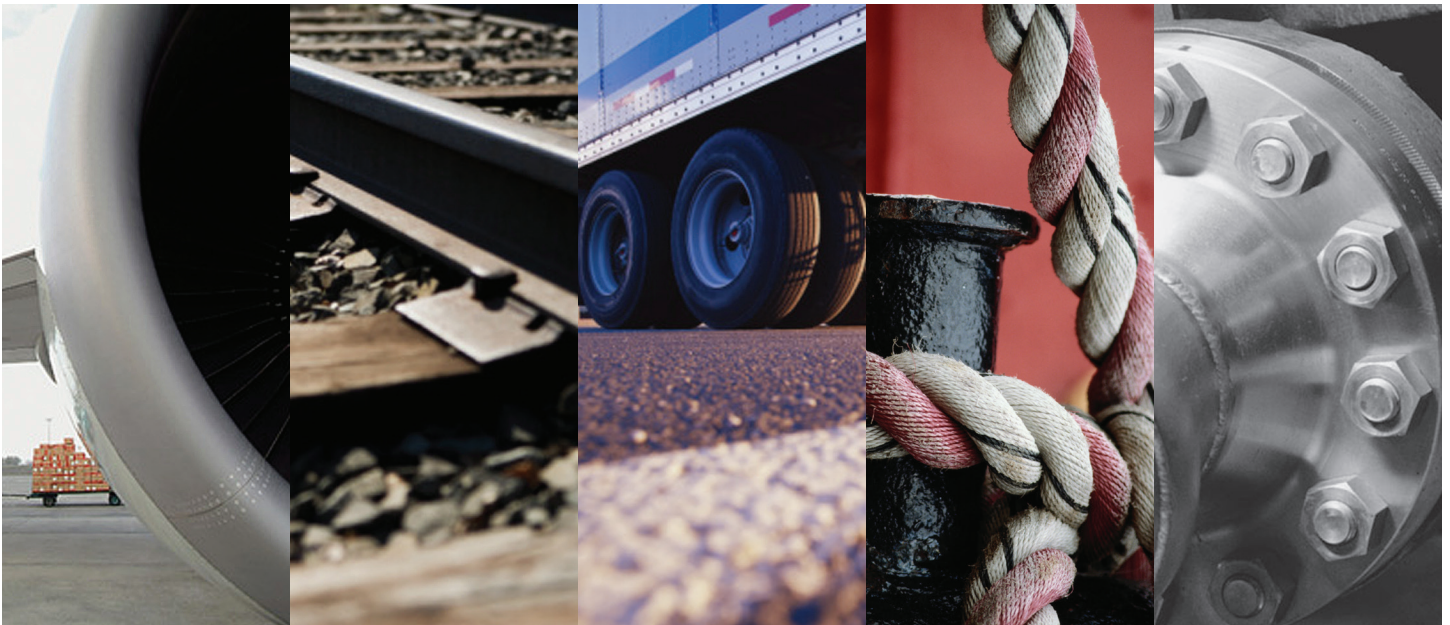


NATIONAL TRANSPORTATION SAFETY BOARD

# FISCAL YEAR 2022 BUDGET REQUEST





# National Transportation Safety Board

Washington, DC 20594

Office of the Chairman

May 27, 2021

The Honorable Kamala D. Harris  
President  
United States Senate  
Washington, DC 20510

The Honorable Nancy Pelosi  
Speaker  
United States House of Representatives  
Washington DC 20515

Dear Madam 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 \$121.4 million for fiscal year (FY) 2022. This funding level is an increase of \$3.0 million from the FY 2021 enacted appropriation level of \$118.4 million and funds 412 full-time equivalent positions.

We are proud of the products and initiatives highlighted in this submission. They not only reflect our agency's accomplishments in the past year, but also outline initiatives that will enable 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 meet these needs through the \$3.0 million increase in the President's budget request. This increase will also support our continued success in improving the quality and quantity of investigation-related data, refining processes for the implementation of 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 \$121.4 million provides sustained support of this mission.

Sincerely,

Handwritten signature of Robert L. Sumwalt, III in blue ink.

