB Training Center. The workshop included US government agencies, international ship registries, and industry to discuss the developments in the practice of marine and aviation accident investigations at the ocean floor. After four presentations from commercial deep salvage providers, panels covered various aspects of operations and planning to address the unique challenges posed by cases like the *El Faro*. Future workshops will share best practices and assist organizations responsible for these investigations.

MS Advocacy and Outreach

In FY 2019 MS engaged extensively with various stakeholders through various briefings and presentations, described below:

Regulators/Government Stakeholders

Briefings: *Conception* casualty to Senator Feinstein’s staff; USS *John S. McCain* report and associated recommendations to SECNAV and CNO Pentagon, Washington, DC.; Hosted US Navy party representatives for the investigation USS *John S McCain*, in reviewing Navy’s submission with three Board Members; NTSB Headquarters, Washington, DC; Hosted (with AS) NTSB familiarization meeting RADM Leavitt, USN, Commanding Officer Navy Safety Center, NTSB HQ; Hosted (with SRC) CG-INV Commanding Officer Capt. Neubauer, USCG, regarding all open recommendations to CG, NTSB HQ, Washington, DC.

US Presentations: MITAGS, Subchapter M Conference-Towing Vessels, Linthicum, MD.; Committee on Marine Transportation System quarterly meetings; Safety issues at USACE Hydrographic Survey Community Conference, Craven Point, NJ.; Seafloor Recovery Workshop with domestic/international partners, NTSB HQ, Washington, DC; *El*

Faro casualty investigation to Coast Guard Sector Northern New England, Commanding Officer Conference on Leadership; Portland, ME.; NTSB–Coast Guard joint investigations at Coast Guard Training Center Course, Yorktown, VA.; Coast Guard Industry Training, NTSB Training Center.

International Presentations: International Maritime Organization (IMO sub-committees) Working Groups, London: IMO III Sub-committee; IMO Hazardous and Toxic Waste Sub-committee; IMO SSE Sub-committee; Marine Accident Investigators International Forum (MAIIF); Presented at MAIIF 2018 Annual Meeting, Singapore; European MAIIF 2019, Slovenia; Americas MAIIF 2019, Mexico City.

Marine Industry Stakeholders

Briefings:

Cruise Line International Association representatives, NTSB HQ, Washington, DC.; Common issues affecting safety on the Mississippi River and associated investigation, representatives from New Orleans–Baton Rouge Pilots on NTSB Headquarters; NTSB Most Wanted List, Passenger Vessel Association Conference (PVA), St. Augustine, FL.

Presentations:

Emerging Seafloor Recovery Technologies at Woods Hole Oceanographic Institution, Woods Hole, MA.; *El Faro* casualty investigation at Philadelphia Tug/Barge Conference 2019; Philadelphia, PA.; Keynote speech and presentation at Council of American Master Mariner’s 2019 Annual Conference, San Diego, CA.; *El Faro* casualty investigation to New York City Bar Admiralty Law Committee 2019 Conference, New York City; *Island Lady* and *Stretch Duck 7* casualty investigation issues to Passenger Vessel Association, Alexandria, VA.; *El Faro* casualty at 2018 National Work Boat Show, New Orleans, LA.; MS-101 Investigation Familiarization Course-2018 to industry and government attendees, NTSB Training Center; NTSB Marine Safety Highlights at CLIA 2018 Annual Washington Conference, Washington; MS Director accompanied Chairman as Keynote Speaker at American Pilot Association 2018 Annual Convention, Savannah, GA.

Academia Stakeholders

Outreach: Agency contact with National Geographic cable television channel for two projects: *Disasters at Sea*, about the NTSB’s *El Faro* casualty investigation, and *Drain the Ocean*, about the NTSB’s search for *El Faro* voyage data recorder with federal partners, Washington, DC.

Presentations: *El Faro* casualty investigation to the Marine Board of the Transportation Research Board and National Science Foundation Washington; *El Faro* casualty investigation to the Chesapeake Area Professional Captains Association, Annapolis, MD.; *El Faro* casualty investigation to State Maritime Academies: State University of New York Maritime College, Ft. Schuyler, New York; Massachusetts Maritime Academy, 2019

Maritime Education Summit, Buzzards Bay, MA.; *El Faro* casualty investigation to the Maritime Legal Association Spring Meeting, Washington, DC.

Investments in technology or systems that improve efficiency or accuracy of data or processes

MS-1 Strategic Advisor and MS-20 Division Chief served as the modal lead team in the development, modification, and vetting of the multi-modal Marine SAFTI Database. The international marine taxonomy adopted by the European Maritime Safety Agency’s European Maritime Casualty Information Platform (EMCIP) was modified to be the basis for NTSB Marine Safety’s database. When fully operational, the Marine SAFTI database will enhance efficiency and accuracy of marine data as an investigative tool.

Ongoing Significant Marine Accident Investigations

Location	Date	Description	Fatalities
Chesapeake, VA	9/23/2019	MV <i>Ijssel Confidence</i> stern struck NGL Energy Partners pier mooring dolphins and catwalk	0
Channelview, TX	9/20/2019	Barges broke free of fleeting area and struck I-40 interstate bridge	0
Dover, TN	9/15/2019	Leatherwood Resort & Marina fire – 4 boats sank and 6 boats were damaged	0
Dennis, MS	9/8/2019	Barge <i>PBL 3422</i> (US) while being pushed ahead by TV <i>Savage Voyager</i> (US) struck Jamie L Whitten lock on Tombigbee Waterway	0
Brunswick, GA	9/8/2019	MV <i>Golden Ray</i> (Flag: Marshall Islands) capsized while outbound in channel	0
SW Pass, LA	9/8/2019	Offshore supply vessel <i>Kristen Faye</i> (US) listed and sank.	0
Ventura, CA	9/2/2019	SPV <i>Conception</i> – dive vessel (US) caught fire and sank while at anchor	34
Port Gravina, AK	8/27/2019	CFV <i>Ariel</i> (US) caught fire and sank	0
800nm NW of Guam	8/4/2019	TV <i>Mangilo</i> (US) unmanned, being towed, sank	0
Seattle, WA	7/24/2019	Recreational vessel <i>Silver Lining</i> (US) took on water and sank in Hood Canal.	
Whitter, AK	7/8/2019	Barge exploded and caught fire to CFV <i>Alaganik</i> (US)	2
Hardin, IL	7/5/2019	TV <i>Chattie Sue Smith</i> (US) sank while tied to TV <i>Mary R</i> and <i>Mary Fern</i>	0
Elizabeth River, VA	6/19/2019	TV <i>Goose Creek</i> (US) with crane barge when crane boom made contact with 115 kV transmission lines	0
Pago Pago, Amer Samoa	6/17/2019	CFV <i>American Eagle</i> (US) collision w/CFV <i>Koorale</i> (US)	0

Location	Date	Description	Fatalities
Convent, LA	6/16/2019	MV <i>Dank Silver</i> (MI) collision w/Sunshine Bridge	0
Norco, LA	6/8/2019	MV <i>Century Queen</i> (Flag: Panama) collision w/ <i>Kaytlin Marie</i> (US)	0
Deer Park, TX	5/30/2019	MV <i>Fairchem Filly</i> (Flag: Marshall Islands), cargo tank over pressurization	0
Webber Falls, OK	5/23/2019	Barge breakaway during high water	0
LMR MM 140, LaPlace, LA	5/16/2019	<i>American Liberty</i> (US) collision w/ <i>African Griffon</i> (Bahamas) and <i>Ever Grace</i> (Bahamas)	0
Houston Ship Channel south of Bayport intersection, Houston, TX	5/10/2019	<i>Genesis River</i> (Panama) collision w/ <i>Voyager</i> (US)	0
Krotz Springs, LA	4/25/2019	TV <i>Edna T Gattle</i> (US), contact w/ RR bridge	0
Venice, LA	4/15/2019	TV <i>Dejeane Maria</i> , (US), sank while pushing barges	0
Chicago, IL	4/13/2019	TV <i>Dewey R</i> (US) contact w/CSX RR bridge	0
Pascagoula, MS	3/29/2019	MV <i>Hawk</i> (NO) collision w/ moored vessels in shipyard	0
Molde, Norway	3/23/2019	PV <i>Viking Sky</i> (NO) ER fire and evacuation – IMO SIS investigation jointly w/ Coast Guard	0
Approach to Tokyo Bay, Japan	3/21/2019	MV APL Guam (US) collision	0
Pasadena, TX	3/15/2019	TV <i>Dixie Vandal</i> (US) collision	0
Tombigee River at MM 89.9, AL	3/10/2019	TV <i>Rivers Wilson</i> (US) bridge contact	0
Unalaska Island, AK	3/9/2019	<i>Freyja</i> grounding/stranding	0
Plaquemine Point (LMR MM 209), LA	3/8/2019	TV <i>Leviticus</i> (US) collision	0
Baton Rouge, LA	3/7/2019	TV <i>Saint Rita</i> (US) flooding/sinking	0
Vicksburg, MS	2/27/2019	TV <i>Chad Pregracke</i> (US) w/barges collision	0
Toledo, OH	2/16/2019	MV <i>St. Claire</i> (US) fire in lay-up	0
Natchez, TN	2/15/2019	TV <i>Bettye T Jenkins</i> (US) barge breakaway w/grain elevator	0
Kashea Bay, AK	2/15/2019	TV <i>Pacific 1</i> (US) sinking	0
New Orleans, LA	2/13/2019	<i>Miss Dixie</i> (US) tow collision w D&R Boney (US) tow	0
San Juan, PR	2/12/2019	PV <i>Norwegian Epic</i> (Flag: Bahamas) contact w/terminal	0
Houston, TX	2/11/2019	TV <i>Lindberg Crosby</i> (US) contact w/I-10 bridge	0
New Orleans, LA	1/16/2019	<i>MSRC 8-1</i> (US) capsized by two barges	2
Calvert City (MM15 TN R), LA	1/7/2019	TV <i>Tom Buster</i> (US) sinking	0
Naval Base Guam, GQ	12/30/2018	PV <i>Nippon Maru</i> (Flag: Japan) contact w/Navy Base pier.	0

Location	Date	Description	Fatalities
Warsaw, KY	12/18/2018	TV <i>Mary Lucy Lane</i> (US) contact w/ US Army Corps of Engineers' Dam and ACE <i>Gibson</i> (US).	0
Pago Pago, PO	12/5/2018	FV <i>Jeanette</i> (US) engine fire	0
Cape Cod, MA	12/2/2018	ITV <i>Big Jake</i> (US), barge breakaway	0
Point Reyes	11/19/2018	CFV <i>Imperial</i> grounding	0
Grand Isle, LA	11/18/2018	Lift Boat <i>RAM XVIII</i> (US), capsizing	0
Portland, ME	11/14/2018	CFV <i>Aaron & Melissa II</i> (US) sinking	0
LMR MM 442, Vicksburg, MS	10/23/2018	<i>Andrew Cargill MacMillon</i> (US), contact w/grain elevator	0
St James, LA	10/12/2018	TV <i>Kristin Alexis</i> (US) / <i>Mr. Ervin</i> (US) crane contact w/ Sunshine Bridge	0
LMR MM 142, Reserve, LA	10/9/2018	TV <i>Miss Roslyn</i> (US), sinking	0
Chandeleur Islands, LA	10/8/2018	SPV <i>Grand Sun</i> (US), fire	0
Stamford, CT	9/17/2018	ITV <i>Seeley</i> (US) / SV <i>Sea Jay</i> (US), collision	0
West Helena, AR	9/12/2018	TV <i>Jacob Kyle Rusthoven</i> (US), fire	0
Manhattan, NY	8/28/2018	PV <i>Carnival Horizon</i> (Flag: Panama), contact w/Manhattan Cruise Terminal Pier 90	0
Branson, MO	7/19/2018	APV <i>Stretch Duck 07</i> (US), capsizing	17
Yokosuka, Japan	6/17/2017	USS <i>Fitzgerald</i> (US) and container ship MV <i>ACX Crystal</i> (Flag: Phillipine)	7

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

RAILROAD, PIPELINE, AND HAZARDOUS MATERIALS INVESTIGATIONS

	(\$000s)	FTEs
FY 2020 Estimate	\$8,706	33
FY 2021 Request	\$9,296	34
Increase/Decrease	\$590	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Railroad, Pipeline and Hazardous Materials Investigations (RPH) comprises four divisions: Railroad, Pipeline and Hazardous Materials, System Safety, and Report Development. The office investigates accidents involving railroads, pipelines, and hazardous materials, and evaluates the associated emergency response. Based on these investigations, the NTSB may issue safety recommendations to federal and state regulatory agencies, unions, industry and safety standards organizations, carriers and pipeline operators, equipment and container manufacturers, producers and shippers of hazardous materials, and emergency response organizations. The office also issues Safety Alerts to industry.

Railroad Division

Since 1967, Congress has assigned the primary responsibility for railroad accident investigations to the NTSB. As in the other surface modes, the NTSB investigates and analyzes select accidents, determines their probable causes, and issues recommendations to prevent similar accidents.

Staff investigate accidents and incidents involving passenger and freight railroads, commuter rail transit systems, and other fixed guideway systems. Accidents are typically collisions or derailments, some of which involve fatalities, severe injuries, release of hazardous materials, and evacuation of residences.

The division does not investigate every railroad accident reported to the FRA or every rail transit accident reported to the Federal Transit Administration (FTA). To most efficiently use NTSB resources, criteria have been established to help identify for investigation those accidents that pose significant safety issues. The division also assesses selected railroad

safety issues, often based on a set of accident investigations specifically undertaken as the basis for such study. In other cases, the special studies may focus on analyses of regulations, railroad safety programs or procedures, or audit reviews of management and operations practices.

Pipeline and Hazardous Materials Division

Staff investigate accidents occurring during the transport of natural gas or other hazardous liquids such as gasoline or propane through underground pipeline systems, as well as accidents that threaten public safety by the release of hazardous substances. Pipeline investigations focus on accidents that involve fatalities or result in substantial property or environmental damage.

The division investigates accidents involving the release of hazardous materials in all modes of transportation, including aviation, highway, railroad, and marine. The division may also investigate select hazardous materials accidents that highlight safety issues of national importance or involve a specific accident prevention issue. An investigation may include analysis of the performance of hazardous materials containers, such as rail tank cars, highway cargo tanks, or smaller non-bulk packaging. The division also investigates environmental response issues in all modes, including pipeline.

System Safety Division

Staff supports the investigations led by the Railroad Division and the Pipeline and Hazardous Materials Division. Staff investigates the role of system safety management in the regulated transportation mode, as well as the role of individual, workgroup, and organizational factors in an accident scenario. Staff also examines the role of regulatory, industry, and company practices in the accidents under investigation. The division maintains oversight of emerging safety regulations, methods, and data related to the railroad, pipeline, and hazardous materials areas.

Investigations typically involve inquiries that extend well beyond the debris field of an accident site. Failures of operational systems rarely are isolated to the last component to break or malfunction. Rather, the reasons for system failures often are traceable back to management decisions and corporate cultural influences. Once these systemic failures are identified and understood, the staff works to develop corresponding safety recommendations. Specific topics evaluated include drug and alcohol usage, work-rest cycles and human fatigue, individual and team training, organizational safety culture, safety management, and public awareness.

Report Development Division

The Report Development Division is responsible for drafting and editing railroad, pipeline, and hazardous materials reports and briefs. The staff reviews, writes, and edits work products to ensure the adequacy of logic, organization, and structure. In addition, the division's editors ensure the quality of NTSB reports, responses to notices of proposed rulemaking, papers, congressional testimony, and speeches (or portions thereof) on matters

pertaining to railroad, pipeline, and hazardous materials safety. The division is also responsible for the effective development of the NTSB transportation safety policy, guidance, protocols, applicable portions of the NTSB orders, and replies to safety inquiries from Congress, other federal agencies, state and local agencies, industry, and the public.

Accomplishments and Ongoing Efforts – Railroad Division

This division's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Railroad Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Amtrak Passenger Train Head-on Collision With Stationary CSX Freight Train Cayce, South Carolina February 4, 2018

On February 4, 2018, about 2:27 a.m. local time, southbound National Railroad Passenger Corporation (Amtrak) train P91, operating on a track warrant, was diverted from the main track through a reversed hand-throw switch into a track and collided head-on with a stationary CSX Transportation Corporation (CSX) local freight train F777. The accident occurred on CSX's Florence Division, Columbia Subdivision in Cayce, South Carolina.

The engineer and conductor of the Amtrak train died because of the collision. Ninety-one passengers and crewmembers on the Amtrak train were transported to medical facilities. The engineer of the stopped CSX train had exited the lead locomotive before the Amtrak train entered the track. When he saw that it was entering the track, he ran to safety and was not injured. The conductor on the CSX lead locomotive saw the Amtrak train approaching on the track and ran to the back of the locomotive. The conductor was thrown off the locomotive and sustained minor injuries. Damage was estimated at \$25.4 million.

The normal method of operation on this segment of track was by wayside signal indications of a traffic control system. On the day prior to the accident, CSX signal personnel began upgrading signal system components to implement positive train control (PTC) on the subdivision. Signal personnel ceased work for the day at 7:00 p.m., prior to completing planned work. The signal suspension remained in place resulting in the continued use of track warrants to move trains through the affected area of signal suspension.

The NTSB determined the probable cause of this collision was the failure of the CSX to assess and mitigate the risk associated with operating through a signal suspension, which eliminated system redundancy for detecting a switch in the wrong position. The CSX conductor failed to properly reposition the switch for the main track, which allowed Amtrak

train P91 to be routed onto the Silica Storage track where the standing CSX train F777 was located. Contributing to the accident was the FRA's failure to implement effective regulation to mitigate the risk of misaligned switch accidents. Also contributing to the accident was Amtrak's failure to conduct a risk assessment prior to operating during a signal suspension.

The safety issues identified in this accident investigation include operations during signal suspensions, the actions and responsibilities of train crews handling switches, the CSX efficiency testing program and staffing, the implementation of a safety management system by Amtrak to assess and mitigate risks for operation on host railroads, occupant protection in passenger railcars, and the medical examination process for railroad employees.

The NTSB made new safety recommendations to CSX and to the 29 host railroads that own and maintain track over which Amtrak operates. The NTSB also reiterated recommendations to the FRA and to Amtrak and classified prior recommendations to the FRA.

Recommendations: 3 new, 5 reiterated, 2 classified
Report Adopted: July 23, 2019

Amtrak Passenger Train 501 Derailment DuPont, Washington December 18, 2017

On December 18, 2017, at 7:34 a.m. local time, southbound Amtrak passenger train 501, consisting of 10 passenger railcars, a power railcar, a baggage railcar, and a locomotive at either end, derailed from a bridge near DuPont, Washington.

The train was on its first revenue service run on a single main track (Lakewood Subdivision) at milepost 19.86; there had been one run for special guests the week before the accident. Several passenger railcars fell onto Interstate 5 and hit multiple highway vehicles. At the time of the accident 77 passengers, 5 Amtrak employees, and 1 Talgo, Inc., technician were on the train. 3 passengers were killed, and 57 passengers and crewmembers were injured. Additionally, 8 individuals in highway vehicles were injured. The damage is estimated to be more than \$25.8 million.

The NTSB determined that the probable cause of the derailment was Central Puget Sound Regional Transit Authority's failure to provide an effective mitigation for the hazardous curve without implementing PTC, which allowed the Amtrak engineer to enter the 30-mph curve at too high of a speed due to his inadequate training on the territory and inadequate training on the newer equipment. Contributing to the accident was the Washington State Department of Transportation's decision to start revenue service without being assured that safety certification and verification had been completed to the level determined in the preliminary hazard assessment. Contributing to the severity of the accident was the FRA's decision to permit railcars that did not meet regulatory strength requirements to be used in revenue passenger service, resulting in (1) the loss of survivable space and (2) the failed

articulated railcar-to-railcar connections that enabled secondary collisions with the surrounding environment, causing severe damage to railcar-body structures which then failed to provide occupant protection resulting in passenger ejections, injuries, and fatalities.