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-Balart  
Ranking Member  
Subcommittee on Transportation, HUD, and  
Related Agencies  
Committee on Appropriations  
US House of Representatives

The Honorable Brian Schatz  
Chairman  
Subcommittee on Transportation, HUD, and  
Related Agencies  
Committee on Appropriations  
US Senate

The Honorable Susan Collins  
Ranking Member  
Subcommittee on Transportation, HUD, and  
Related Agencies  
Committee on Appropriations  
US Senate

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## ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ADS	automated driving system
ADS-B	automatic dependent surveillance – broadcast
BH	the Bahamas
BTS	Bureau of Transportation Statistics
CAROL	Case Analysis and Reporting Online
CDC	Centers for Disease Control and Prevention
<i>CFR</i>	<i>Code of Federal Regulations</i>
CIDER	Crash Investigation Data Extraction and Readout
COVID-19	Coronavirus Disease 2019 (the worldwide pandemic)
CSX	CSX Transportation
CVR	cockpit voice recorder
dba	doing business as
DOT	US Department of Transportation
DUKW	World War II-era amphibious passenger vessel
EEO	Equal Employment Opportunity
FAA	Federal Aviation Administration
FDR	Flight Data Recorder
FEHB	Federal Employees Health Benefits
FERS	Federal Employees Retirement System
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FRA	Federal Railroad Administration
FTA	Federal Transit Administration

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FTE	full-time equivalent
FY	fiscal year
GMDSS	Global Maritime Distress and Safety System
GSA	General Services Administration
HEMS	helicopter emergency medical services
ICAO	International Civil Aviation Organization
IIC	investigator-in-charge
IMO	International Maritime Organization
INTERPOL	International Criminal Police Organization
IT	information technology
MAIIF	Marine Accident Investigators' International Forum
MEDICS	Medical Information Catalog System
MI	the Marshall Islands
mph	miles per hour
MV	motor vessel
MWL	Most Wanted List
NIOSH	National Institute for Occupational Safety and Health
NTSB	National Transportation Safety Board
OMB	Office of Management and Budget
NHTSA	National Highway Traffic Safety Administration
PED	personal electronic device
PHMSA	Pipeline and Hazardous Materials Safety Administration
PREVIEW	Protected Recording Viewer
PTC	positive train control
PVA	Passenger Vessel Association

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RAPTR	Rome Audio Processing Tool
Ripley/Ride The Ducks	Ripley Entertainment Inc. dba Ride The Ducks Branson
SAFTI	System for Analysis of Federal Transportation Investigations
SES	Senior Executive Service
SL	senior level
SPV	small passenger vessel
SQL	Structured Query Language
SR	State Route
SS	steamship
SSA	Safe Skies for Africa
ST	scientific and professional
sUAS	small unmanned aircraft system
SUV	sport utility vehicle
TDA	NTSB Transportation Disaster Assistance Division
VRU	vulnerable road user
VTS	vessel traffic service
UAS	unmanned aircraft system
<i>U.S.C.</i>	<i>United States Code</i>

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## 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 \$121.4 million for fiscal year (FY) 2022. This funding level is an increase of \$3.0 million from the FY 2021 enacted appropriation level of \$118.4 million and funds 412 full-time equivalent positions (FTE).

People are our primary resource, and personnel and payroll costs consume most of our funding. The \$3.0 million 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. The impact of these workload requirements is most significant in our Safety Recommendations, Safety Advocacy, and Transportation Disaster Assistance divisions. The requested funding increase will provide for modest progress toward full staffing levels.

The COVID-19 pandemic that necessitated a nationwide lockdown beginning in March 2020 and government-wide maximum telework since then affected all offices and divisions of the NTSB. Despite the many challenges posed, the agency adjusted, continuing operations despite those challenges. Although travel to accident scenes has been limited throughout the pandemic, we have continued to investigate accidents and to achieve our mission—even making improvements to our systems and processes—during a most difficult time.

The agency made strong progress in the area of improving the quality and quantity of investigation-related data, for example, during FY 2020. 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 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 the initiative, as well as to update and upgrade such systems as the docket management system and the agency website, which help us address the information needs of the public and stakeholders.



This budget request submission highlights some of our many accomplishments achieved in FY 2020. 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 constantly work to improve transportation safety for the American people.

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## 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 and select accidents involving freight trains 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 transportation 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 FAA.
- Review appeals from airmen and merchant seamen whose certificates have been revoked or suspended by the FAA and the US 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

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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 nearly 150,000 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 over 15,100 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, minimize injuries, 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 comprises appointees nominated by the President and confirmed by the Senate. A Chairman (one of the five Members, nominated separately to this position by the President and confirmed separately by the Senate) serves as the chief executive officer of the NTSB. The President designates another 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