The safety issues identified in this accident include individual agency responsibilities in preparation for inaugural service, multiagency participation in preparation for inaugural service, Amtrak safety on a host railroad, implementation of PTC, training and qualifying operating crews, the crashworthiness of the Talgo equipment, survival factors and emergency design of equipment, and multiagency emergency response.

The NTSB made new safety recommendations to the Secretary of Transportation, the FRA, the United States Department of Defense Fire and Emergency Services Working Group, the Washington State Department of Transportation, the Oregon Department of Transportation, Amtrak, and Central Puget Sound Regional Transit Authority. The NTSB also reiterated and classified safety recommendations to the FRA.

Recommendations: 26 new, 4 reiterated, 3 classified
Report Adopted: May 21, 2019

**Derailment and Hazardous Materials Release of Union Pacific Railroad Unit
Ethanol Train
Graettinger, Iowa
March 10, 2017**

On March 10, 2017, at about 12:50 a.m. local time, an eastbound Union Pacific Railroad unit ethanol train with 3 locomotives, 98 loaded tank cars, and 2 buffer cars filled with sand derailed near milepost 56.8 at a timber railroad bridge near Graettinger, Iowa, near Jack Creek, a tributary of the Des Moines River. Twenty loaded tank cars in positions 21 through 40 derailed. Fourteen of the derailed tank cars released about 322,000 gallons of undenatured ethanol, ethyl alcohol without a denaturant added to it, fueling a postaccident fire. There were no injuries; however, three nearby homes were evacuated. About 400 feet of railroad track and a 152-foot railroad bridge were destroyed in the accident. Union Pacific Railroad estimated damages, excluding environmental remediation or the cost of clearing the accident, at \$4 million.

The NTSB determined that the probable cause of the derailment was a rail that had broken as the train was traveling over the west approach of the Jack Creek Bridge as a result of Union Pacific Railroad's inadequate track maintenance and inspection program and the FRA's inadequate oversight of the application of federal track safety standards. Contributing to the consequences of the accident was the continued use of DOT Specification-111 tank cars.

The safety issues identified include the inadequacy of Union Pacific Railroad's track maintenance and inspection program, the inadequacy of the FRA's oversight, and the transportation of fuel ethanol without the use of volatile organic chemical denaturants.

The NTSB made new safety recommendations to the FRA, Pipeline and Hazardous Materials Safety Administration (PHMSA), and Union Pacific Railroad. The NTSB reiterated one recommendation to PHMSA.

Recommendations: 3 new, 1 reiterated
Report Adopted: October 30, 2018

Railroad Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These briefs may be issued by the office director under delegated authority or adopted by the Board.

Metropolitan Atlanta Rapid Transit Authority Train 401 Strikes On-Track Equipment Sandy Springs, Georgia June 3, 2018

On June 3, 2018, at about 8:46 p.m. local time, Metropolitan Atlanta Rapid Transit Authority (MARTA) northbound train 401 struck on-track equipment (OTE) about 120 yards north of the Medical Center Station, near Sandy Springs, Georgia. The train had departed the MARTA Medical Center Station just prior to the accident. The Cleveland Electric Company, a MARTA contractor, owned and operated the OTE. A contract employee, who was the operator of the OTE, died from injuries sustained during the collision. Neither the passengers nor the train operator reported any injuries. The train speed at the time of collision was 22 mph.

The NTSB determined that the probable cause of this collision was the primary flagperson's moving the on-track equipment outside of the restriction area without authority and on-track protection. Contributing to the accident was the rail operator's failure to make a visual check of the immediate track area ahead of the train before commencing movement from the Medical Center Station and the failure to maintain a constant visual check of track conditions as far ahead as possible.

Following the accident, MARTA conducted mandatory refresher training on standard operating procedures for all personnel that might require access to the wayside.

Recommendations: None
Brief Adopted: August 6, 2019

**New York City Transit Train Strikes Two Flagmen
Brooklyn, New York
November 3, 2016**

On November 3, 2016, at 12:05 a.m. local time, NYCT subway train 2328G, operating underground in a tunnel between the Fort Hamilton Parkway and Church Avenue stations, struck two NYCT employees on the F Line in Brooklyn, New York. The employees were setting up flagging protection for a contractor who needed to cross the track to access an instrument control room in the tunnel. One employee was killed, and one was seriously injured. After the accident, 23 passengers were evacuated while the crew remained with the train. The transit equipment and the track structure did not sustain any damage.

The NTSB determined that the probable cause of the accident was the failure of the Rail Control Center to communicate to the train dispatcher and tower operator that flaggers were on the track. Also contributing to the accident is NYCT's absence of a risk assessment when planning its flagging operations and permitting train movements into unprotected work zones.

The investigation of the accident identified safety issues of flagging operations and risk assessments to ensure track worker safety.

The NTSB made three new safety recommendations to the Metropolitan Transportation Authority for NYCT.

Recommendations: 3 new
Brief Adopted: June 21, 2019

**BNSF Railway Head-On Collision
Panhandle, Texas
June 28, 2016**

On June 28, 2016, at 8:21 a.m. local time, eastbound BNSF Railway (BNSF) train S LACLPC1-26K (striking train) collided with BNSF train Q CHISBD6 27L (westbound train) at milepost (MP) 525.4 on the BNSF Panhandle Subdivision near Panhandle, Texas. The collision occurred about 0.5 mile east of the east switch of the Panhandle siding. A significant fire resulted from the collision. The locomotive engineer and conductor on the striking train and the conductor on the westbound train died in the accident. The three head-end locomotives and 10 intermodal cars of the striking train derailed. All five head-end locomotives and three intermodal cars of the westbound train derailed.

The NTSB determined that the probable cause of the collision was the failure of the striking train's crewmembers to comply with signal indications requiring them to slow and stop their train before signal 5261 due to (1) the engineer's disengagement from operating, possibly due to fatigue arising from untreated obstructive sleep apnea and insufficient sleep quality and quantity on the night preceding the collision, and (2) the conductor's

disengagement from operating, possibly due to the effects of two sedating medications. A functional PTC system would have prevented the collision.

After the accident, BNSF revised its policy on the use of certain medications for personnel in safety-sensitive positions. BNSF also revised their procedures for employees returning to duty following some medical conditions.

Recommendations: None

Brief Adopted: June 11, 2019

**CSX Transportation Employee Fatalities at Ivy City
Washington, DC
June 27, 2017**

On June 27, 2017, at 11:18 p.m. local time, two CSX employees (conductor and conductor trainee) from train Q137 were struck and killed by southbound Amtrak train P175 at Amtrak milepost 134.5 in Ivy City, a small neighborhood in Northeast Washington, DC. The two employees were on the track walking toward the front of their southbound train after inspecting a railcar with elevated temperature reported by a track-side detector. Their backs were to the approaching southbound Amtrak train when they were struck.

The NTSB determined that the probable cause of the accident was the CSX train Q137 crew's decision to walk near an active track without protection. Contributing to the accident was their focus on northbound Amtrak train P66 and their failure to realize Amtrak train P175 was approaching them from behind.

The investigation of the accident identified safety issues of railroad employee training and limited direct communications between different railroads.

The NTSB made one new safety recommendation to CSX and Amtrak.

Recommendations: 1 new

Brief Adopted: March 25, 2019

**Passenger Fatality on the Long Island Rail Road
Lynbrook, New York
April 5, 2018**

On April 5, 2018, about 8:00 p.m. local time, a passenger walking eastward on the Long Island Rail Road Lynbrook Station platform in Lynbrook, New York, reached out to touch a moving train, leaned into the train, and was subsequently dragged and killed as the train left the station. Video cameras captured the event from beginning to end.

An autopsy revealed that the deceased had a high blood alcohol concentration that likely impacted his judgement.

The NTSB determined that the probable cause of the accident was the failure of the passenger to recognize that the departing train was moving as he walked on the station platform. Contributing to the cause of the accident was the passenger's high blood alcohol concentration at the time of the accident.

Recommendations: None

Brief Adopted: December 3, 2018

Railroad Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations before a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation issued is designated "Urgent."

Train Emergency Brake Communication Granite Canyon, Wyoming October 4, 2018

On October 4, 2018, at 7:40 p.m. local time, eastbound Union Pacific (UP) freight train MGRCY04 (striking train) collided with the rear of stationary UP freight train MPCNP03 (stationary train) after cresting a hill and traveling down a descending grade of up to 1.58 percent for about 13 miles. The striking train consisted of 3 leading locomotives and 105 railcars. The engineer and conductor of the striking train were killed, and 3 locomotives and 57 railcars of the striking train derailed while 9 railcars of the stationary train derailed. Prior to the accident, the crew of the striking UP freight train reported problems with the train's air brake system and radioed the UP Harriman Dispatch Center to advise them they had accelerated to 50 mph and were unable to stop.

The safety issues identified in this accident investigation include operational problems that could interfere with the air-brake system on trains, such as misconfigured end-of-railcar air hoses and/or loss of communication between head-of-train and end-of-train devices.

As a result of this ongoing investigation, the NTSB issued new safety recommendations to all Class I Railroads and to the American Short Line and Regional Railroad Association.

Recommendations: 3 new
Report Adopted: September 16, 2019

**Hazards of Moving Between Transit Railcars
Philadelphia, Pennsylvania
September 23, 2018**

On September 23, 2018, about 5:35 p.m. local time, a Southeastern Pennsylvania Transportation Authority (SEPTA) subway train operator stopped a southbound train between the Alleghany Station and the North Philadelphia Station on the Broad Street Line when a passenger activated an emergency alert. The train dispatcher instructed the train operator to perform a ground-level inspection of the train. Between the running rails about 10 feet south of the Alleghany Station platform, the operator found a child that had been struck and killed by the train. According to witness statements provided to SEPTA officials, the child, a 7-year-old boy, was walking through the end-of-railcar doors from car 516 to car 536, when he fell between the railcars as the train moved out of the Alleghany Station.

The safety issues identified in this accident investigation include a lack of consistent application and uniformity of appearance for end-of-railcar door safety messaging in railcars across transit agencies.

As a result of this ongoing investigation, the NTSB issued new safety recommendations to the FTA.

Recommendations: 2 new
Report Adopted: August 28, 2019

Ongoing Significant Railroad Accident Investigations

Location	Date	Description	Fatalities
Sacramento, CA	8/22/2019	Collision of two Sacramento Regional Transit District trains	0
Carey, OH	8/12/2019	Collision of two CSX freight trains	0
Philadelphia, PA	7/8/2019	SEPTA train struck 2 track workers	1
Sarnia, Ontario, Canada	6/28/2019	CN derailment in tunnel with hazardous material release	0
Fort Worth, TX	4/24/2019	Union Pacific derailment and release of denatured ethanol	0
Chattanooga, TN	4/13/2019	CSX worker struck in railyard	1

Location	Date	Description	Fatalities
Hamilton, NJ	4/8/2019	Amtrak near-miss of worker	0
Baltimore, MD	2/7/2019	Norfolk Southern conductor struck during switching operation	1
Bronx, NY	12/5/2018	NYCT passenger fell while standing between cars	1
Estill, SC	11/30/2018	CSX train struck worker	1
Granite Canyon, WY	10/4/2018	Union Pacific rear-end collision	2
Philadelphia, PA	9/23/2018	SEPTA passenger fatality	1
Dallas, TX	8/13/2018	Dallas, Garland & Northeastern Railroad Inc employee fatality	1
Kingman, AZ	6/5/2018	Herzog Railroad Services employee fatality	1
Alexandria, VA	5/19/2018	CSX freight train derailed	0
Bowie, MD	4/24/2018	Amtrak employee fatality	1
Wartrace, TN	3/12/2018	CSX employee fatality while working the ballast regulator	1
Arlington, TX	9/22/2017	UP employee fatality	1
Upper Darby, PA	8/22/2017	2 SEPTA trains collided	0
Hyndman, PA	8/2/2017	31 tank cars derailed: 1 propane tank car cracked, breached, and caught fire; residents evacuated	0
Queens Village, NY	6/10/2017	Train struck track worker	1
Rye, NY	5/18/2017	Commuter train derailed	0

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

Accomplishments and Ongoing Efforts – Pipeline

This division's accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019, are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Pipeline Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

**Overpressurization of Natural Gas Distribution System, Explosions, and Fires
Merrimack Valley, Massachusetts
September 13, 2018**

On September 13, 2018, about 4:00 p.m. local time, a series of structure fires and explosions occurred after high-pressure natural gas was released into a low-pressure natural gas distribution system in the northeast region of the Merrimack Valley in the Commonwealth of Massachusetts. The natural gas distribution system was owned and operated by Columbia Gas of Massachusetts, a subsidiary of NiSource Inc. Columbia Gas of Massachusetts delivers natural gas to about 325,000 customers in Massachusetts. One person was killed and 22 individuals, including three firefighters, were transported to local hospitals due to injuries; seven other firefighters incurred minor injuries. The fires and explosions damaged 131 structures, including at least 5 homes that were destroyed in the city of Lawrence and the towns of Andover and North Andover. Most of the damage occurred from fires ignited by natural gas-fueled appliances; several of the homes were destroyed by natural gas-fueled explosions. Fire departments from the three municipalities were dispatched to the fires and explosions. First responders initiated the Massachusetts fire-mobilization plan and received mutual aid from neighboring districts in Massachusetts, New Hampshire, and Maine. Emergency management officials had National Grid United States (the electric utility) shut down electrical power in the area, the state police closed local roads, and freight and passenger railroad operations in the area were suspended. Columbia Gas of Massachusetts shut down the low-pressure natural gas distribution system, affecting 10,894 customers, including some outside the area who had their service shut off as a precaution.

The NTSB determined that the probable cause of the overpressurization of the natural gas distribution system was Columbia Gas of Massachusetts' weak engineering management that did not adequately plan, review, sequence, and oversee the construction project that led to the abandonment of a cast iron main without first relocating regulator sensing lines to the new polyethylene main. Contributing to the accident was a low-pressure natural gas distribution system designed and operated without adequate overpressure protection.

The investigation identified a number of safety issues, including the adequacy of natural gas regulations; pipeline project management, risk assessments, project documentation and constructability reviews; pipeline safety management systems; licensed professional engineer approval of natural gas projects; and emergency response.

As a result of this investigation, the NTSB issued new safety recommendations to PHMSA, to the 31 states that exempt infrastructure projects from the requirement for a professional engineer to approve design plans, to the Commonwealth of Massachusetts Executive Office of Public Safety and Security, and to NiSource Inc. As outlined in the Safety Recommendation Report section below, the NTSB had previously issued recommendations to the Commonwealth of Massachusetts and to NiSource Inc. in a safety recommendation

report adopted on November 14, 2018; those recommendations were classified in this pipeline accident report.

Recommendations: 5 new, 5 classified
Report Adopted: September 24, 2019

**Building Explosion and Fire
Silver Spring, Maryland
August 10, 2016**

On August 10, 2016, at 11:51 p.m. local time, a 14-unit apartment building, located at 8701 Arliss Street, Silver Spring, Maryland, partially collapsed due to a natural gas-fueled explosion and fire, which also heavily damaged an adjacent apartment building attached by a shared wall. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital. Damages exceeded \$1 million.

The NTSB determined that the probable cause of the explosion was the failure of an indoor mercury service regulator with an unconnected vent line that had allowed natural gas into the meter room where it accumulated and ignited from an unknown ignition source. Contributing to the accident was the location of the mercury service regulators where a leak would not easily be detected by odor.

The investigation identified several safety issues, including the location and inspection of service regulators within a structure, the inspection of the gas meter assembly, the notification of the natural gas odor to Washington Gas Light Company, and the detection of natural gas through odorants and methane.

As a result of this investigation, the NTSB issued new safety recommendations to PHMSA, the Public Service Commission of Maryland, the Commonwealth of Virginia State Corporation Commission Division of Public Utility Regulation, the Public Service Commission of the District of Columbia, the International Academies of Emergency Dispatch, the International Code Council, the National Fire Protection Association, the Gas Technology Institute, and Washington Gas Light Company.

Recommendations: 13 new
Report Adopted: April 24, 2019

Pipeline Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These briefs may be issued by the office director under delegated authority or adopted by the Board.

**UGI Utilities Natural Gas-Fueled Explosion
Millersville, Pennsylvania
July 2, 2017**

On July 2, 2017, at 12:32 p.m. local time, a natural gas-fueled explosion occurred at a single-family residence at 206 Springdale Lane, Millersville, Pennsylvania. The explosion killed one person and injured three others, destroyed the residence, and significantly damaged six neighboring homes, one of which was subsequently condemned.

Following the accident, the natural gas main and service pipelines for all the homes on the cul-de-sac were tested for leaks. All segments held pressure, except for the service line at the 206 Springdale Lane connection at the main; this segment had a Permalock mechanical tapping tee. Subsequent inspection of the Permalock tee revealed that gas was leaking at the connection of the tee to the 2-inch main, and two of the four nylon bolts securing the tee to the main had fractured. At the time of the accident, the operating pressure of the line was 54 pounds per square inch, gauge (psig), as measured at the closest monitoring point about 0.5 mile away from 206 Springdale Lane.

The NTSB determined that the probable cause of the explosion was an improperly installed mechanical tapping tee that had leaked and allowed gas to migrate into the house, where the gas ignited. The investigation identified safety issues related to mechanical tapping tee installation procedures and instructions and to the dissemination of information important for distribution integrity management programs.

As a result of the investigation, the NTSB issued early safety recommendations to PHMSA and Honeywell, the manufacturer of the Permalock tapping tees, in a safety recommendation report that was adopted on June 18, 2018. Those safety recommendations were classified in the brief adopted February 25, 2019.

Recommendations: 4 classified
Brief Adopted: February 25, 2019

**Third-party Damage by Sure Shot Communications to Ameren Natural Gas
Distribution System
Canton, Illinois
November 16, 2016**

On November 16, 2016, about 5:44 p.m. local time, a natural gas-fueled explosion occurred at a two-level commercial building located at 45 East Side Square in Canton, Illinois. One Ameren employee was killed, and 11 people were injured, including two Ameren employees.

Prior to the accident, Sure Shot Communications LLC was performing directional drilling adjacent to the building to install conduit for fiber optic cable. At 3:58 p.m., the contractor reported to the Joint Utility Locating Information for Excavators, the one-call message handling and delivery service for identifying underground utilities, that a marked gas line

had been damaged. At 4:06 p.m., Ameren Illinois, the owner and operator of the gas line, received a damage report from Sure Shot and dispatched field technicians to evaluate the situation. The lead Ameren responder contacted his supervisor to confirm that the pipeline had been struck and to request excavation equipment to uncover the service line. A backhoe excavator arrived at 4:41p.m. and Ameren technicians began to isolate the leak. By 5:37 p.m., Ameren technicians shut off the natural gas flow to the service line by squeezing off the pipeline. At 5:44 p.m., the Opera House Annex behind the Opera House Professional Center exploded, killing one and injuring 11 who were impacted by debris from the blast.

The NTSB determined that the probable cause of the accident was third-party damage from Sure Shot’s directional drilling to install underground fiber optic conduit. Contributing to the pipeline damage was Sure Shot’s decision not to excavate at the utility crossing to visually inspect the work, while in progress, until clear of the underground utilities, as required by Illinois law. Contributing to the severity of the accident was the failure of Sure Shot and Ameren to evacuate the area.

Recommendations: None

Brief Adopted: December 3, 2018

Pipeline Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations before a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation issued is designated “Urgent.”

Natural Gas Distribution System Project Development and Review Merrimack Valley, Massachusetts September 13, 2018

On September 13, 2018, about 4:00 p.m. local time, a series of explosions and fires occurred after high-pressure natural gas was released into a low-pressure gas distribution system in the northeast region of the Merrimack Valley, Massachusetts. The distribution system was owned and operated by Columbia Gas of Massachusetts, a subsidiary of NiSource, Inc. The system overpressure damaged 131 structures, including at least 5 homes that were destroyed in the city of Lawrence and the towns of Andover and North Andover. Most of the damage was a result of structure fires ignited by gas-fueled appliances. Several structures were destroyed by natural gas explosions. One person was killed and at least 21 individuals, including 2 firefighters, were transported to the hospital. Seven other firefighters received minor injuries.

On September 13, prior to the overpressure event, a Columbia Gas-contracted work crew, which included a Columbia Gas inspector, had executed one of the Columbia Gas-designed

and -approved pipe-replacement projects at the intersection of South Union Street and Salem Street in South Lawrence. The project was to install a plastic distribution main and abandon in place a cast-iron distribution main. The distribution main that was abandoned still had the regulator-sensing lines that were used to detect pressure in the distribution system and provide input to the regulators to control the system pressure. Once the contractor crews disconnected the distribution main that was being abandoned, the section containing the regulator-sensing lines began losing pressure.

As the pressure in the abandoned distribution main dropped, the pressure regulators responded by opening further, increasing pressure in the distribution system. The pressure regulators opened completely when they no longer sensed system pressure, allowing the full flow of high-pressure gas to release into the distribution system supplying the neighborhood. As a result, natural gas was delivered to customers at a pressure well above the maximum-allowable operating pressure which led to the ignition of fires and explosions in homes.

The investigation of this accident identified several safety issues, including the engineering work package approval process, the pipeline recordkeeping process, and the management of maintenance and construction changes to pipelines and pipeline operations.

Accordingly, the NTSB issued urgent safety recommendations to the Commonwealth of Massachusetts and to NiSource Inc.

Recommendations: 5 new, Urgent
Report Adopted: November 14, 2018

Ongoing Significant Pipeline Accident Investigations

Location	Date	Description	Fatalities
Danville, KY	8/1/2019	Natural gas transmission line rupture and fire	1
San Francisco, CA	2/6/2019	Excavator damaged natural gas main	0
Dallas, TX	2/23/2018	Single-family residence explosion (2 previous houses had fire/explosions)	1
Minneapolis, MN	8/2/2017	Minnehaha Academy exploded	2
Firestone, CO	4/17/2017	Single-family residence explosion	2
Helena, AL	10/31/2016	Track hoe struck gas pipeline	1
Tekamah, NE	10/17/2016	Pipeline release of anhydrous ammonia	1

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

Accomplishments and Ongoing Efforts – Hazardous Materials Investigations

This division's accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019, are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Hazardous Materials Investigations Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Rupture of a DOT-105 Rail Tank Car and Subsequent Chlorine Release at Axiall Corporation

New Martinsville, West Virginia

August 27, 2016

On August 27, 2016, about 8:26 a.m. local time, a railroad tank car sustained a 42-inch-long crack in its tank shell shortly after being loaded with 178,400 pounds of liquefied compressed chlorine at the Axiall Corporation Natrium plant in New Martinsville, West Virginia. Over the next 2.5 hours, the entire 178,400-pound load of chlorine was released and formed a large vapor cloud that migrated south along the Ohio River valley. The railroad tank car, AXLX1702, built in June 1979 by ACF Industries, Incorporated, was a 17,388-gallon US DOT specification–105J500W tank car, also known as a class DOT-105 tank car, with a stenciled load limit of 178,400 pounds and a maximum gross rail load of 263,000 pounds.

The tank car was equipped with an ACF Industries, Incorporated ACF-200 stub sill underframe design, which the FRA noted in a 2006 safety advisory as being prone to such defects as tank head cracks, pad-to-tank cracks, sill web cracks, and tank shell buckling that in some instances has led to release of hazardous materials.

The NTSB determined that the probable cause of the chlorine release was an undetected preexisting crack near the inboard end of the stub sill cradle pad, that failed because of the changing tank shell stresses during the thermal equalization of the car after loading with low-temperature chlorine. Contributing to the failure was Axiall Corporation's insufficiently frequent stub sill inspection interval that did not detect the crack, the low fracture resistance of the nonnormalized steel used in the tank car construction, and the presence of residual stresses associated with Rescar Companies' tank wall corrosion repairs and uncontrolled local postweld heat treatment.

In the course of the investigation, the NTSB identified several safety issues, including the continued use of pre-1989 tank cars constructed of nonnormalized steel in chlorine and other poison inhalation hazard/toxic inhalation hazard service, the tank car manufacturer's maintenance and repair instructions, postweld heat treating procedures, and qualification and maintenance intervals.

As a result of this investigation, the NTSB made new safety recommendations to PHMSA, the Association of American Railroads, and American Railcar Industries, Inc. The NTSB also classified one prior recommendation to the FRA.

Recommendations: 5 new, 1 classified
Brief Adopted: February 11, 2019

Hazardous Materials Investigations–Other Efforts and Focus Areas

Outreach Activities

- Staff have regularly attended the Association of American Railroads Tank Car Committee meetings, also attended by representatives of railroads, tank car owners, shippers, tank car builders, equipment manufacturers, government regulators, advocacy organizations, and the interested public. Staff provides presentations about new safety recommendations, ongoing investigations, relevant safety issues, new Board products, and upcoming events. Topics covered in recent meetings include the development of industry standards for continued use of non-normalized steel pressure tank cars for poison inhalation hazard (PIH) service, oversight of tank car shops that conduct qualification and maintenance activities, monitoring phaseout of existing fleet of DOT-111 tank cars, identification of emerging tank car safety issues, and implementation of the Board’s safety recommendations related to tank car safety. The carriage of flammable liquids in rail tank cars is also associated with one of the issue areas on the NTSB Most Wanted List for 2019 – 2020, Ensuring the Safe Shipment of Hazardous Materials.
- Since the Lac-Mégantic, Quebec, freight train accident of July 2013, hazardous materials staff have maintained a close working relationship with their counterparts at the Transportation Safety Board (TSB) of Canada. The NTSB and TSB continue collaboration and sharing information about the accident performance of US DOT and Transport Canada specification flammable liquid tank cars, particularly those used to transport crude oil. During the past year, NTSB and TSB investigators have deployed together to accidents in Doon, Iowa, and St. Lazare, Manitoba. The findings from these investigations will be used to support jointly developed reports about the effectiveness of new requirements for DOT-117 tank cars used in high-hazard flammable trains.
- Staff attended the Battery Show Conference in Novi, Michigan, in September 2019, which provided educational sessions and exhibits on the full supply chain of lithium batteries—from raw materials to recycling. Topics such as battery design, thermal management, and regulatory requirements were covered in the sessions. Lithium-based batteries are listed as a hazardous material by the US DOT and found in a number of applications in the automobile, aviation, consumer electronics, and medical device industries. The NTSB hosted a forum, Lithium Ion Batteries in

Transportation, in 2013 and continues to investigate accidents involving lithium batteries in all modes of transportation.

Ongoing Significant Hazardous Materials Investigations

Location	Date	Description	Fatalities
Beach Park, IL	4/25/2019	Anhydrous ammonia trailer leak	0
St. Lazare, Manitoba, Canada	2/16/2019	CN crude oil train derailment	0
Diamond Bar, CA	2/11/2018	Tube trailer carrying composite cylinders loaded with hydrogen caught fire; evacuation	0
Fredericksburg, VA	11/2/2016	CSX tank car leaked ethanol	0
Brampton, Ontario, Canada	6/3/2016	Battery fire on delivery truck	0

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

RESEARCH AND ENGINEERING

	(\$000s)	FTEs
FY 2020 Estimate	\$12,607	45
FY 2021 Request	\$13,310	46
Increase/Decrease	\$703	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Research and Engineering (RE) is an investigative office providing scientific and technical expertise for NTSB accident investigations in all modes of transportation. The office, which includes four divisions and two program areas, also conducts safety research, generates periodic statistical reviews of aviation accidents, and provides medical and toxicology expertise for investigations in all modes.

Safety Research Division

The Safety Research Division examines transportation accidents, accident trends, and technological changes to identify problems and associated remedial actions that will reduce risk and improve the safety of the transportation system. Division staff includes transportation safety research and data analysts, who conduct systematic examinations of (1) risks or hazards in the transportation environment that may influence accidents or injury, (2) the techniques and methods of accident investigation, and (3) the effectiveness of various safety countermeasures such as policies, programs, or technologies. The division also provides data science, data visualization, and statistical expertise to support accident launches and investigations, assist in the development of safety recommendations, and publish annual statistical reviews for the NTSB, Congress, and the public.

Materials Laboratory Division

The Materials Laboratory Division performs expert multidisciplinary engineering and scientific analyses to determine whether the performance of materials and structures is related to the cause or severity of an accident. Engineers also analyze wreckage to determine the causes of fires and explosions. The division provides chemical and forensic science expertise, as well as technical advice and resources for experimental testing and research in the physical sciences.

Vehicle Recorder Division

The Vehicle Recorder Division extracts, formats, and analyzes data from aircraft flight data recorders (FDRs) and cockpit voice recorders (CVRs), and from recorders installed in locomotives, large ships, and some highway vehicles. Engineers also examine recorded electronic audio and video information captured by aircraft, ship, train, and support communication systems; provide electronic engineering expertise for all accident investigation modes in examining communication and control systems; provide time synchronization to correlate voice, data, and video recorder outputs; use advanced digital and analog filtering and signal representation techniques to extract critical recorder information; and perform forensic examinations of personal electronic devices and other computer hardware.

Vehicle Performance Division

The Vehicle Performance Division provides specialized aeronautical, mechanical, structural, and biomechanical engineering expertise; three-dimensional laser scanning and accident reconstruction; photogrammetry and video analysis; and animation and graphics development for all modes. Engineers use computational and visualization technology to provide accurate time-motion histories of the sequence of events and evaluate data from multiple sources to determine vehicle and occupant motion and the underlying causes of that motion. Engineers also develop video animations of accident scenarios, evaluate occupant injury mechanisms, and participate in and direct research into special projects as required.

Program Area - Medical Investigative Consultation Program

RE medical staff evaluates the medical aspects of investigations, including medical fitness, pathology, toxicology, injury causation, and biomechanics. Examples of medical issues addressed include operator incapacitation, injury prevention, night vision, hypoxia, substance impairment, obstructive sleep apnea, and use of prescription and over-the-counter medications as well as illicit substances.

Program Area - Chief Data Scientist

The Chief Data Scientist supports the agency-wide effort to better utilize data for strategic decision-making, and is designated the agency's Chief Data Officer as required by the Foundations for Evidence-Based Policymaking Act of 2018. The Chief Data Scientist is also responsible for the application of machine learning and advanced data science methods and techniques to support agency investigations and research, analysis, and reporting of emerging transportation safety trends.

Accomplishments and Ongoing Efforts

Safety Research Division

In a typical year, Safety Research Division analysts complete more than 250 requests for data reports, geospatial maps, and statistical analysis from NTSB Board Members and offices, Congress, transportation industry, and the public. The division completed 261 of these requests in FY 2019. In addition to supporting accident investigations, the division compiled and published two aviation accident statistical reviews, conducted a transportation safety research study, and developed safety recommendations for the study report. Below are some examples of these efforts:

Bicyclist Safety on US Roadways: Crash Risks and Countermeasures Safety Research Study and Report

Bicyclists, like pedestrians and motorcyclists, are considered vulnerable road users because they are not protected by an enclosed vehicle compartment, which makes the likelihood of injury or death much greater in the event of a crash with a motor vehicle. In 2016, more than 800 bicyclists died and almost 200,000 were injured in motor vehicle crashes in the United States. On September 12, 2019, division analysts submitted an in-depth analysis of bicyclist crash risks and select countermeasures designed to improve bicyclist safety. The research goals were to (1) describe fatal and nonfatal injury trends associated with bicycle crashes involving motor vehicles, (2) examine the scope and nature of bicyclist crash and injury risk factors and assess data limitations, (3) identify proven safety countermeasures that may be underused, (4) assess obstacles that may interfere with the full use of the identified countermeasures, and (5) explore emerging issues that are relevant to bicycling safety. The final study report will be presented to the NTSB Board Members for their consideration on November 5, 2019.

Report in Process

Electric Vehicle Battery Fires Safety Report

The relative likelihood of fuel system fires associated with electric vehicle batteries compared to vehicles with gasoline-fueled internal combustion engines is an emerging highway safety question of interest. Division analysts provided a data report on the prevalence of electric vehicle battery fires and assisted with the development of recommendations in support of the multiple highway safety investigations involving electric vehicles (from 2017-2018) that are being analyzed for this safety report.

Report in Process

2016 US Civil Aviation Accident Summary
2017 Preliminary Aviation Accident Statistics
Annual Reports

Staff compiled, organized, and summarized the agency's *2016 Summary of US Civil Aviation Accidents*, which was published online December 19, 2018, as well as the 2017 preliminary aviation accident data and statistics, released November 1, 2018. Staff also wrote structured query language scripts and other computer code to extract, clean, and compile these data and their associated graphs and charts.

Accident Investigations:

Amtrak Passenger Train Head-On Collision With Stationary CSX Freight Train
Cayce, South Carolina
February 4, 2018

On February 4, 2018, about 2:37 a.m. local time, southbound Amtrak train 91, operating on a track warrant, was diverted from the main track through a reversed hand-throw switch into a siding and collided head-on with a stationary CSX local freight train. Division analysts provided a data report addressing rail accidents associated with improperly lined switches in the United States from 2013 to 2017 and developed geospatial mapping products for the investigation.

Report Adopted: July 23, 2019

Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017

Three passengers were killed and 65 others including passengers, crew and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Report Adopted: May 21, 2019

Motorcoach Roadway Departure and Crash Into Ravine
Loxley, Alabama
March 13, 2018

One driver was killed and 46 passengers were injured when a 2018 Prevost 56-passenger motorcoach departed Interstate 10 and fell into Cowpen Creek ravine near Loxley, Alabama. Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Report Adopted: May 10, 2019

**Diving vessel *CONCEPTION* sunk after fire
Santa Cruz Island, California
September 2, 2019**

A 75-foot commercial diving vessel *Conception*, with 39 persons on board burned to the waterline and subsequently sank in about 60 feet of water. Thirty-three passengers and one crewmember died. Division analysts provided a data report on accidents involving diving and other charter operations for the investigative launch team.

Investigation in Process

**Truck Tractor Combination Vehicle Cross-Median Collision With Passenger Van,
Combination Vehicle, and Pickup Truck
Gainesville, Florida
January 3, 2019**

Two combination vehicle drivers and 5 van passengers were killed, and multiple other van passengers were injured when a 2018 truck tractor in combination with a van semitrailer crossed the center median of Interstate 75 and collided with a 2006 Chevy van operated by a church group, a second combination vehicle, and a 2006 Chevy pickup truck near Gainesville, Florida. Division analysts provided a data report addressing median crossing accident statistics and developed geospatial mapping products for the investigation.

Investigation in Process

**Duck Boat Capsize and Sinking
Branson, Missouri
July 19, 2018**

Seventeen passengers were killed when the amphibious passenger vessel *Stretch Duck 7*, owned and operated by Ride the Ducks Branson, sank in Table Rock Lake, near Branson, Missouri. Division analysts provided a preliminary data report on similar vessel accidents over a 20-year period and are completing an in-depth data report on small passenger vessel accidents in support of this investigation.

Investigation in process

**Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018**

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured when a partially constructed pedestrian bridge crossing an eight-lane roadway in Miami, Florida, experienced a structural failure and collapsed.

Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Investigation in process

Materials Laboratory Division

Materials Laboratory engineers examine parts and wreckage from about 150 accidents in a typical year from all transportation modes and document findings through formal factual reports, study reports, analytical reports, and safety recommendations. Examples of these efforts include the following:

In-flight Breakup of a Piper PA28 Daytona Beach, Florida April 4, 2018

The airplane collided with terrain following an in-flight breakup shortly after takeoff from Daytona Beach International Airport, Daytona Beach, Florida. The airplane was registered to and operated by Embry-Riddle Aeronautical University, under the provisions of 14 *CFR* Part 91 as an instructional flight. The left wing was found separated from the aircraft near the wreckage location. The pilot and instructor were fatally injured. Staff conducted a metallurgical failure analysis of the left-wing main-spar lower cap and supported nondestructive evaluation inspection techniques.

Report adopted September 3, 2019

Building Explosion and Fire Silver Spring, Maryland August 10, 2016

A 14-unit apartment building in Silver Spring, Maryland, partially collapsed due to a natural gas-fueled explosion and fire. The explosion and fire also heavily damaged an adjacent apartment building, which shared a common wall with the first building. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital. Staff conducted a metallurgical failure analysis of the jurisdictionally service piping, evaluated gas regulators, and created computation fluid dynamics models for the gas-filling process in the building's basement utility room.

Report adopted April 24, 2019

**Explosion and Fire aboard Articulated Tug and Barge *Buster Bouchard/B. No. 255*
Port Aransas, Texas
October 20, 2017**

While getting under way from Anchorage, the articulated tug and barge suffered an explosion and subsequent fire occurred on its bow. Two barge crewmembers who were on the bow were killed in the explosion. Staff conducted on scene fire, explosion, and metallurgical examinations and conducted a metallurgical failure analysis of a forward bulkhead.

Report adopted April 18, 2019

**Rupture of a DOT-105 Rail Tank Car and Subsequent Chlorine Release at Axiall Corporation
New Martinsville, West Virginia
August 27, 2016**

A railroad tank car sustained a 42-inch long crack in its tank shell shortly after being loaded with 178,400 pounds of liquefied compressed chlorine at the Axiall Corporation Natrium plant. Over the next 2.5 hours, the entire load of chlorine was released and formed a large vapor cloud that migrated south along the Ohio River valley. The accident tank car had recently been overhauled, repaired, and inspected, and this was its first use since its return to service. Staff conducted a metallurgical failure analysis of the fracture and studied nondestructive evaluation options for welds and repair welds.

Report adopted February 11, 2019

**Diving vessel *CONCEPTION* sunk after fire
Santa Cruz Island, California
September 02, 2019**

A 75-foot commercial diving vessel *Conception*, with 39 persons on board, burned to the waterline and subsequently sank in about 60 feet of water. Thirty-three passengers and one crewmember died. Staff provided fire and explosion expertise—examining the vessel wreckage and determination of the fire origin, cause, and tenability.

Investigation in Process

**Natural Gas Pipeline Rupture and Fire
Danville, Kentucky
August 01, 2019**

A 30-inch-diameter natural gas transmission pipeline owned and operated by Enbridge Inc. ruptured and released about 66 million cubic feet of natural gas which ignited. The accident resulted in the death of 1 person, the hospitalization of 6 people and the evacuation of 75 residents from the Indian Camp mobile home park. The fire destroyed 5 nearby

residences, damaged 14 other residences, and burned about 30 acres of land including railroad tracks owned and operated by Norfolk Southern Corporation. Staff provided metallurgical expertise at the accident scene, determined the key evidence to examine, and performed a full metallurgical failure analysis of the failed pipe section.

Investigation in Process

**Median Cross-Over Crash Involving a Combination Vehicle and a Motorcoach
Thoreau, New Mexico
August 30, 2018**

A truck-tractor in combination with a van semitrailer was traveling eastbound on Interstate 40 (I-40), near Gonzales, in McKinley County, New Mexico. At the same time, a motor coach operated by Greyhound Lines Inc. was traveling westbound on I-40. The combination vehicle experienced an issue with the left wheel/tire on the steer axle, crossed the center median, and entered the westbound lanes, where it collided with the motor coach. As a result of the crash, seven motor coach occupants were fatally injured. Staff conducted a failure analysis of a front tire from the combination vehicle.