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## RESOURCE REQUIREMENTS

### Appropriations Language

#### ***Salaries and Expenses - 950310***

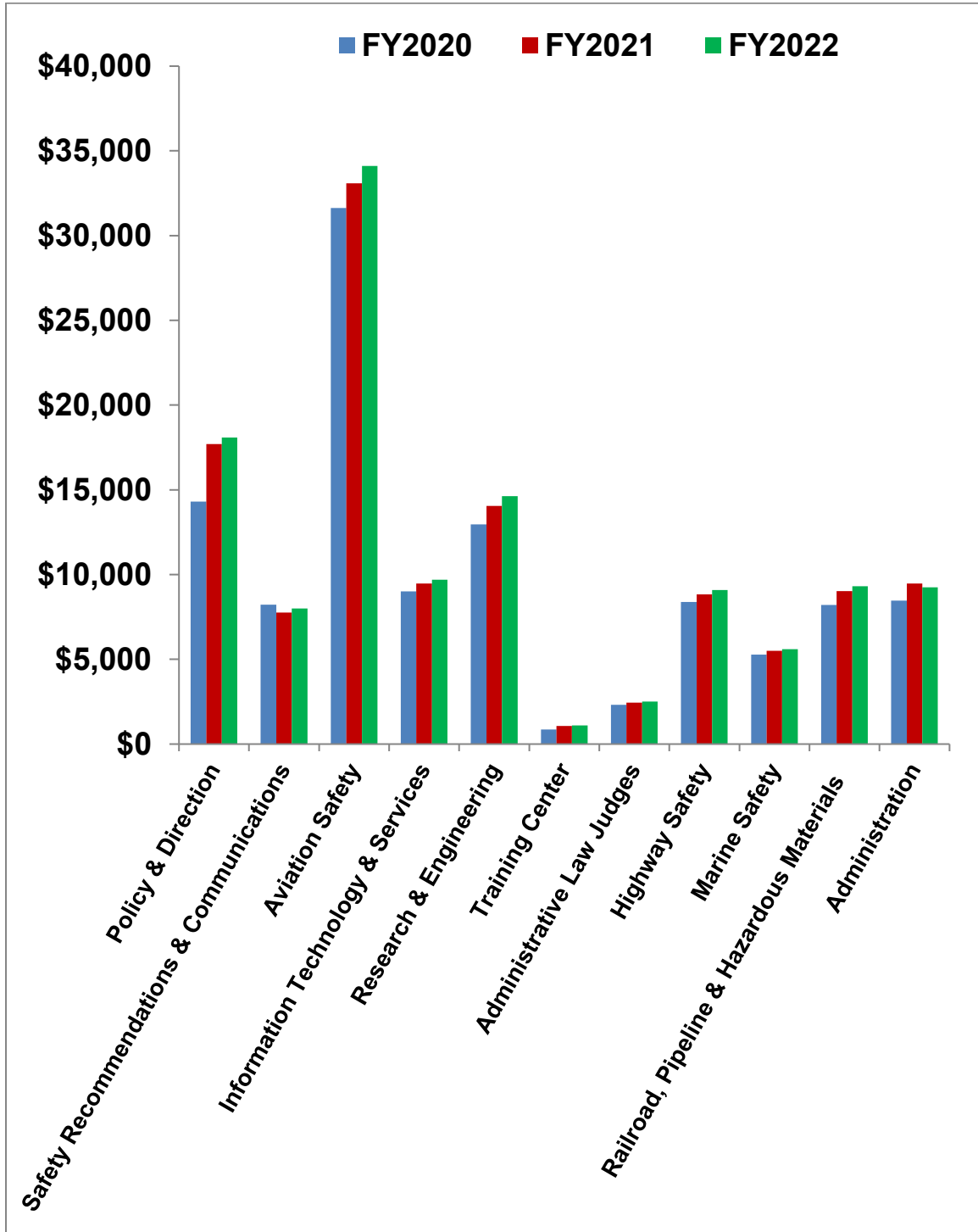
“For necessary expenses of the National Transportation Safety Board, including hire of passenger motor vehicles and aircraft; services as authorized by 5 *U.S.C.* 3109, but at rates for individuals not to exceed the per diem rate equivalent to the rate for a GS-15; uniforms or allowances therefor, as authorized by law (5 *U.S.C.* 5901-5902), \$121,400,000 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 2022.

## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

*Obligations by Program Activity (\$000s)*



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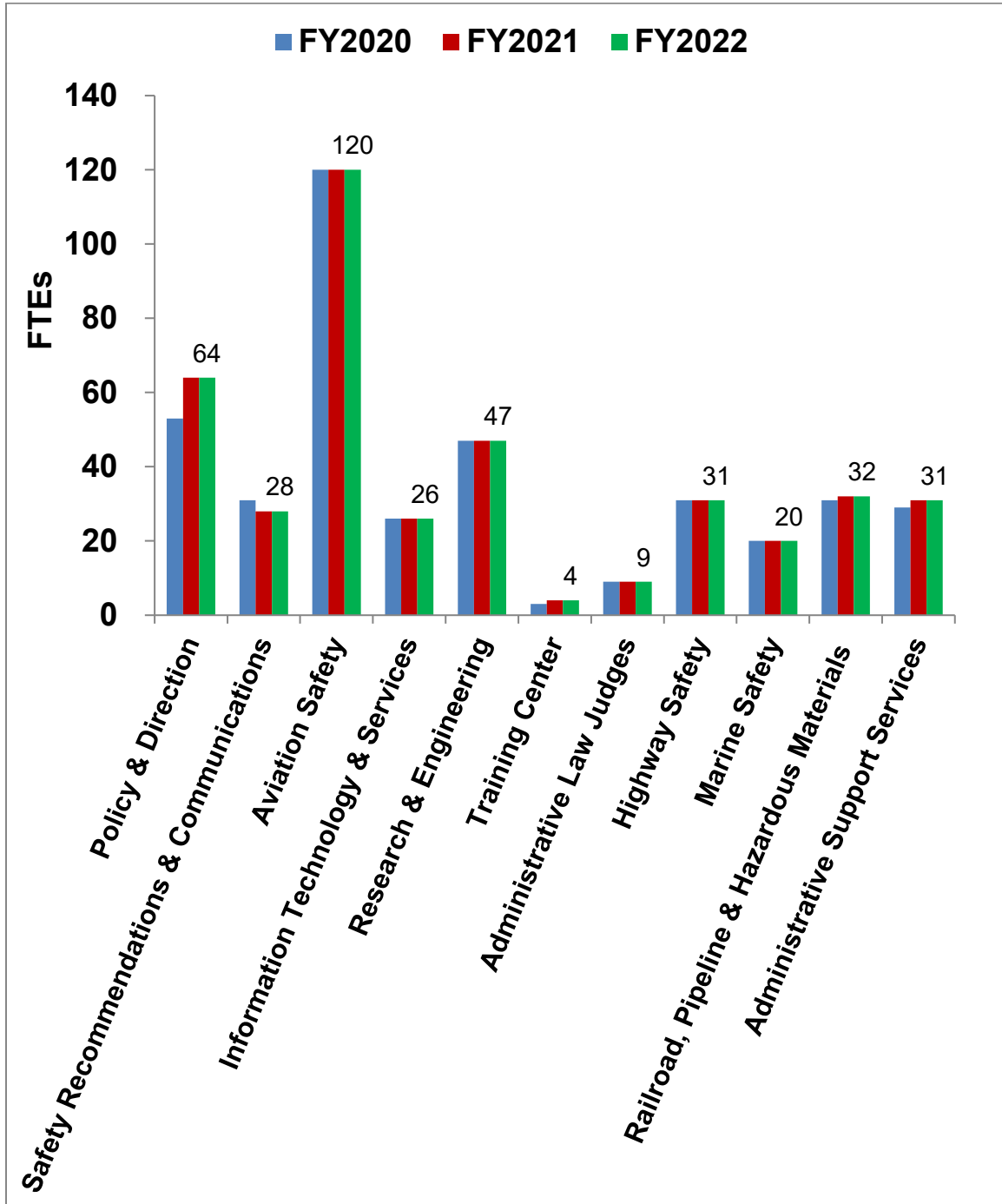
## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

### *Obligations by Program Activity (\$000s)*

Identification Code: 95-0310-0-1-407	FY 2020	FY 2021	FY 2022
Policy and Direction	14,300	17,697	18,087
Safety Recommendations and Communications	8,223	7,754	7,996
Aviation Safety	31,626	33,082	34,112
Information Technology and Services	9,013	9,470	9,690
Research and Engineering	12,962	14,045	14,630
Training Center	857	1,074	1,108
Administrative Law Judges	2,309	2,438	2,516
Highway Safety	8,385	8,829	9,096
Marine Safety	5,276	5,509	5,602
Railroad, Pipeline, and Hazardous Materials Investigations	8,210	9,029	9,311
Administration	8,471	9,472	9,252
<b>Total</b>	<b>109,631</b>	<b>118,400</b>	<b>121,400</b>

## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

### Staffing by Program Activity





## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

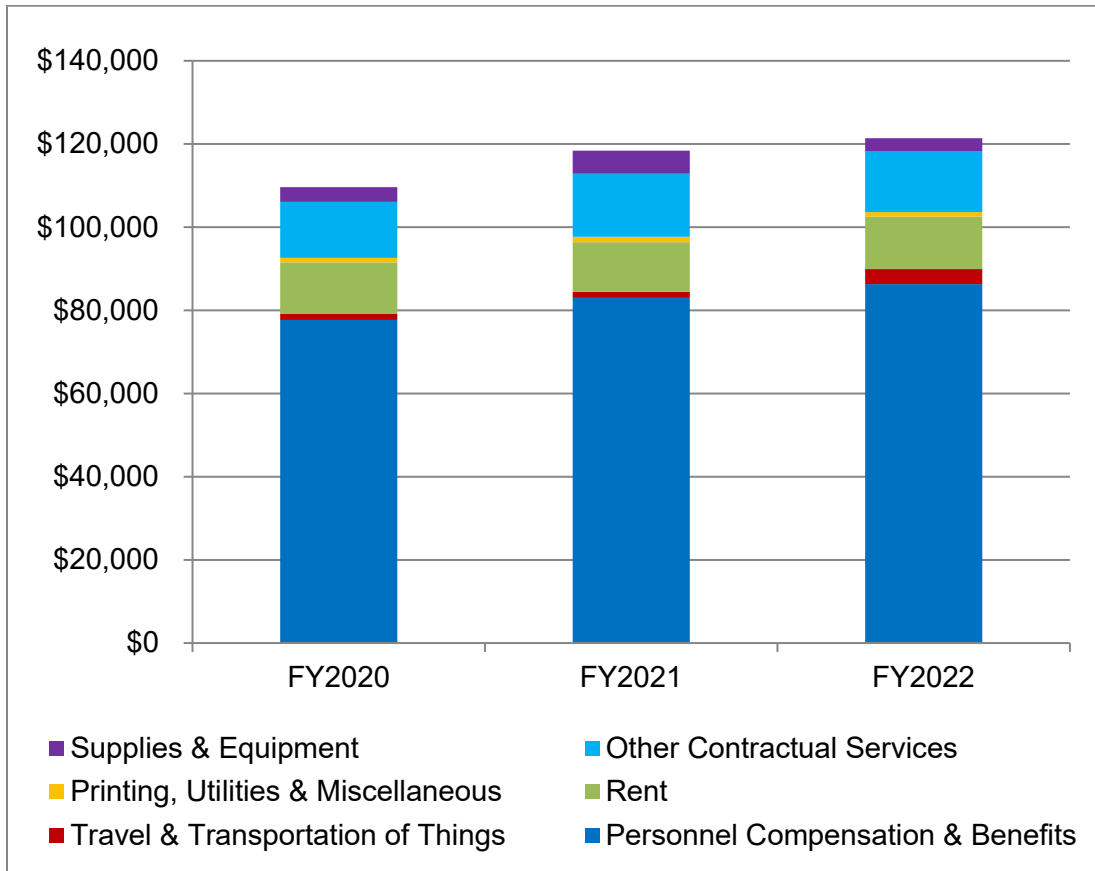
### *Staffing by Program Activity*

Identification Code: 95-0310-0-1-407	FY 2020	FY 2021	FY 2022
<b>Policy and Direction</b>	<b><u>53</u></b>	<b><u>64</u></b>	<b><u>64</u></b>
Chairman, Vice Chairman, Board Members*	12	15	15
Office of the Managing Director	18	23	23
Office of the General Counsel	7	9	9
Office of the Chief Financial Officer	13	14	14
Office of Equal Employment Opportunity, Diversity & Inclusion	3	3	3
<b>Safety Recommendations and Communications</b>	<b>31</b>	<b>28</b>	<b>28</b>
<b>Aviation Safety</b>	<b>120</b>	<b>120</b>	<b>120</b>
<b>Information Technology and Services</b>	<b>26</b>	<b>26</b>	<b>26</b>
<b>Research and Engineering</b>	<b>47</b>	<b>47</b>	<b>47</b>
<b>Training Center</b>	<b>3</b>	<b>4</b>	<b>4</b>
<b>Administrative Law Judges</b>	<b>9</b>	<b>9</b>	<b>9</b>
<b>Highway Safety</b>	<b>31</b>	<b>31</b>	<b>31</b>
<b>Marine Safety</b>	<b>20</b>	<b>20</b>	<b>20</b>
<b>Railroad, Pipeline, and Hazardous Materials Investigations</b>	<b>31</b>	<b>32</b>	<b>32</b>
<b>Administration</b>	<b>29</b>	<b>31</b>	<b>31</b>
<b>Total</b>	<b>400</b>	<b>412</b>	<b>412</b>