Investigation in Process

**Southwest Airlines Engine Incident
Philadelphia, Pennsylvania
April 17, 2018**

Southwest Airlines flight 1380, a Boeing 737-700, N772SW, experienced a failure of the left CFM International CFM-56-7B engine and loss of engine inlet and cowling during climb about flight level 320 (32,000 feet). Fragments from the engine inlet and cowling struck the wing and fuselage, resulting in a rapid depressurization after the loss of one passenger window. Staff conducted a metallurgical failure analysis of the failed engine fan blades and developed crack growth rate data to enable remediation.

Investigation in Process

**Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018**

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured, when a partially constructed pedestrian bridge crossing an eight-lane roadway in Miami, Florida, experienced a structural failure and collapsed. Staff analyzed the metallurgical and materials engineering failure and oversaw both the mechanical testing of concrete and reinforcing steel and the animation development of the collapse sequence.

Investigation in process

**High-Pressure Hydrogen Gas Cylinder Fire During Transportation
Diamond Bar, California
February 11, 2018**

An Air Products and Chemicals Inc. module of 25 horizontally mounted high-pressure gas cylinders loaded with 240 kilograms of compressed hydrogen caught fire while being transported. About 500 persons within a 10-block business district were evacuated. Staff conducted metallurgical evaluations of pressure release devices.

Investigation in Process

Vehicle Recorder Division

In a typical year, the Vehicle Recorder Division's laboratories process about 400 recording devices and complete essential readouts, transcripts, and studies for aviation, rail, marine, and highway investigations. Here are some examples of these efforts:

**Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017**

Three passengers were killed and 65 others including passengers, crew, and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. NTSB recorder specialists recovered and reviewed data from locomotive event data recorders, on-board image recorders, and the engineer's continuous positive airway pressure (CPAP) machine. The event and image recorders had been damaged by the accident and exposed to rain for several hours prior to their recovery. The NTSB's Vehicle Recorder Laboratory used established procedures and protocols to recover the recorded event and video data, including data from inward-facing video that had captured the operating compartment. These data were crucial in reconstructing the events leading up to the accident. The data from the CPAP machine was used by the NTSB's medical officers in their investigation of the engineer's medical history.

Report Adopted May 21, 2019

**Ethiopian Airlines Flight 302
Addis Ababa, Ethiopia
March 10, 2019**

A Boeing 737 MAX 8 aircraft operated by Ethiopian Airlines crashed approximately 6 minutes after takeoff, killing all 157 people aboard. NTSB recorder specialists were extensively involved in the recovery and interpretation of data from the FDR and CVR, which had both been severely damaged. Recorder specialists in the United States identified

the components and procedures necessary while another specialist traveled to Paris, France, to assist directly in the data recovery. Numerous challenges were overcome during the recovery process, aided by the unique expertise brought to the table by the NTSB's recorder specialist. Once the data was recovered, the specialist continued to Addis Ababa to continue the interpretation and analysis of the data and audio. The recovered information has been key to reconstructing the events of the accident flight.

Investigation in process

**Tesla Model 3 Accident with Combination Vehicle
Delray Beach, Florida
March 1, 2019**

The driver of a Tesla Model 3 was killed when the vehicle collided with a combination vehicle, shearing off the roof of the Model 3 as the vehicle under-rode the combination vehicle's trailer. This accident highlights the continued challenges and opportunities in the emerging area of autonomous and semi-autonomous vehicle systems. NTSB recorder specialists analyzed multiple sources of data including airbag module data, outward-facing video, and vehicle telemetry data provided by the manufacturer. Specialists needed to work with the manufacturer in order to properly understand, validate, and interpret the data. This accident will increase the NTSB's expertise in handling future accidents involving autonomous and semi-autonomous vehicles.

Investigation in process

**Duck Boat Capsize and Sinking
Branson, Missouri
July 19, 2018**

Seventeen passengers were killed when the amphibious passenger vessel *Stretch Duck 7*, owned and operated by Ride the Ducks Branson, sank in Table Rock Lake, near Branson, Missouri. The vessel was equipped with an on-board digital video recorder (DVR) containing a hard drive and memory card that was retrieved from the submerged wreckage and sent to the NTSB's Vehicle Recorder Laboratory. The lab used established procedures and protocols for drying and recovering data from those devices as well as numerous other electronic devices including cell phones and a digital camera. The video recovered from the DVR was crucial in aiding the investigation in the areas of operations, human factors, and meteorology. A recorder specialist traveled to the accident site to facilitate an on-scene review of the recorded video to aid investigators. Recorder specialists also facilitated the transcription of audio and video from the DVRs of *Stretch Duck 7* and her sister vessels from the accident date, performed time correlations, and used advanced digital signal-processing techniques to improve the intelligibility of the audio recordings.

Investigation in process

Vehicle Performance Division

In a typical year, Vehicle Performance staff members produce about 55 study reports and animations, launch to accident sites to acquire evidence for performance reports, and participate in the development of safety recommendations and modal accident reports. Here are some examples of these efforts through September 30, 2019:

Departure From Controlled Flight Trans-Pacific Air Charter, LLC Learjet 35A, N452DA

**Teterboro, New Jersey
May 15, 2017**

A Gates Learjet 35A departed controlled flight while on a circling approach to runway 1 at the Teterboro Airport and impacted a commercial building and parking lot. The two pilots onboard the aircraft died. Staff evaluated the vehicle performance and developed an animation depicting the sequence of events during the accident flight.

Report Adopted March 12, 2019

Motorcoach Run-Off-the-Road and Overtake US Highway 83

**Laredo, Texas
May 14, 2016**

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, departed the east side of the highway and, after entering the earthen right-of-way, overturned onto its left side. Nine passengers died, 36 passengers experienced minor-to-serious injuries, and the motorcoach driver and trip coordinator were treated for minor injuries. Staff performed simulations to show that the departure from the roadway was caused by driver input, possibly in reaction to the wet, slippery conditions.

Report Adopted November 7, 2018

Derailment and Hazardous Materials Release of Union Pacific Railroad Unit Ethanol Train

**Graettinger, Iowa
March 10, 2017**

On March 10, 2017, at 12:50 a.m. local time, 20 cars of a Union Pacific unit train derailed near Graettinger, Iowa; 14 of the cars released about 322,000 gallons of ethanol, causing a fire. As an investigation tool, staff used Google Earth to display recorded video, audio, and parametric data and to animate the sequence of events; the final animation developed in

Google Earth was shown at the Board Meeting.

Report adopted October 30, 2018

**Pickup Truck Centerline Crossover Collision with Medium Bus on US Highway 83
Concan, Texas
March 29, 2017**

About 12:20 p.m. local time on March 29, 2017, a 20-year-old male driver in a 2007 Dodge Ram 3500 pickup truck traveling north on U.S. Highway 83 collided with a southbound medium-size bus, occupied by a 67-year-old driver and 13 passengers. The bus driver and 12 of the 13 bus passengers were killed, and the truck driver and one bus passenger suffered serious injuries. For the Board Meeting, staff used image stabilization software on a hand-held cell phone video taken from a vehicle behind the pickup truck and then extracted clips from the stabilized video to show the erratic path of the pickup truck before the accident.

Report adopted October 16, 2018

**Robinson R-44 Collision with the Ground
Hayward, California
July 15, 2019**

On July 15, 2019, at 2:26 p.m. local time, a Robinson R44 II helicopter, N144TG, was substantially damaged during a low altitude maneuver at Hayward Executive Airport (HWD), Hayward, California. The commercial pilot was fatally injured and the student pilot was seriously injured. Staff developed new algorithms and custom software unique to this case to analyze video recorded by a fixed camera installed on a nearby building that showed the shadow of the helicopter on the ground. From this, staff was able to obtain quantitative estimates of the helicopter ground track, heading, and roll angle up to the time when it impacted the ground.

Investigation in Process

**Beech BE-300 Collision with Hangar after Takeoff
Addison, Texas
June 30, 2019**

On June 30, 2019, about 9:11 a.m. local time, a Beech BE-300, N534FF, collided with a hangar and terrain after takeoff from Addison Airport (KADS), Addison, Texas. The airline transport pilot, the commercial co-pilot, and eight passengers sustained fatal injuries, and the airplane was destroyed. A postimpact fire ensued. Staff performed a detailed video analysis of surveillance video which captured the accident sequence. From this ground track, altitude, speed, roll angle and pitch angle of the airplane during the last 8 seconds of flight were quantitatively derived that ended when the airplane impacted a

hangar.

Investigation in Process

**Beech 65A90 Skydiving Aircraft Impact with Terrain After Takeoff
Mokuleia, Hawaii
June 21, 2019**

On June 21, 2019, about 6:20 p.m. local time, a Beech 65-A90, N256TA, operating as a local sky-diving flight under the provisions of Title 14 CFR Part 91, collided with terrain following takeoff from Dillingham Airfield, Mokuleia, Hawaii. The commercial pilot and ten passengers sustained fatal injuries, and the airplane was destroyed. Limited video footage from a security camera located at the end of the runway was recovered for the accident. The airplane did not have (nor require) a Flight Data recorder, and no radar data were available. Staff performed weight and balance calculations showing that the airplane was loaded at or beyond the allowable aft center of gravity limit and analyzed flight test data provided by Beechcraft that indicates the accident airplane was likely operating in an area of the flight envelope with reduced or negative longitudinal stability.

Investigation in Process

**Midair Collision Between a De Havilland DHC-2 and a DHC-3 Aircraft
Ketchikan, Alaska
May 13, 2019**

On May 13, 2019, about 12:21 p.m. local time, a float-equipped De Havilland DHC-2 (Beaver) airplane, N952DB, and a float-equipped De Havilland DHC-3 (Turbine Otter) airplane, N959PA, collided in midair, about 7 miles northeast of Ketchikan, Alaska. The DHC-2 commercial pilot, and four passengers sustained fatal injuries. The DHC-3 airline transport pilot sustained minor injuries, nine passengers sustained serious injuries, and one passenger sustained fatal injuries. The DHC-2 was destroyed during the collision, uncontrolled descent, and impact with tree covered terrain and water. The DHC-3 sustained substantial damage during the collision and impact with the water. Staff used radar, Automatic Dependent Surveillance-Broadcast (ADS-B), and recorded global positioning system (GPS) data recovered from the accident aircraft to determine a time history for the relative position of aircraft and the collision geometry. Staff performed detailed FARO FOCUS 3D laser scans of two exemplar aircraft. Advanced analysis and modeling software developed in-house (DANTE) was used to fuse this data into a simulation illustrating the likely appearance and visibility of each aircraft to the pilot of the other aircraft. Staff is also using MATLAB to reconstruct the appearance of the electronic displays in each aircraft illustrating the traffic information likely displayed to the pilot of each aircraft.

Investigation in Process

Miami Air International B-737-800 Landing Overrun
Jacksonville, Florida
May 3, 2019

On May 3, 2019, at 9:42 p.m. local time, Miami Air International flight 293, a Boeing 737-81Q, N732MA, departed the end of the runway 10 at Jacksonville Naval Air Station (KNIP), Jacksonville, Florida, and came to rest in shallow water in St. Johns River. There were no serious injuries to the 142 passengers and crew onboard. The airplane was substantially damaged. Staff used recorded FDR data along with GPS and runway condition data collected on-scene to analyze the motion of the aircraft and derive the physical forces acting on aircraft throughout accident. Staff employed a Trimble Geo7x survey-grade handheld GPS receiver to document runway geolocation data, and an ELA Textur runway macrotexture laser scanner to document runway surface characteristics. Staff used advanced analysis and modeling software developed in-house (DANTE) to fuse this data and obtain a derivation of the wheel braking coefficient acting of the aircraft and an evaluation of runway friction performance and airplane anti-skid system performance.

Investigation in Process

Ethiopian Airlines Flight 302
Addis Ababa, Ethiopia
March 10, 2019

A Boeing 737 MAX 8 aircraft operated by Ethiopian Airlines crashed approximately 6 minutes after takeoff, killing all 157 people aboard. Staff are supporting the investigation through evaluations of aircraft performance and the pilots' interactions with the control systems. Staff will also assist with validating planned pilot-in-the-loop simulations.

Investigation in Process

Atlas Air B-767-300 Rapid Descent into Trinity Bay
Baytown, TX
February 23, 2019

On February 23, 2019, about 12:30 p.m. local time, Atlas Air flight 3591, a Boeing 767-300, N1217A, entered a rapid descent from 6,000 feet and impacted a marshy bay area about 30 miles from Houston George Bush Intercontinental Airport (IAH), Houston, Texas. The airplane was destroyed and highly fragmented. Two pilots and one non-revenue jumpseat pilot were fatally injured. Based on meteorological and ADS-B data, Flight 3591 had just penetrated a cold front and entered instrument meteorological conditions shortly before the final descent. Staff used ADS-B data to investigate the possibility of spatial disorientation.

Investigation in Process

2001 Ford Excursion Limousine Accident
Schoharie, New York
January 3, 2019

A 2001 Ford Excursion, modified post-manufacture into a limousine by extending the body to accommodate a bar and additional passenger seating, crashed at a high rate of speed after failing to stop at a stop sign after descending a steep grade. No changes were made to the original braking system to accommodate the additional weight resulting from these modifications. A total of 17 fatalities resulted from the accident. Staff is leading a study to understand the overall adequacy of the Original Equipment Manufacturer/Original Equipment Supplier (OEM/OES) braking system on the vehicle for the weight of the modified vehicle. Staff is developing full scale vehicle testing including dynamometer tests to evaluate how this additional weight would have affected the performance of the OEM/OES braking system with concentration on the increased risk for brake fade. Advanced vehicle dynamics modeling software (CarSim) will be employed to evaluate the performance of the braking system as the limousine made its final descent down the steep grade before the crash.

Investigation in Process

Cessna 500 Departure from Controlled Flight on Landing
Fargo, ND
November 30, 2018

On November 30, 2018, about 1:49 p.m. local time, a Cessna 550 Citation II, N941JM, departed controlled flight while on approach to Hector International Airport (FAR) in Fargo, North Dakota, and impacted terrain to the right of the runway. The pilot and one passenger were not injured, and 9 passengers received minor injuries. Instrument meteorological conditions prevailed at the time of the accident, and the flight was operating on an instrument flight plan. The accident airplane did not have (nor require) a flight data recorder. Staff used flight-test validated simulation models to “fly through” the available radar data and show that the flight likely stalled during the last 2 minutes of the approach as the airplane continued to fly without ice protection into areas where ice had been both forecast and reported. The simulation provided valuable insight into critical aerodynamic parameters that would not otherwise be available.

Investigation in Process

Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured when a partially constructed pedestrian bridge crossing an eight-lane roadway separating Florida International University from the City of Sweetwater in Miami, Florida, experienced a structural failure and collapsed. Staff created

a detailed three-dimensional computer model and overlaid laser scan and photogrammetric point clouds on the model to assist with documenting the elements associated with the collapse. Staff also created a combined animation and video visualization used at the Board Meeting (held in October 2019) for the investigation.

Investigation in Process

**Sightseeing Helicopter Loss of Engine Power and Descent into the East River
New York, New York
March 11, 2018**

An Airbus Helicopters AS350B2, operated by Liberty Helicopters Inc. through a contractual agreement with NYONair, was substantially damaged when it impacted the East River and subsequently rolled inverted after the pilot reported a loss of engine power. The pilot, who sustained minor injuries, was able to escape the sinking helicopter, but the five passengers were not, and all five died. Staff are evaluating the aircraft performance and rate of descent into the river through recorded radar data along with onboard and witness videos. Staff are also creating an animation illustrating the sequence of events in the accident, to be used at the Board Meeting for the investigation.

Investigation in Process

Aircraft Investigators Performance (AIP) Workshop

Aircraft Investigators Performance is an international organization comprising governmental accident investigators focused on vehicle performance work. Currently, membership consists of investigators from the NTSB, the French Bureau of Enquiry and Analysis for Civil Aviation Safety (BEA), the TSB of Canada, the National Research Council (NRC) of Canada, the Air Accidents Investigation Branch (AAIB) from the United Kingdom, the Australian Transport Safety Board, and the Russian Interstate Aviation Committee (MAK). Membership meets yearly both in person and via teleconference to discuss aviation performance work related to accident investigations. Topics include aircraft performance simulation, video analysis, estimation of aerodynamic coefficients, and animation of results. The goal of the group is to share knowledge across organizations to further improve each agency's work in the area of accident aircraft performance

Medical Investigative Consultation Program

Medical staff participate in numerous NTSB accident investigations in all transportation modes each year, evaluating and addressing medical issues through formal factual and analytical reports, safety recommendations, coordination with other agencies, and formal presentations to the NTSB and external audiences. In FY 2019, medical staff completed

110 medical accident investigations and completed more than 175 reports for these cases. Here are some examples of recent efforts:

**Head-on Collision Between Amtrak Passenger Train and CSX Freight Train
Cayce, South Carolina
February 4, 2018**

On February 4, 2018, about 2:27 a.m. local time, southbound Amtrak train 91, operating on a track warrant, diverted from the main track through a hand-thrown switch into a siding and collided head-on with a stationary CSX freight train. Medical staff participated in the on-scene investigation, performed fitness-for-duty evaluations of the two train crews, and performed the injury evaluation of the train occupants.

Report Adopted July 23, 2019

**Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017**

Three passengers were killed and 65 others including passengers, crew, and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. Medical staff participated in the on-scene investigation, evaluated the involved train crew for fitness-for-duty, reviewed relevant video, and assisted with the description of the injuries to the train occupants and highway vehicle occupants. By downloading and reviewing data from the engineer's CPAP machine, medical staff were able to eliminate fatigue as a contributor to this accident.

Report Adopted May 21, 2019

**Motorcoach Roadway Departure and Crash Into Ravine
Loxley, Alabama
March 13, 2018**

About 5:28 a.m. local time on March 13, 2018, a 2018 Prevost 56-passenger motorcoach, occupied by a 65-year-old male driver and 46 passengers, was traveling westbound on Interstate 10 (I-10) in Baldwin County near Loxley, Alabama. The crash event began when the 2018 Prevost motorcoach departed the westbound lanes, crossed the center median, and traveled across the two opposing eastbound travel lanes and onto the shoulder, striking the guardrail adjacent to the south shoulder of the roadway. The guardrail redirected the motorcoach, which then crossed the eastbound travel lanes in the opposite direction, returning to the center median. Medical staff performed the medical evaluation of the driver, who was witnessed to have become incapacitated at the time of the deviation from

the roadway, but were unable to determine the exact cause of his incapacitation.

Report Adopted May 10, 2019

**Motorcoach Run-Off-the-Road and Overturn US Highway 83
Laredo, Texas
May 14, 2016**

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, departed the east side of the highway, and, after entering the earthen right-of-way, overturned onto its left side. Medical staff performed a fitness-for-duty evaluation of the motorcoach driver, who was found to have poorly controlled diabetes that likely reduced his vision at the time of the crash.

Report Adopted November 7, 2018

TRAINING CENTER

	(\$000s)	FTEs
FY 2020 Estimate	\$1,207	4
FY 2021 Request	\$1,216	4
Increase/Decrease	\$9	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The NTSB Training Center is an organizational component of the Office of the Managing Director. Budget exhibits have historically shown these activities as program resources outside the policy and direction line that incorporates the Office of the Managing Director. The Training Center is responsible for training NTSB staff and our partners in investigations, for developing training plans, and for overseeing the development and implementation of workforce development programs.

Accomplishments and Ongoing Efforts

The Training Center continues to move forward in its evaluation of courses to further refine the offerings and improve instruction in all areas of technical, investigative, supervisory, and leadership development, and other mission support. The center offers course content in investigative skills that target processes, procedures, and technical issues critical to the agency's mission of accident investigation. The center adds new courses and initiatives in response to senior leadership strategic priorities for the agency's workforce. These courses are generally open only to NTSB investigative and support staff.

In FY 2019, the Training Center implemented FedTalent, its new learning management system, to aid in scheduling, approving, delivering, and evaluating all agency training. The system tracks and maintains a permanent record of all staff education and training activities and will provide a valuable tool for tracking staff competencies and skills. Additional capabilities, such as the ability to create and track progress on Individual Development Plans, will be added as they become available.

Full-time training officers and advisers coordinate the development of group training by regularly conducting needs analyses and assessments for each office and by focusing on longer-term training requirements. Workforce development course offerings undergo continuous evaluation and improvement to adapt to the NTSB's changing needs and

priorities. The skills developed and enhanced by workforce development training are highly transferable and add significant value to the investigative and mission support functions.

These are some of the ongoing activities of the Training Center:

- ***Providing general aviation forums/symposia:*** Several years ago, the Training Center developed and hosted a Volunteer Pilots Safety Stand Down Day. The success of this safety seminar prompted the Training Center to develop and present other seminars on a regular and continuing basis. The NTSB partners with the FAA and other interested groups to develop programs addressing the regulatory and private aspects of general aviation safety. In the last several years we have produced 16 safety seminars on various topics that have received high marks from the aviation community. In December 2018, the Training Center and AS staff delivered a safety seminar on Night Flying, addressing the risks involved when pilots operate under nighttime conditions. In March 2019, the Training Center and AS staff delivered the third annual Inspection Authorization Renewal Safety Seminar.

Future safety seminars will continue to concentrate on areas of general aviation operations that have the highest fatality rates and on emerging and trending issues identified by an increasing number of accidents. As appropriate, the Training Center continues to partner with other federal agencies and such private organizations as the Aircraft Owners and Pilots Association, the Experimental Aircraft Association, and the Society of Aviation and Flight Educators.

- ***Expanding workforce development for all NTSB Staff:*** We continue to expand the course offerings for NTSB career professionals. After much success in the past year, we continued online retirement planning training in FY 2019. Online training helps to address the needs of our regional and teleworking personnel, as well as those of investigative staff whose on-call status demands greater scheduling flexibility. During FY 2019 we entered into interagency partnerships with the US Department of Interior and the Treasury Executive Institute to provide required training for contracting officers and new supervisors, and to greatly expand the leadership and managerial development course offerings available to the agency's senior executives, managers, and aspiring leaders. We also continued our participation in the Federal Small Agency Council's training cooperative, sharing excess course capacity among agencies. The workforce development curriculum is designed to address important cross-functional technical, administrative, and leadership competencies at the agency.
- ***Strongly emphasizing technical training for NTSB investigators:*** We continue to upgrade and refine investigators' skills with such upcoming courses as Cognitive Interviewing, Accident Site Photography, Investigating Human Fatigue Factors, and Project Management.
- ***Offering investigation courses for federal agencies and external stakeholders:*** The Training Center is often contacted to develop and present classes for other agencies in

aviation accident investigation and in other modes of transportation. Thus far, the Training Center has developed and provided training for the US Department of Energy, the FBI, the US Army National Guard, and the Coast Guard. Through September 30, 2019, we held four classes for the Coast Guard and conducted training for external stakeholders Air Methods, Alaska Air, Dallas-Ft. Worth International Airport, Delta Airlines, Cathay Pacific Airways, and Air New Zealand on managing communications during a major transportation accident. We continue to present both a 2-week Aircraft Accident Investigation class (now in its 10th year), and a 1-week Helicopter Accident Investigation class for the US Army National Guard, as well as courses in Advanced Aircraft Mishap Analysis and Reporting, and Advanced Marine Mishap Analysis and Reporting for the Coast Guard. Employees from the DOT and its modal administrations also attend many of our courses.

- ***Evaluating and updating current courses and developing courses to produce new revenue streams.*** The Training Center staff evaluates each course that we offer and makes swift and necessary adjustments for the next offering. We continuously evaluate and update content with more recent examples and case studies to enhance learning and add modules as necessary based on upcoming and new transportation tools.
- ***Continuing to increase awareness of the NTSB and its mission by offering TWA 800 briefings to other federal agencies and groups involved with transportation safety and security, and to promote interest in transportation safety-related science, technology, engineering, and math careers.***

FY 2019 Activities

Courses With External Enrollment	Students
Courses at Training Center:	
Aircraft Accident Investigations Orientation for Aviation Professionals (offered twice)	53
Cognitive Interviewing (offered twice)	40
Family Assistance (offered twice)	93
Aircraft Accident Investigations (offered twice)	95
Investigating Human Fatigue Factors	24
Inspection Authorization Renewal Safety Seminar	94
Accident Site Photography	13
Managing Communications Following an Aircraft Accident or Incident	90
Helicopter Accident Investigation	25
Accident Investigation Orientation for Rail Professionals	41
Highway Crash Investigation	13
Marine Accident Investigation	85
Night Flying Safety Seminar	65

Courses With External Enrollment	Students
Attendance Subtotal– Courses at Training Center	731
Offsite Courses:	
Managing Communications During a Major Transportation Accident – Cathay Pacific Airways	29
Managing Communications During a Major Transportation Accident – Delta Airlines	51
Managing Communications During a Major Transportation Accident – Air New Zealand	68
Managing Communications During a Major Transportation Accident – Alaska Air	62
Managing Communications During a Major Transportation Accident – Air Methods	84
Managing Communications During a Major Transportation Accident – Dallas-Ft. Worth International Airport	35
Attendance Subtotal – Off Site Courses	329
Private Courses at Training Center:	
Advanced Aircraft Mishap Analysis and Reporting – Coast Guard (offered twice)	118
Advanced Marine Mishap Analysis and Reporting – Coast Guard (offered twice)	111
Aircraft Accident Investigation – Army National Guard	36
Subtotal Attendance – Private Courses at Training Center	265
Total Attendance – Courses with Public Enrollment (October 1, 2018 – September 30, 2019)	1,325

Courses Conducted Exclusively for NTSB Employees	Students
A Prescription to Relieve Financial Stress	5
Audio Books	104
Building Resiliency After a Distressing Event	13
Civil Service Retirement System (CSRS) Retirement Planning – Part I	5
Civil Service Retirement System (CSRS) Retirement Planning – Part II	8
Civil Treatment Employee Training Webinar	28
Comprehensive Project Management: Principles for Project Managers	16
Covey's 7 Habits for Managers	15
Hazwoper Refresher 8-hour course	34
Mid-Career Retirement Planning	48
Federal Employees Retirement System Retirement Planning	37
Civil Service Retirement System Retirement Planning	9
Social Security & Medicare	44
Federal Insurances	36
Financial Planning	31

Courses Conducted Exclusively for NTSB Employees	Students
Income Tax Planning	16
Transition to Retirement	10
Project Management: PMP Prep	4
The Path to Becoming Highly Effective	11
Media Training for NTSB Investigators	21
Confined Space Entry (offered twice)	24
Contracting Officer's Representative (COR) Level II	15
Covey's 7 Habits for Managers	13
Crane Operator Safety	3
Crucial Accountability	11
EEO for Supervisors and Managers	19
Estate Planning – Part I	3
Estate Planning – Part II	11
Federal Insurances	36
FERS Benefits for Mid-Career Planning – Part I	18
FERS Benefits for Mid-Career Planning – Part II	15
FERS Retirement Benefits – Part I	12
FERS Retirement Benefits – Part II	14
Financial Planning – Getting Organized	23
Financial Planning – Have a Plan	11
Forklift Operator	4
Get Control: Time Management and Productivity Series	15
Hazwoper Refresher – 24-hour course (online)	1
Hazwoper Refresher – 8-hour course (offered twice)	32
Hazwoper Refresher – 8-hour course (online)	2
Income Tax Planning	11
Institute for Management Studies	6
Foreign Language Training	38
Media Training for NTSB Investigators	21
Mid-Career Retirement Planning	48
NTSB 101 – New Employee Orientation (offered twice)	33
OSHA 2225 Respiratory Protection and Fit Test	93
Project Management Application (PMA) Basics	8
Project Management PMP Prep	19
SeaFloor Investigations Workshop	16
Social Security and Medicare	10
Strategies for Managing Stress	8
The Path to Becoming Highly Effective	10
The Power of Positivity	12

Courses Conducted Exclusively for NTSB Employees	Students
The Struggle is Real: Strategies for Time Management	23
Transition to Retirement	12
US Constitution Training	350
Using the PMA Copy Feature and Mail Merge	4
What We All Need to Understand About Mental Health	13
Workplace Communication	4
Attendance Total – Courses Conducted Exclusively for NTSB Employees (October 1, 2018 – September 30, 2019)	1,516

ADMINISTRATIVE LAW JUDGES

	(\$000s)	FTEs
FY 2020 Estimate	\$2,313	9
FY 2021 Request	\$2,397	9
Increase/Decrease	\$84	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The NTSB serves as the court of appeals for airmen and aircraft mechanics against whom the FAA has taken a certificate action, and for mariners against whom the Coast Guard has taken a certificate action. The agency's administrative law judges hear, consider, and issue initial decisions on administrative appeals regarding FAA aviation enforcement actions. Included are appeals of the following:

- Orders issued by the FAA Administrator amending, modifying, suspending, or revoking, in whole or in part, certificates of airmen, air agencies, and air carriers for alleged violations of the *Federal Aviation Regulations* or for lack of qualifications.
- FAA actions denying applications for the issuance or renewal of airman certificates, including airman medical certificates.
- Certain FAA civil penalty orders issued against individuals, pilots, flight engineers, mechanics, or repairmen where the amount in dispute is less than \$50,000.

The judges also adjudicate claims under the Equal Access to Justice Act for fees and expenses stemming from FAA certificate and civil penalty actions.

The NTSB currently has three judges assigned to headquarters in Washington, DC, (including one who teleworks full time from Arlington, Texas), and one judge located in the Denver Regional Office. The Pilot's Bill of Rights, Public Law No. 112-53 (August 3, 2012), requires judges to apply the Federal Rules of Evidence and Federal Rules of Civil Procedure to their proceedings. Either the certificate holder or the FAA can appeal a judge's decision in these cases to the five-member Board. The Board's review on appeal of an administrative law judge's decision is based on the record of the proceeding, which

includes hearing testimony (the transcript), exhibits, the judge’s decision, and appeal briefs submitted by the parties.

The FAA has the right to appeal the Board’s decisions to the US Court of Appeals when it determines that the decisions “will have a significant adverse impact” with respect to aviation safety duties and powers designated to be carried out by the FAA. Under the Pilot’s Bill of Rights, airmen and mechanics now also have the right to appeal all adverse Board decisions to a US District Court or to a US Court of Appeals. The District Court’s review of the Board’s decision is based on the evidence from the record before the Board, including hearing testimony, transcripts, exhibits, decisions, and briefs submitted by the parties. The Court of Appeals has the power to affirm, modify, or set aside the decision, in whole or in part, or, if the need is determined, to order further proceedings by the Board. The decision of the Court of Appeals is subject to review by the US Supreme Court on writ of certiorari.

Section 716 of the Aviation Investment and Reform Act for the 21st Century, Public Law 106-181 (April 5, 2000), expanded the NTSB’s jurisdiction to include, upon petition by the affected certificate holder, reviews of FAA designations of safety enforcement actions as emergencies that require the order to be effective immediately. The Board has delegated this review authority to its administrative law judges. However, in the event of an appeal to the Board from a law judge’s decision on the merits of the emergency or other immediately effective order, the Board may, at its discretion, note in its order disposing of the appeal its views on the law judge’s ruling on the petition, and such views serve as binding precedent in all future cases. The Pilot’s Bill of Rights provides for substantive independent and expedited review by the US District Court of any decision by the FAA Administrator to make such an order effective immediately.

An administrative law judge must issue an Oral Initial Decision regarding the appeal of an emergency order or an immediately effective order within 30 days of receipt. If the law judge’s decision is appealed to the full Board, an Opinion and Order must be issued within 60 days of the appeal’s initial receipt.

Marine certificate actions are heard first by the Coast Guard administrative law judges and may be appealed to the Vice Commandant of the Coast Guard. The ruling of the Vice Commandant may then be appealed to the NTSB’s full Board. The same higher appellate process is followed for marine certificate actions.

Accomplishments and Ongoing Efforts

The Office of Administrative Law Judges completed these actions in FY 2019:

- Met its goal of conducting hearings and rendering decisions in emergency cases within 30 days of the receipt of an appeal; the office rendered decisions on 46 emergency appeals and held 25 emergency hearings.
- Made rulings, within the 5-day statutory time frame, on 18 petitions challenging the FAA Determination that an Emergency Exists in Air Safety.
- Issued a total of 58 decisions and held 19 hearings.

- Processed 19 new appeals of decisions made by NTSB administrative law judges to the full board.
- Closed a total of 111 cases.

INFORMATION TECHNOLOGY AND SERVICES

	(\$000s)	FTEs
FY 2020 Estimate	\$8,863	26
FY 2021 Request	\$9,105	26
Increase/Decrease	\$242	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The OCIO provides strategic direction and operational support for NTSB information systems and develops and distributes programs and products for use by the agency and the public. The office consists of four divisions and one program area, as described below.

Computer Services Division

The Computer Services Division (CSD) provides computer and network services for headquarters and regional offices, including Internet access, web services, e-mail, backup, continuity of operations infrastructure, and disaster recovery. The help desk staff performs a wide range of tasks, including desktop/laptop setup, repair, and replacement; network connectivity; and software installation and upgrades. In short, the CSD is responsible for deploying and maintaining essential systems and services that range from desktop telephones to enterprise storage systems, cell phones, and tablets.

Systems Support Division

The Systems Support Division (SSD) develops, distributes, and maintains agency-specific applications, provides web design and content management, and provides database administration services. Applications include accident data collection, storage, analysis, and dissemination for all modes, as well as management of systems for accident records, safety recommendations, correspondence, FOIA requests, and general administration. This division also develops office-centric applications for modal and/or support office business functions.

Records Management Division

The Records Management Division (RMD) maintains the archives of accident investigation files, NTSB reports, and other agency records. It is responsible for fulfilling public requests for information, including FOIA requests; for providing training for the docket management system and guidance on redaction policies and techniques; and for monitoring the privacy and confidentiality of data and information. This division also provides general records management.

Enterprise Architect Division

The Enterprise Architect Division (EAD) supports the NTSB mission and strategic goals by providing a blueprint—in logical or business terms, as well as technology terms—for how the organization operates today, plans to operate in the future, and intends to invest in technology. Enterprise architecture defines the business, processes, and information necessary to operate the business, support technologies, and transitional processes required to implement new technologies in response to changing business needs.

Information Technology Security Program

The chief information security officer protects the availability, confidentiality, and integrity of information technology (IT) resources through the application of requirements specified in OMB Circular A-130, the Federal Information Security Management Act (FISMA), and various US Department of Commerce National Institute of Standards and Technology publications. The IT security program uses a risk-based, cost-effective approach to secure information and systems, identify and resolve current IT security weaknesses and risks, and protect against future vulnerabilities and threats.

Accomplishments and Ongoing Efforts

The core of OCIO activities revolve around two major initiatives: digital transformation and meeting the goals identified in the Presidential Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure. These two initiatives focus on the need to efficiently and effectively deliver services and products on a more secure and reliable technical platform while reevaluating agency processes, procedures, technologies, and use of data in meeting mission objectives in delivery of services and products to the public. Foundational to meeting these initiatives, the OCIO will need to upgrade its long outdated technical platform, while moving to cloud as appropriate, and enhance the agencies' cybersecurity environment/program. Having completed in FY 2018 the efforts to upgrade and improve the resiliency and performance of the agency's wide area network, priorities in FY 2019 and the following years include replacement of the internal technical infrastructure, implementation of a foundational cloud platform, and enhancement of the cybersecurity program. Separately, but in line with meeting the May 11, 2019, Executive Order, is compliance with the mandates of the enhanced governmentwide FISMA addressing all aspects of cybersecurity and risk management.

Computer Services Division

The CSD resolved more than 3,172 service desk requests for the NTSB's distributed locations (headquarters, regional offices, and teleworkers) in FY 2019. The division's IT specialists also launched on multiple major accident investigations to further assist members and staff on-scene. Additionally, the division provided both front- and back-end computing services to the agency with minimal downtime from unplanned outages and implemented personal identity verification (PIV) card access for privileged users by deploying PIV cards for administrative access.

The CSD also updated the mobile devices (cell phones) for all applicable users and is currently installing upgrades to all internal network systems. Additionally, during FY 2019, the CSD worked to bring all the agency's systems into compliance with the Department of Homeland Security's (DHS) continuous diagnostics and mitigation initiative.

Systems Support Division

Either individually or through one of the OCIO teams, SSD staff are engaged in all aspects of the day-to-day IT activities that support the agency, from the Service Desk to the Network Operations Center/Security Operations Center and SharePoint teams. For example, in FY 2019, we addressed more than 478 Service Desk Incident/Service tickets, covering everything from Portal requests to application support.

In addition to its routine responsibilities, the SSD is working on several high-profile projects: SQL Server (database), SharePoint Farm (Portal and public-facing), and Service Desk application upgrades, all of which are pursuant to the government's cloud-first initiative. Because these activities are all interdependent, completion dates are expected to extend into the first or second quarter of FY 2020.

The SSD continues to provide updates to its suite of in-house applications, to include the Product Management Application, the Project Status Board, Supply Inventory, Case Appeal Filing System, the National Archives and Records tracking tool, and the SharePoint-based International Advocacy Travel Form. These applications are critical to the offices they support, as noted in the agency's recent Business Impact Analysis.

Records Management Division

In FY 2019, the RMD posted 1197 accident dockets. During the same period, the division received 435 FOIA requests and processed 761 FOIA requests. Revamped FOIA practices were put in place to mitigate and reduce the FOIA backlog. The RMD continues to work with the chief privacy officer to create a Controlled Unclassified Information Program to review all Privacy Impact Assessments and System of Records Notices for the agency.

Enterprise Architecture Division

Enterprise architecture continues to work on various efforts to standardize business processes, analyze/ visualize NTSB's data to more effectively comprehend and identify

trends and patterns, and to enable all NTSBs data users to make better decisions based on that data.

EAD launched the Multi-Modal Accident Management Application for all modal offices, enabling these offices to standardize the accident investigation process, resulting in structured data. The team is now working on the post-implementation enhancements requests and data integration.

The team has started working on the development of a robust query tool that allows creation of data queries involving the full spectrum of private and public data contained in databases, facilitating holistic research across the NTSB's data elements. This tool is designed with enough flexibility to allow the query framework to be used by all modes, and contains user-friendly features, such as the ability to save, share, and export query results. The team has released a beta version of the tool and is working on integrating it with the Multi-Modal Accident Management Application.

EAD continues to provide guidance, design oversight, and technical advice in all NTSB software development efforts, IT consulting services to various divisions, and contracting officer's technical representative services to various IT initiatives.

IT Security Program

The security program continued to advise the CIO regarding the agency's FISMA compliance requirements and advocated the expanded use of such external cybersecurity enhancement services as DHS's Continuous Diagnostics and Mitigation program phase 2, Einstein 3A threat monitoring, and weekly Cyber Hygiene Assessment reports. The IT Security program coordinated with our external cybersecurity oversight agencies and provided responses to several ongoing reporting directives, Cybersecurity Incident Reports, and the FY 2018 Annual FISMA report. For the 8th consecutive year, the Inspector General's audit found that the agency's IT security program complied with FISMA requirements. In FY 2019, the NTSB Security Program submitted the final Trusted Internet Connection 3.0 pilot use case proposal to OMB and DHS; as of the end of FY 2019, the proposal was under review.

ADMINISTRATION

	(\$000s)	FTEs
FY 2020 Estimate	\$9,759	34
FY 2021 Request	\$10,359	35
Increase/Decrease	\$600	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Administration coordinates and manages infrastructure and support activities for the NTSB, providing support in the areas of human resource management, labor relations, facilities management, safety, security, and acquisition and lease management. Physical inventory, shipping and receiving, and management of the NTSB conference and training center facilities are also major functions. Four divisions carry out the office's work: Administrative Operations and Security, Acquisition and Lease Management, Human Resources (HR), and Safety.