\* FY 2021 and FY 2022 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)*

<b>Identification Code: 95-0310-0-1-407</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>
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**Personnel Compensation and Benefits:**

11.1	Permanent Positions	54,046	56,099	57,614
11.3	Positions Other Than Permanent	2,207	2,958	3,038
11.5	Other Personnel Compensation	1,751	2,593	3,124
	<b>Total Personnel Compensation</b>	<b>58,004</b>	<b>61,651</b>	<b>63,776</b>
12.1	Personnel Benefits	19,718	21,324	22,522
	<b>Subtotal, Personnel Compensation and Benefits</b>	<b>77,722</b>	<b>82,975</b>	<b>86,298</b>

**Other Than Personnel Compensation and Benefits:**

21.0	Travel and Transportation of Persons	1,449	1,379	3,569
22.0	Transportation of Things	66	70	70
23.1	Rental Payments to General Services Administration	9,626	9,142	9,859
23.2	Rental Payments to Others	2,669	2,803	2,709
23.3	Communications, Utilities, and Miscellaneous Charges	994	1,234	1,042
24.0	Printing and Reproduction	100	105	105
25.0	Other Contractual Services	13,444	15,120	14,636
26.0	Supplies and Materials	702	951	951
31.0	Equipment	2,859	4,623	2,161
99.9	<b>Total Obligations</b>	<b>109,631</b>	<b>118,400</b>	<b>121,400</b>

**Personnel Summary:**

FTE Employment	400	412	412
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## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

### Analysis of Changes - FY 2021 to FY 2022

\$ 330 Staffing Changes

The requested funding level provides for an FTE level of 412, equal to the FTE level supported by the FY 2021 Budget Request.

\$ 1,778 Pay Increase

Funds to cover the pro-rated impact of a projected FY 2022 2.7 percent pay raise effective January 1, 2022.

\$ 1,215 Other Personnel Compensation Increase

Funds to cover other personnel-related compensation including the FY 2022 increase in the Federal Employees Retirement System (FERS) and Federal Employees Health Benefits (FEHB) contribution rates.

\$ (324) Program Investments & Operational Expenses

Slight reduction in overall operating expenses due to a high level of program investments in FY 2021.

\$ 3,000 Total

### Summary of Changes

\$ 118,400 FY 2021 level (supports 412 FTEs)

\$ 3,000 Total Increase/Decrease

\$ 121,400 FY 2022 Level (supports 412 FTEs)

## NATIONAL TRANSPORTATION SAFETY BOARD SALARIES AND EXPENSES

### *Non-SES/SL/ST Awards*

The following information outlines Non–Senior Executive Service/Senior Level/Scientific and Professional (Non–SES/SL/ST) Awards spending as a percentage of Non–SES/SL/ST Salary spending for FY 2020 allotted funds, FY 2021, and FY 2022.

	<b>Non–SES/SL/ST Salary Spending (\$000s)</b>	<b>Awards %</b>
FY 2020 Actual	\$51,950	1.4%
FY 2021 Estimate	\$54,689	2.4%
FY 2022 Request	\$56,185	2.4%

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## POLICY AND DIRECTION

	(\$000s)	FTEs
FY 2021 Estimate	\$17,697	64
FY 2022 Request	\$18,087	64
Increase/Decrease	\$390	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. 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 the executive, investigative, and administrative functions of the agency. The office coordinates the activities of the entire staff, manages the day-to-day operation of the agency, develops policies, and recommends plans to achieve program objectives. The Managing Director is responsible for the overall leadership, direction, and performance of the agency.

The Office of the Managing Director was realigned in early 2020 to (1) create a more effective span of control within the Managing Director’s office by establishing two Deputy Managing Directors and dividing pertinent workload between them, (2) provide more oversight and direction for the agency’s accident investigation processes, from launch to

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product completion, (3) increase focus by the Managing Director on the overall management of the agency, including strategic planning, and (4) improve management and accountability over the agency's business and support offices.

The Deputy Managing Director for Investigations oversees the agency's transportation investigations and functions. All modal investigative offices and the Office of Research and Engineering report to this Deputy.

The Principal Deputy Managing Director for Management and Operations has responsibility for the management and oversight of agency non-investigative operations and administrative programs. The Offices of the Chief Information Officer and Administration now report directly to this position, as do the Training Center and the Executive Secretariat. 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.

Additionally, a Special Operations Division was established to coordinate the agency's involvement in special access programs and to serve as the primary interagency liaison with the Federal Bureau of Investigation; federal, state, and local emergency response organizations, and other pertinent first responder agencies. The Response Operations Center, which 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, is under the Special Operations Division.

The realignment of the Transportation Disaster Assistance (TDA) Division from the Office of Safety Recommendations and Communications to the Principal Deputy Managing Director for Management and Operations reflects TDA's extensive support of investigative operations and outreach to first responder organizations; transportation operators; and local, state, and federal agencies regarding agency operations. These are activities governed within the Managing Director's span of control, and the move bolsters the coordination of effort and policy. This move also provides senior agency support for TDA's legislated mandates and the peer support and stress awareness programs under the employee assistance program.

TDA ensures that the agency meets its statutory obligations under the Aviation Disaster Family Assistance Act (49 *U.S.C.* section 1136) and the rail passenger disaster family assistance provisions of the Rail Safety Improvement Act of 2008 (49 *U.S.C.* section 1139). This effort 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. Additional information on TDA activities can be found in Appendix C.

Also, effective July 1, 2020, the Safety Division, formerly a division of the Office of Administration, was realigned to the Office of the Managing Director and renamed the Occupational Safety and Health Division. This was done to ensure that a systematic and

comprehensive process for assessing and managing risk to the workforce is managed at the highest level of the organization. The Chief of the Occupational Safety and Health Division reports directly to the Managing Director.

The Occupational Safety and Health 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 to reduce the potential for human and economic losses associated with incidents and accidents.

### ***Office of the General Counsel***

The Office of the General Counsel serves as the chief legal officer of the agency and ensures the proper implementation of the NTSB's statutory responsibilities relating to transportation safety. Specifically, the office advises agency officials on legal and policy issues arising under the NTSB's governing legislation and regulations, and on other administrative law matters. Office staff provide an 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. The Office of the General Counsel also administers the agency's ethics program; provides legal reviews of contracts and acquisition documents; and makes release determinations of official information for use in litigation not involving the United States. In addition, the office 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; and represents the NTSB (or assists the Department of Justice) in administrative or judicial forums in personnel matters, in litigation arising from the agency's accident investigation responsibilities, and in other matters in which the agency has an interest. Finally, the Office of the General Counsel provides internal legal assistance and guidance regarding all other aspects of NTSB accident and incident investigations, such as 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 manages the agency's financial resources, develops NTSB budget requests for submission to the Office of Management and Budget (OMB) and Congress, and executes the budget for resources appropriated to the NTSB by Congress. The office also prepares the agency's financial statements as required by the Accountability of Tax Dollars Act, oversees property and inventory control programs and the agency's travel and charge card programs. Additionally, the office is responsible for



agency accounting and financial policy and for overseeing internal controls to comply with the requirements of the Federal Managers' Financial Integrity Act.

### ***Office of Equal Employment Opportunity, Diversity, and Inclusion***

The Office of Equal Employment Opportunity (EEO), Diversity, and Inclusion 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 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. The office's 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.

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## SAFETY RECOMMENDATIONS AND COMMUNICATIONS

	(\$000s)	FTEs
FY 2021 Estimate	\$7,754	28
FY 2022 Request	\$7,996	28
Increase/Decrease	\$242	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of Safety Recommendations and Communications comprises five divisions: Media Relations, Government and Industry Affairs, Safety Advocacy, Safety Recommendations, and Digital Services. The office 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; and the public. The office'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 its activities and disseminating information about NTSB activities to the public via mass media. This includes collaborating with other Office of Safety Recommendations and Communications divisions to ensure the integrated, coordinated, and synchronized release of information, including imagery, the division's 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 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 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 support for forums, meetings, roundtables, and other special investigative events.
- Providing guidance and training to members of the transportation industry to align their communications with the NTSB party agreement for 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 Safety Advocacy Division in support of its advocacy programs.

## ***Safety Advocacy Division***

This division is responsible for the following:

- Developing and administering the NTSB’s Most Wanted List of Transportation Safety Improvements (MWL). The MWL is the agency’s preeminent advocacy tool, highlighting the top safety improvements that can be made to prevent accidents, minimize injuries, and save lives. A new list is announced biennially. Although the NTSB actively advocates for the implementation of all its safety recommendations, follow-up efforts are generally more intensive for recommendations related to 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 Government and Industry Affairs 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 safety advocacy organizations and providing information on NTSB activities and safety recommendations.