Administrative Operations and Security Division

The Administrative Operations and Security Division is responsible for the day-to-day support for the direction and operation of NTSB facilities and our building management program including security, property management, facilities management, mail services, and fleet vehicle transportation.

Acquisition and Lease Management Division

The Acquisition and Lease Management Division manages the NTSB acquisition program and provides best value business solutions to support the agency's mission. The division is a full-service acquisition organization that awards and administers contracts and agreements, manages the purchase card program, awards and manages real property leases for both the NTSB headquarters and regional offices, and provides customers with acquisition guidance and training.

Human Resources Division

The HR Division is responsible for human capital planning and management, policy and program development and administration, and recruitment and hiring. The division also manages labor and employee relations, benefits, pay and leave, performance management and awards, the telework program, and the employee assistance program.

Safety Division

The Safety Division is responsible for ensuring compliance with federal, state, and local statutory and regulatory mandates, guidelines, standards, and procedures, and for ensuring safe working conditions for NTSB employees (in the office and at on-scene investigations). This includes planning, implementing, and evaluating the agency's Occupational Safety and Health Program (OSHP) to reduce the potential for human and economic losses associated with incidents and accidents.

Accomplishments and Ongoing Efforts

Administrative Operations and Security Division

The Administrative Operations and Security Division maintains an agreement with the General Services Administration (GSA) to meet the requirements of Homeland Security Presidential Directive 12 (HSPD-12) for PIV credentials for all employees and contractors. This agreement continues the implementation of the physical access control system upgrades for NTSB headquarters, the regional offices, and the Training Center to comply with the new HSPD-12 program requirements. The installation of the physical access control system upgrades for the NTSB's headquarters facility has begun with expected completion for all NTSB's facilities by May 31, 2020.

The division has conducted its annual accountable asset inventory and validation for FY 2019 in accordance with agency policy and has reported to GSA the agency's property disposition in accordance with the GSA Federal Management Regulation. The division participated in the annual Continuity of Operations Plan Eagle Horizon 2019 drill in accordance with Federal Emergency Management Agency regulations and is in the process of reviewing, updating and revising the agency's plan. The division also performed an assessment of fleet vehicles it receives from GSA and determined that the vehicle assigned to the Denver Regional Office should be returned to GSA, which was accomplished on May 30, 2019.

Acquisition and Lease Management Division

In FY 2019, the Acquisition and Lease Management Division executed 329 contract actions to support the mission of the agency. The division continued to provide support and training to investigators regarding the acquisition process and the roles and responsibilities for purchase cardholders. This training ensures that investigators are better prepared to request

and receive the mission critical goods and services necessary to complete accident investigations.

The Acquisition and Lease Management Division transitioned the agency's charge card management program from SmartPay 2 to SmartPay 3. SmartPay is a GSA contractual vehicle that provides government agencies with commercial charge cards and payment solutions through a master contract and subsequent independent agency task orders. The program is essential to NTSB accident investigations, enabling investigators to make micro-purchases on-scene in support of investigations.

Human Resources Division

HR works with the Office of Personnel Management each year to administer the Federal Employee Viewpoint Survey. Employee participation in the survey resulted in a 70 percent response rate in 2019, nearly matching the record 2017 and 2018 response rates. The survey provided valuable information that senior leadership subsequently used to improve the work environment and, ultimately, productivity and mission accomplishments. The Employee Engagement Index increased to 75 percent (versus 68 percent government-wide). Management actions that contributed to these results included improving communication, encouraging collaboration and teamwork, focusing training and development on enhancing employee competencies, and showcasing and recognizing staff members' achievements.

In FY 2019, HR collaborated with the program offices throughout the agency to recruit and hire 35 new employees for mission-critical and support positions and to provide 19 current employees internal career promotions. Additionally, we provided employment opportunities to 23 students through the Federal Pathways Program and 3 volunteer opportunities through established agreements with the Chickasaw Nation, the Washington Scholars Program, and the On Ramps to Careers Program (DC Summer Youth). The summer program is designed to provide an enriching employment experience with a variety of briefings, workshops, and activities about the NTSB's mission and goals combined with meaningful work assignments.

We continued the implementation of position management principles to identify staffing priorities in accordance with the administration's requirements. We also considered the impact of emerging transportation technologies in relation to the current skill level of the agency staff and identified recruitment and training options for closing skills gaps.

The NTSB has pursued various avenues to market our technical positions. In 2019, we expanded our presence on LinkedIn and encouraged NTSB employees to use their networks to market vacant positions. We also updated the Careers page on the NTSB website to showcase jobs, to provide information about the agency, and to give prospective applicants information about applying for federal jobs. These actions are intended to

expand our ability to attract a highly talented applicant pool for job vacancy announcements.

We are improving our hiring by using our staffing software, USA Staffing, to help managers focus their efforts on the most promising candidates. In FY 2019, our use of software to send and receive forms for new employees in the onboarding process improved efficiency, effectiveness, and quality because the information is now routed directly into new-hires' electronic official personnel folders. Our onboarding program has been strengthened by the identification of mentors who help guide each new employee to become engaged and productive as quickly as possible. In FY 2019, HR focused attention on work/life flexibilities for our employees. We promoted the expanded services provided by the employee assistance program and provided workshops and training for supervisors and employees on the updated telework policy to improve their understanding of options available to address work life balance and address our mission needs during adverse weather and other emergency situations. Revised policies specifying hours of duty and work schedules and the administration of premium pay under the Fair Labor Standards Act served to further clarify the variety of ways that the NTSB's workforce could plan and carry out their work and receive fair compensation.

In FY 2020, we will continue to explore a Student Loan Repayment Program to increase the NTSB's ability to compete for and retain talent for positions throughout the agency. We are also revising our policies on probationary periods for new employees and for new supervisors and managers and directing attention to career ladder promotions. This initiative will help educate supervisors and managers on ways to use the tools and program initiatives to develop and retain employees with the skills we need to accomplish our mission.

In FY 2019, HR received full certification of the performance management system for senior executives in response to our bi-annual request to the Office of Personnel Management. Achievement of full certification allows the agency to facilitate the recruitment and retention of the most talented of these employees by offering more competitive compensation.

Safety Division

As part of the continuous improvement of the OSHP, the Safety Division implemented a more efficient method to provide annual training to participants in the respiratory protection program. Regional and full-time telework employees will complete an online respiratory protection course followed by the annual fit-testing by NTSB personnel. This approach is an alternative to the traditional method of in-person training followed by fit-testing by Federal Occupational Health, creating flexibility for employees while ensuring compliance with requirements and reducing ongoing vendor training costs.

To improve the safety guidance for investigators launching to accident scenes, the Safety Division followed up with investigators while on the accident scene to determine whether site conditions had changed and to ensure that the proper Personal Protective Equipment

(PPE) was available. This continuous safety involvement in the accident investigation process placed the focus on employee safety and allowed for discussion of specific safety hazards to mitigate risk.

In FY 2019, the Safety Division completed the annual OSHP audit and will provide its findings in the 2020 Annual Report to the Occupational Safety and Health Administration. The Safety Division will continue to lead efforts to improve the agency's OSHP through internal audits, increased safety-related training, annual facility inspections, and a focus on fatigue risk management.

APPENDIX A: MOST WANTED LIST

The NTSB issued its first Most Wanted List (MWL) of Transportation Safety Improvements in October 1990 to highlight specific recommendations that could significantly reduce transportation accidents, deaths, and injuries. Since then the MWL, now organized by topic area, is the NTSB's premier advocacy tool. It identifies the top safety improvements that can be made across all modes to prevent accidents, minimize injuries, and save lives in the future. Listed below are the 10 issue areas contained in the 2019-2020 NTSB Most Wanted List of Transportation Safety Improvements.

ELIMINATE DISTRACTIONS

Distraction is a growing and life-threatening problem in all modes of transportation. All drivers, pilots, and operators need to eliminate distractions and stay focused on safely operating their vehicle, aircraft, vessel, or train. Pedestrians are equally susceptible to distraction and need to remain aware of their surroundings. We believe distraction should be addressed through education, legislation, and enforcement.

END ALCOHOL AND OTHER DRUG IMPAIRMENT

Impairment is a contributing factor in far too many transportation accidents across all modes, with alcohol impairment as a leading cause of highway crashes. We want to continue to see states adopt per se BAC limits of 0.05 percent or below, as well as broaden their use of other effective countermeasures, like ignition interlock devices and high-visibility enforcement. Impairment in transportation is not limited to just alcohol; it also includes impairment by other drugs—legal or illicit. We want a national drug testing standard for passenger vehicles and stronger screening and toxicology testing in commercial transportation.

ENSURE THE SAFE SHIPMENT OF HAZARDOUS MATERIALS

More than 2 million miles of pipeline deliver 24 percent of the natural gas and 39 percent of the total oil consumed in the United States, yet only 16 percent of U.S. rail tank cars carrying flammable liquids meet the improved safety specifications for DOT-117/ DOT-117R cars. As infrastructure ages, the risk to the public from pipeline ruptures also grows, and older, more dangerous tank cars continue to carry flammable liquids. We are calling on the railroad industry to meet existing federal deadlines for replacing or retrofitting rail tank cars, and on the pipeline industry to conduct adequate risk assessments. Failure to meet safety standards by—or ahead of—deadlines places communities near railroads or above pipelines at an unacceptable risk.

FULLY IMPLEMENT POSITIVE TRAIN CONTROL

Positive train control (PTC) can stop a train before a crash happens. Although Congress mandated that PTC be installed and operating by December 31, 2018, only 25 percent of passenger route miles and just 60 percent of passenger locomotives have met that criteria.

A two-year extension has been granted to rail lines that are not fully compliant. PTC must be fully implemented before the extended deadline to ensure the safety of railroad passengers and the people who live and work near railroads.

IMPLEMENT A COMPREHENSIVE STRATEGY TO REDUCE SPEEDING-RELATED CRASHES

Speeding increases the likelihood of being involved in a crash and intensifies the severity of injuries sustained in a crash. Speeding-related crashes kill more than 10,000 people and cost society more than \$52 billion annually. Proven countermeasures—including automated enforcement technology, vehicle technology, infrastructure design, and education campaigns—must be used more broadly to reduce speeding-related crashes.

IMPROVE THE SAFETY OF PART 135 AIRCRAFT FLIGHT OPERATIONS

Air tour, air medical service, air taxi, charter, and on-demand flights are not required to meet the same safety requirements as commercial airlines, leaving them susceptible to disaster. Part 135 operators must implement safety management systems that include a flight data monitoring program, and they should mandate controlled-flight-into-terrain-avoidance training that addresses current terrain-avoidance warning system technologies.

INCREASE IMPLEMENTATION OF COLLISION AVOIDANCE SYSTEMS IN ALL NEW HIGHWAY VEHICLES

Motor vehicle crashes are a leading cause of death and injury in the U.S., and many of them could be prevented with collision avoidance systems that are already available. Vehicle manufacturers should make this technology standard equipment on all vehicles. And consumers, informed about the technology's capabilities and limitations, should buy vehicles equipped with it.

REDUCE FATIGUE-RELATED ACCIDENTS

Fatigue is a pervasive problem in transportation that degrades a person's ability to stay awake, alert, and attentive to the demands of safely controlling a vehicle, vessel, aircraft, or train. We are calling for a comprehensive approach to combatting fatigue in transportation, focusing on research, education, and training; technology; sleep disorder treatment; hours-of-service regulations; and on-and off-duty scheduling policies and practices.

REQUIRE MEDICAL FITNESS – SCREEN FOR AND TREAT OBSTRUCTIVE SLEEP APNEA

Undiagnosed and untreated obstructed sleep apnea continues to be deadly on our roads and rails, causing too many preventable accidents. We want to see mandatory screening and treatment for obstructive sleep apnea for rail and highway personnel in safety-sensitive positions.

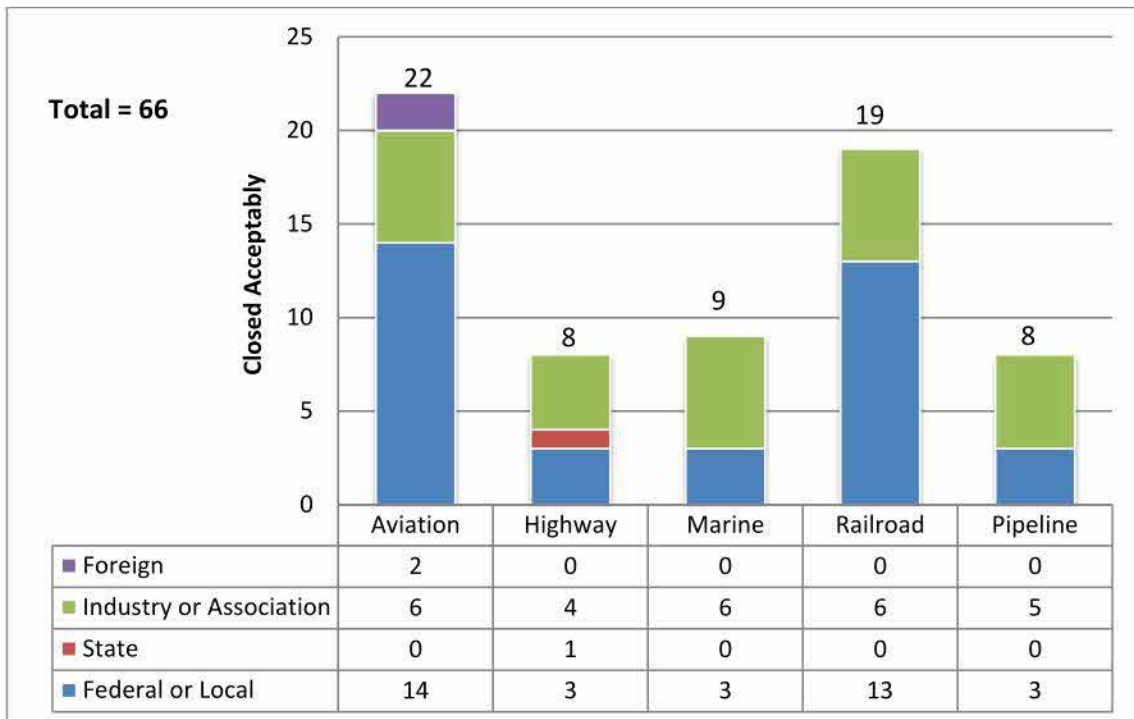
STRENGTHEN OCCUPANT PROTECTION

Seat belts, child car seats, and child safety restraint systems in highway vehicles and on airplanes reduce the risk of injury and death. Restraints in motor vehicles saved 14,668 lives in 2016 alone. We want all states to enact laws and regulations requiring all motor vehicle occupants to use seatbelts and allowing primary enforcement of seat belt laws for all vehicle occupants. We also want to see requirements for enhanced vehicle design to provide better occupant protection, and for general aviation aircraft owners to install shoulder harness systems.

APPENDIX B: STATUS OF SAFETY RECOMMENDATIONS

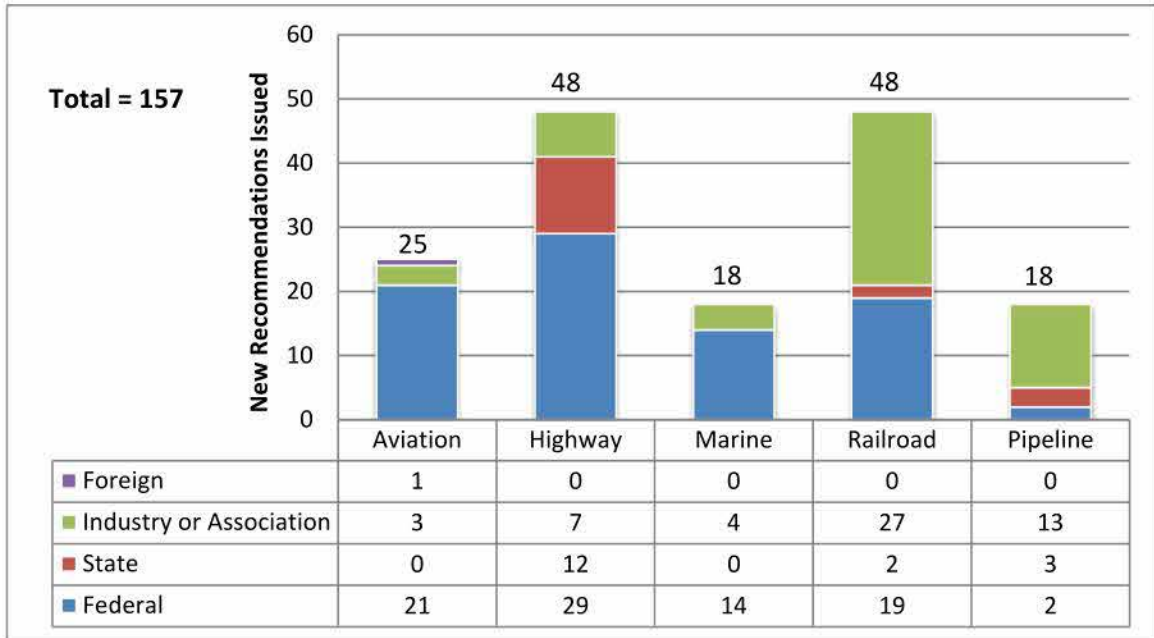
Safety Recommendations Closed

The chart below shows the distribution by mode of the 66 NTSB safety recommendations closed in an acceptable status October 1, 2018 through September 30, 2019.



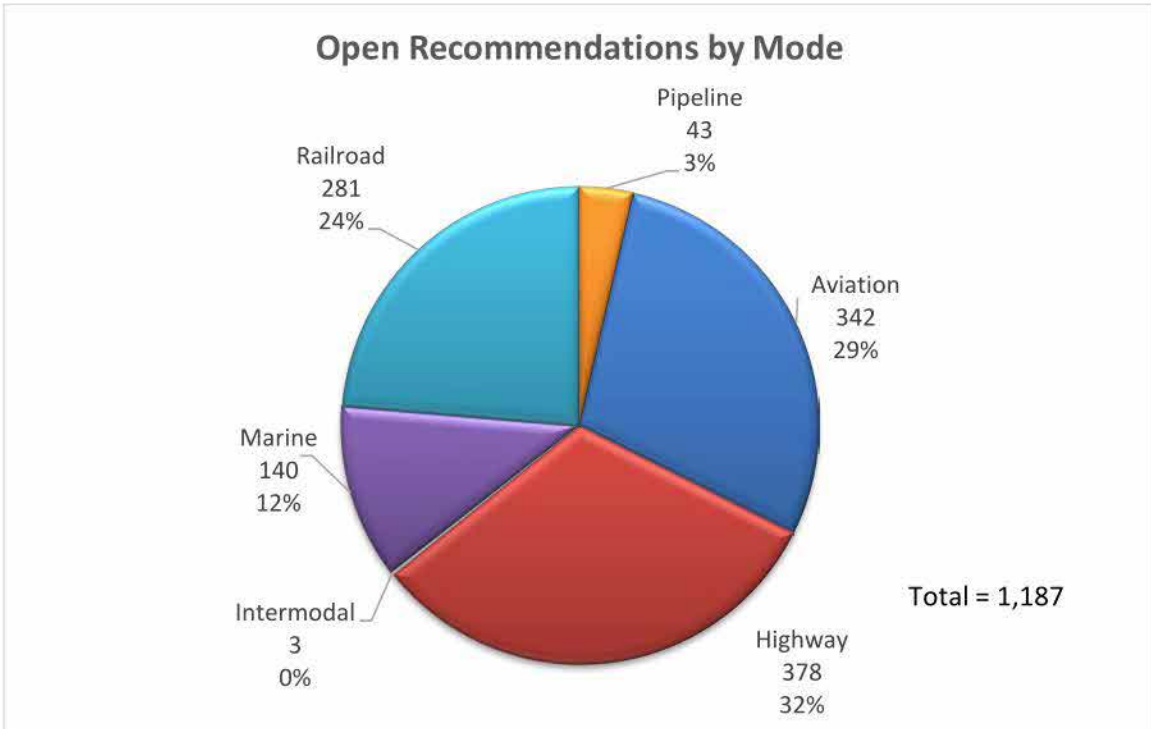
New Safety Recommendations Issued

The chart below shows the distribution by transportation mode of the 157 new safety recommendations issued by the NTSB October 1, 2018 through September 30, 2019.

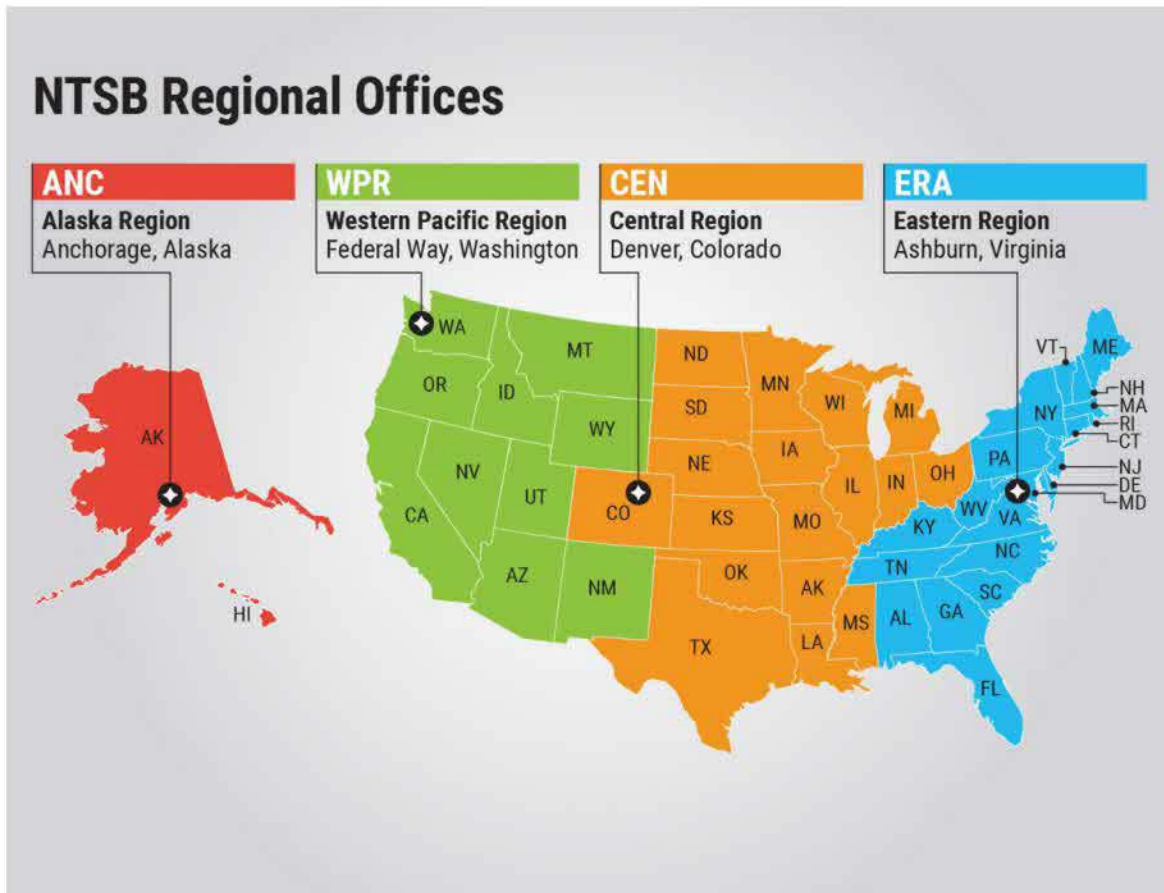


Open Safety Recommendations

The chart below displays the distribution by transportation mode of the 1,187 open safety recommendations as of September 30, 2019.



APPENDIX C: AVIATION SAFETY REGIONAL OFFICES



	Alaska Region	Western Pacific Region	Central Region	Eastern Region
Coverage Area	Alaska, Hawaii	Montana, Idaho, Utah, Arizona, Nevada, Washington, Oregon, California, Wyoming and New Mexico as well as the territories of Guam, American Samoa and Northern Mariana Islands	Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, Louisiana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, and Colorado	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, and Florida, as well as the District of Columbia, Puerto Rico, and the US Virgin Islands

APPENDIX D: HISTORICAL INFORMATION

NTSB Salaries and Expenses Funding History (in millions)

FY	Amount
2000*	\$56.8
2001*	\$62.8
2002*	\$67.9
2003*	\$72.0
2004*	\$73.1
2005*	\$76.1
2006*	\$75.9
2007	\$79.3
2008	\$84.4
2009	\$91.0
2010	\$98.0
2011*	\$97.8
2012	\$102.4
2013*	\$97.0
2014	\$103.0
2015	\$104.0
2016	\$105.2
2017	\$106.0
2018	\$110.4
2019	\$110.4

* Includes across-the-board rescissions

Current Board Members

Name	Board Title	Appointment	Term Expiration
Robert L. Sumwalt	Chairman	August 5, 2019	August 8, 2022
Bruce Landsberg	Vice-Chairman	July 25, 2018	December 31, 2022
Jennifer Homendy	Member	August 6, 2019	December 31, 2024
Michael Graham	Member	December 19, 2019	December 31, 2025
Thomas B. Chapman	Member	December 19, 2019	December 3, 2023

Emergency Fund Activity

Fiscal Year	Appropriations (Rescissions)	Obligation Activity	Balance	Purpose/Source
2000			\$2,000,000	No Activity
2001			\$2,000,000	No Activity
2002		\$491,687	\$1,508,313	Extraordinary costs related to the crash of American Airlines Flight 587 at Belle Harbor, NY
2003		\$4,914	\$1,503,399	Adjustment of FY 2002 Obligations
2004		(\$138,000)	\$1,641,399	Adjustment of FY 2002 Obligations
2004	\$358,601		\$2,000,000	Appropriation (P.L. 108-199)
2004	(\$2,116)		\$1,997,884	Rescission (P.L. 108-199)
2005			\$1,997,884	No activity
2006			\$1,997,884	No activity
2007			\$1,997,884	No activity
2008			\$1,997,884	No activity
2009			\$1,997,884	No activity
2010			\$1,997,884	No activity
2011			\$1,997,884	No activity
2012			\$1,997,884	No activity
2013			\$1,997,884	No activity
2014			\$1,997,884	No activity
2015			\$1,997,884	No activity
2016			\$1,997,884	No activity
2017			\$1,997,884	No activity
2018			\$1,997,884	No activity
2019			\$1,997,884	No activity

Training Center Costs and Revenues

	FY 2017	FY 2018	FY 2019
Earned revenue	\$954,567	\$1,164,133	\$1,133,921
Subleases	\$0	\$0	\$0
Total revenue	\$954,567	\$1,164,133	\$1,133,921
Costs:			
Pay	\$864,886	\$593,021	\$654,678
Travel	\$70,495	\$93,287	\$75,593
Contracts	\$339,963	\$228,087	\$392,599
Supplies	\$13,589	\$4,534	\$2,468
Equipment	\$6,849	\$0	\$0
Costs before space rental	\$1,295,782	\$918,929	\$1,125,338
Space rental	\$2,616,876	\$2,626,073	\$2,626,073
Total operating costs	\$3,912,658	\$3,545,002	\$3,751,411
Deficit	\$2,958,091	\$2,380,869	\$2,617,489

FTE Staffing at Year End by Headquarters and Field Offices

FY	Headquarters	Regional	Total
2000	346	81	427
2001	345	71	416
2002	337	89	426
2003	329	98	427
2004	314	107	421
2005	308	109	417
2006	286	101	387
2007	292	85	377
2008	286	102	388
2009	293	100	393
2010	283	101	384
2011	296	107	403
2012	304	108	412
2013	307	105	412
2014	299	103	402
2015	307	111	418
2016	304	115	419
2017	299	115	414
2018	291	112	403
2019	291	112	399

FTE Staffing by State and Region FY 2019

Location	Administration	Administrative Law Judges	Aviation Safety	Highway Safety	Information Technology & Services	Marine Safety	Policy & Direction	Railroad, Pipeline & Hazardous Materials	Research & Engineering	Safety Recommendations & Communications	Training Center	Total
Alaska			5									5
Colorado		1	11	1								13
Illinois			9		1			1				11
Indiana								1				1
Louisiana								1				1
Minnesota			2									2
Missouri			1									1
Texas		1	6	6				1				14
Wisconsin			1									1
Alabama			1									1
Connecticut			1									1
Delaware				1								1
Florida			3							1		4
Georgia			3							1		4
New Hampshire			1									1
New Jersey			1					1				2
New York			1									1
North Carolina			3									3
South Carolina												1
Tennessee				1								1
Virginia	1		10					1			3	15
Washington, DC	29	7	43	18	28	20	45	23	42	32		287
Arizona			2									2
California			7	1				4				12
Montana			1	1								1
Oregon			2	1								3
Washington			9	1								10
Grand Total	30	9	123	31	29	20	45	33	42	34	3	399

Alaska

Central Region

Eastern Region

Western

International Investigations

FY 2019 Investigation Costs by Accident*

Description	Location	Amount
A Lion Air B737 crashed into the Java Sea.	Jakarta, Indonesia	\$ 657,945
An Ethiopian Airline B737MAX crashed shortly after takeoff.	Addis Ababa, Ethiopia	\$ 444,281
The <i>USS John S McCain</i> collided with Tank Vessel <i>Alnic MC</i> east of Singapore.	Singapore, Republic of Singapore	\$ 112,765
An Agusta A109S helicopter impacted terrain shortly after takeoff.	Santa Maria Coronango, Mexico	\$ 98,939
A helicopter crashed shortly after departure into the Atlantic Ocean.	Big Grand Cay, Bahamas	\$ 97,929
An Air Niugini B737-800 crashed into lagoon on approach.	Chuuk, Federated States of Micronesia	\$ 72,657
A UPS flight rejected takeoff due to blown tire indication.	Incheon, Republic of Korea	\$ 64,647
US Navy destroyer <i>USS Fitzgerald</i> collided with Philippine-flagged MV <i>ACX Crystal</i> .	Yokosuka, Japan	\$ 51,648
An Air France A380 with Engine Alliance GP7200 engines had No. 4 engine fan and inlet cowling separation.	Goose Bay, Canada	\$ 47,929
A Korean Air A220 with PW1521 engines sustained turbine damage.	Busan, Republic of Korea	\$ 46,431
A B737 crashed shortly after takeoff.	Havana, Cuba	\$ 38,554
A Fly Jamaica B-757 experienced hydraulic failure and runway overrun during landing.	Georgetown, Guyana	\$ 37,814
Passenger vessel <i>Viking Sky</i> experienced main engine failure; vessel had to be evacuated	Molde, Norway	\$ 36,881
A TI-BEI Cessna 208B-0900 crashed during departure with no survivors.	Punta Islita, Costa Rica	\$ 31,027
A small fire broke out in tail of Dassault Falcon 7X at Changi Airport.	Singapore, Republic of Singapore	\$ 24,753
A St. Lazare, Manitoba, Canada, train derailed with DOT-117R Tank Cars.	St. Lazare Manitoba, Canada	\$ 19,925
A Boeing 777-300 experienced a main landing gear failure.	Narita, Japan	\$ 16,802
An ATR 42-500 crashed after reporting a No. 1 engine failure/shutdown.	Havelian, Pakistan	\$ 15,639

Description	Location	Amount
A Swiss International Airbus A220 had an inflight shutdown of the No. 1 engine.	Paris, France	\$ 15,523
A Honda HA-420 runway overrun occurred during landing.	Foz do Iguacu, Brazil	\$ 15,296
A Cessna Citation experienced in-commanded roll, possibly caused by a malfunction of the Tamarack Atlas Active Winglets.	Bournemouth, United Kingdom	\$ 13,728
A Bell 214B helicopter impacted remote mountainous terrain.	Dongducheon, Republic of Korea	\$ 13,087
A B777 encountered an electrical failure.	Belo Horizonte, Brazil	\$ 14,058
A Bravo Airways flight experienced a “thunder-gust,” resulting in a runway excursion.	Zhuliany, Ukraine	\$ 11,982
A Boeing 787 experienced lower engine thrust than commanded while descending.	Osaka, Japan	\$ 10,254
A US flagged container ship <i>APL Guam</i> collided with the bow of the Antigua Barbuda flagged container ship <i>Marcliff</i> . Following this collision, the <i>Marcliff</i> collided with the anchored vessel <i>Hansa Steinburg</i> .	Tokyo Bay, Japan	\$ 9,691
A Belgium Airlines A330 experienced a No. 1 engine flameout during cruise while flying.	Brussels, Belgium	\$ 9,275
A RJ85 powered by Honeywell (Lycoming LF507-1F) had an uncontained No. 1 engine turbine failure.	Bishkek, Kyrgyzstan	\$ 9,212
An Avior Airlines (Venezuelan) B737 tailstrike occurred on landing.	Callao, Peru	\$ 9,164
An Aerotransportes de Cargo Union operating as Tampa Cargo had 3 main landing gear tires that were damaged during braking.	Mexico City, Mexico	\$ 8,290
A B737 gear collapse occurred.	La Paz, Bolivia	\$ 7,403
On an Embraer 190-200, the pilot noticed a burning smell in the cockpit and declared an emergency.	Dublin, Ireland	\$ 7,293
A CRJ-700 experienced an internal engine failure shortly after takeoff.	East London, South Africa	\$ 7,117
A Peruvian Airline SAC B737-48E #1 engine quit during cruise flight.	Arequipa, Peru	\$ 6,760

Description	Location	Amount
A SA de CV Embraer ERJ190-100 IGW lost control during climb, and the aircraft was destroyed by impact and fire.	Durango, Mexico	\$ 6,474
A Piper PA-46-301P, N264DB, disappeared from radar 15 miles north of Guernsey, the Channel Islands, off the coast of France.	St. Peter Port, United Kingdom	\$ 6,205
A Boeing 747 overran runway 32 at Halifax Stanfield International Airport.	Halifax, Canada	\$ 6,162
Safe Skies for Africa	Senegal, Nigeria	\$ 22,785
Grand Total		\$ 2,126,327

*Report includes accidents, whether occurring in the current year or previously, with more than \$5,000 in FY 2019 expenses. Costs include payroll as well as travel and other direct costs incurred in FY 2019.

***Total International Accident Investigation Costs by Fiscal Year
2012 - 2019****

FY	Costs
2012 (a)	\$1,641,132
2013 (b)	\$2,366,274
2014 (c)	\$976,642
2015 (d)	\$1,838,241
2016 (e)	\$1,664,764
2017 (f)	\$826,248
2018 (g)	\$902,981
2019 (h)	\$2,126,327

* Beginning with FY 2012, the agency can capture both payroll and other direct costs (such as travel) through its cost accounting systems. The totals above reflect these costs.

- (a) Includes \$149,707 billed to DOT under the SSA Program.
- (b) Includes \$42,727 billed to DOT under the SSA Program.
- (c) Includes \$64,897 billed to DOT under the SSA Program.
- (d) Includes \$120,026 billed to DOT under the SSA Program.
- (e) Includes \$138,115 billed to DOT under the SSA Program.
- (f) Includes \$35,146 billed to DOT under the SSA Program.
- (g) Includes \$88,300 billed to DOT under the SSA Program.
- (h) Includes \$22,785 billed to DOT under the SSA Program.

Status of Action by State for Motor Vehicle Safety Recommendations

State	Child Passenger Safety	Primary Seat Belt Enforcement	Passenger Restriction (a)	Cell Phone	Ignition Interlock	Motorcycle Helmets
Alabama	Partial	Partial	Yes	Partial	Yes	Partial
Alaska	Yes	Yes	Yes	Partial	Yes	
Arizona	Yes		Partial	Partial		
Arkansas	Partial	Partial	Yes	Partial	Yes	
California	Yes	Yes	Yes	Partial		Yes
Colorado	Yes		Yes	Partial	Yes	
Connecticut	Yes	Partial	Yes	Partial	Yes	
Delaware	Yes	Yes	Yes	Partial	Yes	
District of Columbia	Yes	Yes	Yes	Partial	Yes	Partial
Florida	Partial	Partial		Partial		
Georgia	Yes	Partial	Yes	Partial		Yes
Hawaii	Yes	Yes	Partial	Partial	Yes	
Idaho	Partial		Partial	Partial		
Illinois	Yes	Yes	Yes	Partial	Yes	
Indiana	Yes	Yes	Yes	Partial		
Iowa	Partial	Partial		Partial		
Kansas	Yes	Yes	Partial	Partial	Yes	
Kentucky	Yes	Yes	Yes	Partial		
Louisiana	Yes	Yes	Partial	Partial	Yes	Yes
Maine	Yes	Yes	Yes	Partial	Yes	
Maryland	Yes	Yes	Partial	Partial	Yes	Partial
Massachusetts	Yes		Partial	Partial		Yes
Michigan	Yes	Partial	Yes	Partial		
Minnesota	Yes	Yes	Yes	Partial		
Mississippi	Partial	Yes		Partial	Yes	Partial
Missouri	Yes		Partial	Partial	Yes	Yes
Montana	Partial		Partial			
Nebraska	Yes		Partial	Partial	Yes	Yes
Nevada	Partial		Partial	Partial	Yes	Partial
New Hampshire	Partial		Yes	Partial	Yes	
New Jersey	Yes	Yes	Yes	Partial		Yes
New Mexico	Partial	Yes	Yes	Partial	Yes	
New York	Yes	Partial	Yes	Partial	Yes	Yes
North Carolina	Yes	Yes	Yes	Partial		Yes
North Dakota	Yes			Partial		
Ohio	Yes		Yes	Partial		

State	Child Passenger Safety	Primary Seat Belt Enforcement	Passenger Restriction (a)	Cell Phone	Ignition Interlock	Motorcycle Helmets
Oklahoma	Yes	Partial	Yes	Partial		
Oregon	Yes	Yes	Yes	Partial	Yes	Yes
Pennsylvania	Yes		Partial	Partial		
Rhode Island	Yes	Yes	Yes	Partial	Yes	
South Carolina	Yes	Yes	Partial	Partial		
South Dakota				Partial		
Tennessee	Yes	Partial	Yes	Partial	Yes	Yes
Texas	Yes	Yes	Yes	Partial	Yes	
Utah	Yes	Yes	Yes	Partial	Yes	
Vermont	Yes		Yes	Partial	Yes	Yes
Virginia	Yes		Yes	Partial	Yes	Partial
Washington	Yes	Yes	Yes	Partial	Yes	Yes
West Virginia	Yes	Yes	Yes	Partial	Yes	Partial
Wisconsin	Yes	Yes	Yes	Partial		
Wyoming	Yes		Partial	Partial		
Total	Yes = 39 + DC Partial = 10	Yes = 24 + DC Partial = 10	Yes = 31 + DC Partial = 14	Yes = 0 Partial = 49 + DC	Yes = 28 + DC	Yes = 13 Partial = 6 + DC

- (a) "Restriction" refers to drivers in the intermediate (also referred to as provisional or second) stage. Unless accompanied by a supervising driver who is at least 21 years old, these drivers are limited to no more than one passenger under age 20, family excepted, until they receive an unrestricted license for at least 6 months.

US Transportation Fatalities, 2018

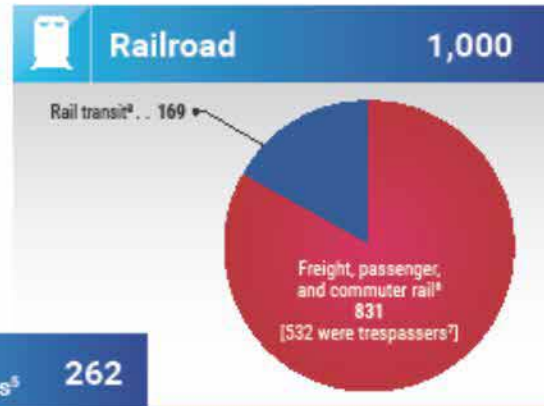
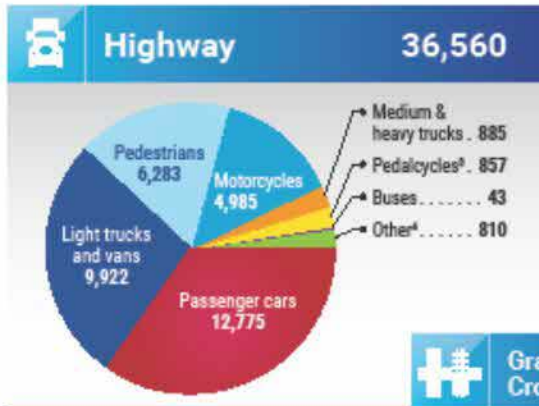


National Transportation Safety Board

US Transportation Fatalities in 2018¹ – by Mode

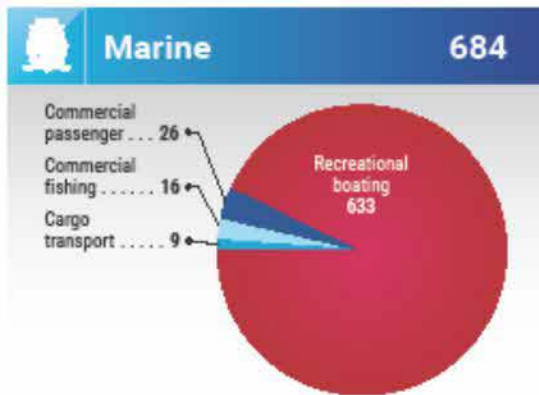
Total: 38,515²

Aviation data is sourced from the NTSB's [1999–2018 Preliminary Aviation Statistics](#). For other transportation modes, the NTSB used data from the Bureau of Transportation Statistics, [Transportation Fatalities by Mode](#).



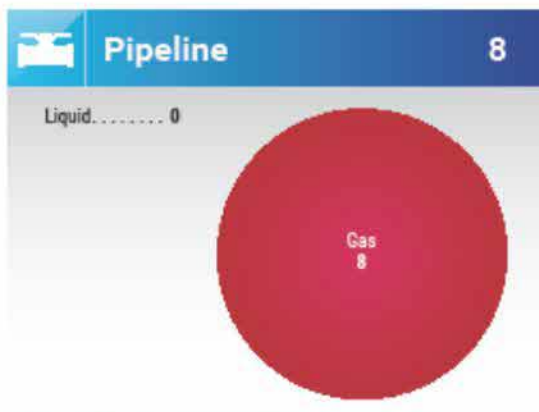
[National Highway Traffic Safety Administration](#)

[Federal Railroad Administration](#) and [Federal Transit Administration](#)



[Department of Homeland Security/US Coast Guard](#)

[National Transportation Safety Board](#)



[Pipeline and Hazardous Materials Safety Administration](#)

Footnotes

- ¹ Numbers for 2018 are preliminary estimates. Aviation data are from the [NTSB](#); marine data are reported by the US Department of Homeland Security; all other data are reported by the [US Department of Transportation](#).
- ² To reduce double counting, BTS excludes railroad fatalities involving motor vehicles at public highway-rail grade crossings and transit fatalities involving non-rail modes from the overall total fatalities.
- ³ Pedalcycles include bicycles and other cycles.
- ⁴ Other refers to occupants of other vehicle types, other non-motorists, and unknown.
- ⁵ Grade crossing fatalities are reported as a separate category but should not be added to the total because they are included in the highway and rail fatalities as appropriate.
- ⁶ Freight, passenger, and commuter rail data are reported by the Federal Railroad Administration. The FRA does not include suicides.
- ⁷ Trespassing fatalities are reported as a separate category but should not be added to the total because they are included in the freight, passenger, and commuter rail fatalities. Trespassing fatalities are not included for rail transit.
- ⁸ Rail transit data are reported by the Federal Transit Administration and include fatalities (including suicides) involving heavy rail, light rail, cable car, inclined plane, monorail/automated guideway, streetcar rail, and hybrid rail.
- ⁹ Total fatalities may not equal the sum of each category because accidents may involve multiple categories.
- ¹⁰ Foreign/unregistered includes non-US registered aircraft involved in accidents in the United States.

From: [Bryson Sharon](#)
To: [Patty Monahan](#); [Phillip Washington](#)
Cc: [Sledzik Paul](#); [Kantrowitz Susan](#)
Subject: NTSB response for Presidential Transition Team
Date: Thursday, December 10, 2020 6:53:19 PM
Attachments: [NTSB response to Presidential Transition Team meeting 12-10-2020.docx](#)

Mr. Washington and Ms. Monahan,

Thank you for taking time this morning to talk with us about the work of our agency. It was a pleasure to meet you and learn about the interest of the new administration.

The attached document is a compilation of information on both our accident investigations, safety studies and testimony on the specific areas of interest discussed during the meeting. Included is a link to our 2019 – 2020 Most Wanted List. As I mentioned, the 2021-2022 list is currently being developed and a draft will go before the five member Board March 9, 2021 for consideration and vote.

Also included for you is information with links to a range of completed investigations, safety studies and testimony regarding our work in the area of Roadway Safety. Specifically, there is information on automated vehicle safety, pedestrian safety, bicyclist safety, reducing speeding-related crashes, school bus safety, plus several other investigations conducted by the agency that we thought might be of interest to you.

In addition, regarding the duration of investigations, the NTSB has undertaken several key initiatives in the last two years to improve the timeliness of investigations while continuing to ensure their high quality. The agency has undertaken, with support and funding from Congress, a data collection and integration program known as the System for Analysis of Federal Transportation Investigations or SAFTI. This project has consolidated processes and data across the agency allowing for the management of our investigative and report development processes. This was launched September 30, 2020 and is already proving to be an invaluable tool. This will allow for the comprehensive, data-driven oversight of our accident investigations. It is our

NTSB Most Wanted List

- MWL List of issue areas: <https://www.nts.gov/safety/mwl/Pages/default.aspx>
- List of MWL recommendations: <https://www.nts.gov/safety/mwl/Documents/2019-20/2019-20-MWL-SafetyRecs.pdf>
- MWL public video: <https://www.youtube.com/watch?v=Cb1mlyHs-1g&feature=em-uploademail>

List of safety improvements resulting from NTSB investigations and studies (1967-2017)

50 YEARS OF TRANSPORTATION SAFETY IMPROVEMENTS

1967 - 2017

MULTIMODAL

- Reducing distraction**
 - State legislation to restrict use of personal electronic devices when driving
 - Federal and industry requirements for personal electronic devices use while operating vehicles
- Combatting fatigue**
 - Implementing fatigue management programs
 - Improving hours of service requirements
- Improving fitness for duty**
 - Recognizing obstructive sleep apnea as a widespread but treatable risk
 - Medical and physical requirements for operators
- Eliminating impairment**
 - Drug and alcohol testing for safety sensitive positions
- Installing/improving data, audio and video recorders**
- Implementing a safety culture**
 - Safety management systems/Risk management systems

HIGHWAY

- Mandatory seat belt use laws enactment/enforcement**
- Graduated driver licensing laws**
- Age 21 and .05 BAC drinking and driving laws**
- Pupil transportation and school bus safety, including lap/shoulder belts in school buses**
- Smart air bags and depowered passenger vehicle airbags**
- Child passenger safety including car seat inspection stations**
- Vehicle stability control and collision avoidance technology**
- Enforcement of commercial vehicle regulations**
- Motorcoach safety: post-crash fires, passenger lap/shoulder belts**
- Improved tunnel and bridge inspections**
- CNV brake improvements**
- Electronic logs for commercial vehicles**
- 15 passenger van safety: seat belts, crash worthiness, stability**
- Construction zone safety**
- Oversize vehicle pilot car guidelines and education**

AVIATION

- Floor-level escape lighting, fire-blocking seat coverings, lavatory smoke detectors, stronger cabin seats**
- Terrain avoidance and warning systems**
- Collision avoidance systems**
- Crew resource management**
- Thunderstorm/windshear avoidance technology/procedures**
- Eliminating explosive fuel tanks on airliners**
- Improved reporting of slippery runway conditions**
- Shoulder harnesses in general aviation**
- Air medical transport safety**

MARINE

- Boating while intoxicated laws**
- Survival gear for commercial fishing vessels**
- Personal flotation devices for children**
- Emergency position-indicating radio beacons (EPIRBs) on vessels**
- Immersion suits on vessels**
- Enclosed, firesafe, lifeboats on tankships**
- Coast Guard Cutter safety**
- Cruise ship fire safety**
- Gas inerting on large tank vessels**
- Bridge resource management**
- Safety management systems for towing industry vessels**

RAILROAD/TRANSIT

- Positive train control**
- 2-way end-of-train devices on freight trains**
- Passenger rail car safety standards**
- 1-800 emergency number posted at grade crossings**
- Standards for continuous welded rail**
- Revised track and switch inspection procedures**
- Tank car enhancements**

PIPELINE

- One-call systems before excavation (Call 811 Before You Dig)**
- Internal inspection devices to detect flaws/damage**
- Federal standards for pipeline safety on military bases**
- Integrity management**
- Facility response plan effectiveness and oversight**
- Eliminate grandfather clause for hydro testing of gas transmission lines**

HAZMAT

- Lithium ion battery carriage, packing, and loading**
- Hazard communications training for first responders, community planning, and preparedness**
- Tanker truck rollover prevention and crash protection**
- Enhance spill response planning/preparedness in marine operations**

NTSB Making Transportation Safer

50 YESTERDAY TODAY & TOMORROW

Roadway Safety Reports

Automated vehicle safety

The NTSB has conducted several recent investigations involving AV safety issues.

Chairman Sumwalt testimony in November 2019 before the Senate Committee on Commerce, Science, and Transportation on “Highly Automated Vehicles: Federal Perspectives on the Deployment of Safety Technology” is a good synopsis of the NTSB’s key findings and recommendations.

<https://www.nts.gov/news/speeches/RSumwalt/Documents/sumwalt-20191120.pdf>

Collision Between a Car Operating With Automated Vehicle Control Systems and a Tractor-Semitrailer Truck Near Williston, Florida May 7, 2016

- Report
<https://www.nts.gov/investigations/AccidentReports/Reports/HAR1702.pdf>
- Summary
<https://www.nts.gov/news/events/Documents/2017-HWY16FH018-BMG-abstract.pdf>
- Key Findings
 - The Tesla’s automated vehicle control system was not designed to, and could not, identify the truck crossing the Tesla’s path or recognize the impending crash. Therefore, the system did not slow the car, the forward collision warning system did not provide an alert, and the automatic emergency braking did not activate.
 - The Tesla driver’s pattern of use of the Autopilot system indicated an over-reliance on the automation and a lack of understanding of the system limitations.
 - If automated vehicle control systems do not automatically restrict their own operation to conditions for which they were designed and are appropriate, the risk of driver misuse remains.
 - The way in which the Tesla “Autopilot” system monitored and responded to the driver’s interaction with the steering wheel was not an effective method of ensuring driver engagement.
 - Tesla made design changes to its “Autopilot” system following the crash. The change reduced the period of time before the “Autopilot” system issues a warning/alert when the driver’s hands are off the steering wheel. The change also added a preferred road constraint to the alert timing sequence.
 - Fatigue, highway design and mechanical system failures were not factors in the crash. There was no evidence indicating the truck driver was distracted by cell phone use. While evidence revealed the Tesla driver was not attentive to the driving task, investigators could not determine from available evidence the reason for his inattention.

Collision Between a Sport Utility Vehicle Operating With Partial Driving Automation and a Crash Attenuator

- Report
<https://www.nts.gov/investigations/AccidentReports/Pages/HAR2001.aspx>
- Summary
<https://www.nts.gov/news/events/Documents/2020-HWY18FH011-BMG-abstract.pdf>

- Key Findings
 - *Driver Distraction.* The Tesla driver was likely distracted by a gaming application on his cell phone before the crash, which prevented him from recognizing that Autopilot had steered the SUV into a gore area of the highway not intended for vehicle travel. The driver was using a company-supplied phone, but his employer, Apple Inc., did not have a policy preventing cell phone use while driving. Strong company policy, with strict consequences for using portable electronic devices while driving, is an effective strategy in helping to prevent the deadly consequences of distracted driving. Additionally, an engineering solution to the distracted driving problem is needed. Electronic device manufacturers have the capability to lock out highly distracting functions of portable electronic devices when being used by an operator while driving, and such a feature should be installed as a default setting on all devices.
 - *Risk Mitigation Pertaining to Monitoring Driver Engagement.* The Tesla Autopilot system did not provide an effective means of monitoring the driver's level of engagement with the driving task, and the timing of alerts and warnings was insufficient to elicit the driver's response to prevent the crash or mitigate its severity. Requirements are needed for driver monitoring systems for advanced driver assistance systems that provide partial driving automation (SAE Level 2 systems), and Tesla needs to develop applications that more effectively sense the driver's level of engagement and that alert drivers who are not engaged.
 - *Risk Assessment Pertaining to Operational Design Domain.* Crashes investigated by the NTSB continue to show that the Tesla Autopilot system is being used by drivers outside the vehicle's operational design domain (the conditions in which the system is intended to operate). Despite the system's known limitations, Tesla does not restrict where Autopilot can be used. Tesla should incorporate system safeguards that limit the use of partial driving automation systems (Autopilot) to those conditions for which they were designed. Additionally, the National Highway Traffic Safety Administration has failed to develop a method for verifying that manufacturers of partial automation systems are incorporating system safeguards that are critical to ensuring the safety of the motoring public.
 - *Limitations of Collision Avoidance Systems.* The Tesla's collision avoidance assist systems were not designed to, and did not, detect the crash attenuator. Because this object was not detected, (a) Autopilot accelerated the SUV to a higher speed, which the driver had previously set by using adaptive cruise control, (b) the forward collision warning did not provide an alert, and (c) the automatic emergency braking did not activate. For partial driving automation systems to be safely deployed in a high-speed 3 operating environment, collision avoidance systems must be able to effectively detect potential hazards and warn of potential hazards to drivers.
 - *Insufficient Federal Oversight of Partial Driving Automation Systems.* The US Department of Transportation and the National Highway Traffic Safety Administration (NHTSA) have taken a nonregulatory approach to automated vehicle safety. NHTSA plans to address the safety of partial driving automation systems through enforcement and a surveillance program that identifies safety-related defect trends in design or performance. This strategy must address the risk of foreseeable misuse of automation and include a forward-looking risk

analysis. Additionally, NHTSA should complete a further evaluation of the Tesla Autopilot system to ensure the deployed technology does not pose an unreasonable safety risk.

- *Need for Event Data Recording Requirements for Driving Automation Systems.* Advanced driver assistance systems that provide partial automation collect significant safety relevant data that can be used for crash analysis and risk assessment. Currently, manufacturers provide limited access to this data and there is no standardization of retrievable data parameters. This report describes NTSB's previous safety recommendations and the inaction of federal regulators to address this important issue area that is needed to foster system safety improvements.

Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian (Uber self-driving test vehicle)

- Report
<https://www.nts.gov/investigations/AccidentReports/Reports/HAR1903.pdf>
- Summary
<https://www.nts.gov/news/events/Documents/2019-HWY18MH010-BMG-abstract.pdf>
- Key finding
 - *Need for safety risk management requirements for testing automated vehicles on public roads.* Although the National Highway Traffic Safety Administration has published three iterations of an automated vehicles policy, that summary guidance does not provide a means of evaluating an ADS. The absence of safety regulations and detailed guidance has prompted some states to develop their own requirements for automated vehicle testing. The report explores the roles of federal agencies, industry, and individual states in supporting the development of automation and ensuring public safety during ADS testing

Other Roadway Safety reports

Pedestrian Safety Special Investigative Report

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SIR1803.pdf>
- Summary
<https://www.nts.gov/news/events/Documents/2018-DCA15SS005-BMG-abstract.pdf>

Bicyclist Safety on US Roadways: Crash Risks and Countermeasures

- Report
<https://www.nts.gov/safety/safety-studies/Pages/SS1901.aspx>
- Summary
<https://www.nts.gov/news/events/Documents/2019-DCA18SS002-abstract.pdf>

Reducing Speeding-Related Crashes Involving Passenger Vehicle

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SS1701.pdf>
- Summary
<https://www.nts.gov/news/events/Documents/2017-DCA15SS002-BMG-Abstract.pdf>

School Bus transportation safety

- The NTSB has done several reports on school bus safety, and all are captured on a school bus safety webpage
<https://www.nts.gov/safety/Pages/schoolbuses.aspx>

Select Risk Factors Associated with Causes of Motorcycle Crashes

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SR1801.pdf>
- Summary
<https://www.nts.gov/safety/safety-studies/Pages/SR1801.aspx>

Stretch Limousine Run-Off-Road Crash

- Report
<https://www.nts.gov/investigations/AccidentReports/Reports/HAR2003.pdf>
- Summary
<https://www.nts.gov/investigations/AccidentReports/Pages/HAR2003.aspx>
- Associated report “Providing Occupant Protection for Limousine Passengers”
<https://www.nts.gov/investigations/AccidentReports/Reports/HSR1902.pdf>

Crashes Involving Single-Unit Trucks that Resulted in Injuries and Deaths

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SS1301.pdf>
- Summary
<https://www.nts.gov/safety/safety-studies/Pages/SS1301.aspx>

Selected Issues in Passenger Vehicle Tire Safety

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SIR1502.pdf>
- Summary
https://www.nts.gov/news/events/Documents/2015_tiresafety_BMG_Abstract.pdf

Equity

The NTSB has not looked specifically at equity across populations during our investigations, but several recent studies have touched on issues related to equity. In addition to aspects of those listed above, these include:

Migrant worker bus transportation safety

- Report
<https://www.nts.gov/investigations/AccidentReports/Pages/HAR1705.aspx>
- Abstract
<https://www.nts.gov/news/events/Documents/2017-HWY16MH019-BMG-abstract.pdf>

Forum: Trains and Trespassing: Ending Tragic Encounters

https://www.nts.gov/news/events/Pages/2015_trespassing_FRM_Agenda.aspx

Curbside Motorcoach Safety

- Report
<https://www.nts.gov/safety/safety-studies/Pages/SR1102.aspx>

Integrity Management of Gas Transmission Pipelines in High Consequence Areas

- Report
<https://www.nts.gov/safety/safety-studies/Documents/SS1501.pdf>
- Summary
<https://www.nts.gov/safety/safety-studies/Pages/SS1501.aspx>

expectation that this will allow us to more effectively manage our investigative and report development processes gaining much needed efficiencies across the agency.

Concurrently with this data collection process we have launched a project to look specifically at the timeliness of our general aviation accident investigations. The Aviation Report Timeliness Project (ARTP) launched in March 2019. This project formalized the investigative classification system being used allowing us to focus our limited resources on the most important work. While this is relatively new, we are already realizing significant benefits. Although this is specifically focused on general aviation the model is already being used by all modes as a template for their investigative process. We understand the importance of timely accident investigations and are committed to improvements while maintaining the quality of our products.

Again, thank you for the opportunity to meet and begin to describe the critical safety work of the NTSB! Please let us know if you have additional questions.

Sincerely,
Sharon

Sharon W. Bryson
Managing Director
National Transportation Safety Board

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NTSB Organization (AS OF 3/5/2020)