## ***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 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 2020, the division efforts generated more than 211,895 print, online, and broadcast media mentions of our investigative work. This included high-visibility investigations such as the Calabasas, California, helicopter crash, and Board meetings for the Schoharie, New York, limousine crash; Carey, Ohio freight train collision; and the Atlas Air cargo plane crash in Anahuac, Texas. During the pandemic the division worked with the Office of the Chief Information Officer to develop and implement a virtual media briefing capability to coincide with the agency’s move to virtual Board meetings.

A total of 439 unique hyperlinks were created and used in 51 news releases, 22 media advisories, and 672 tweets to drive web traffic to NTSB online products and information; those links received more than 224,028 clicks. Staff published 85 images to the NTSB Flickr account, earning a total of 559,419 views, demonstrating the value of the use of compelling imagery in the division’s products.

The division’s news releases and media advisories continue to earn an above-average open rate of 25 percent, slightly above the 21 percent accepted industry standard for government communications.

The division continues to provide media relations training to NTSB staff and transportation industry communicators, instructing 617 people in 12 sessions held throughout FY 2020.

## ***Government and Industry Affairs Division***

The division has 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 2020 staff prepared Board Members and senior staff to testify at a congressional hearing regarding the foreign investigations of aviation accidents involving the Boeing 737 MAX. In addition, staff provided support on congressional hearings on maritime vessel safety and autonomous vehicles, as well as a confirmation hearing for a new Board Member. The division also supported staff testimony and legislative advocacy on the following topics before various state legislatures: distracted driving in South Carolina and Ohio, occupant protection in Massachusetts, pedestrian safety in Maryland, and impaired driving in Hawaii.

The division has further supported three accident launches on scene and the remaining major launches and general aviation regional investigations from headquarters. As each of these investigations continues, the division is the main point of contact for additional outreach to and inquiries from Congress, state, and local officials.

## ***Safety Advocacy Division***

In FY 2020, this division supported 45 advocacy and outreach activities on issues related to the MWL and other critical recommendations. In addition, the division supported 15 Board Member trips or virtual presentations, developing legislative testimony related to MWL issue areas, and briefing state representatives on occupant protection, impairment, and distraction. Staff also began development of the 2021–2022 MWL.

In the spring of 2020, the division shifted to conducting advocacy efforts virtually due to the pandemic. Staff collaborated with the National Safety Council and the Insurance Institute for Highway Safety to host two virtual Transportation Communicators and Advocates breakfasts that focused on how attendees were navigating the communications space during the pandemic. Staff launched a digital and social media safety advocacy campaign (#SafetyReminder) to remind the traveling public and commercial vehicle operators to make transportation safety a priority as the nation reopened after lockdown. This campaign supports the agency’s mission of saving lives, preventing injuries, and reducing property damage in transportation.

Division staff continued to share NTSB advocacy information with stakeholders and to highlight progress on MWL issues via two *Advocacy Spotlight* digital newsletters and 111 e-mail notifications related to events, reports, investigative findings, and MWL-related information. Staff reached over 191,000 people via hundreds of messages on Twitter, Facebook, LinkedIn, Instagram, YouTube, and Flickr. In addition, the division posted 30 blogs written by NTSB Board Members and staff to promote transportation safety and produced eight episodes of the “Behind the Scene @ NTSB” podcast, which highlighted

agency activities, staff, and programs. The division also supported webinars on MWL topics specific to unique audiences and recommendation recipients.

### ***Safety Recommendations Division***

In FY 2020, the division reviewed and analyzed 222 responses from recommendation recipients and developed recommendation classification responses to those letters for Board review and approval. Staff generated 176 follow-up letters for recommendation recipients who had not responded to NTSB safety recommendations and assisted the modal offices in developing and issuing 159 new safety recommendations during the report-planning phase of 29 accident investigations and studies. In addition, the division developed numerous reports and data summaries on specific recommendation topics to support NTSB Board Members, other agency staff, the media, and the public.

Staff also initiated a program to classify and follow up on actions states have taken in response to NTSB recommendations, including legislation that has been either introduced or enacted, and the implementation of design specification and maintenance inspection programs for roads, bridges, and tunnels. The division also worked with the Office of the Chief Information Officer to develop the safety recommendation search function of the agency's new multi-modal search tool.

Outreach activities in FY 2020 have included meetings with numerous government and industry organizations, including the Office of the Secretary of Transportation, the FAA, the Federal Motor Carrier Safety Administration, the Federal Railroad Administration, the Federal Transit Administration, the National Highway Traffic Safety Administration, the Pipeline and Hazardous Materials Safety Administration, the Coast Guard, the US Army Corps of Engineers, the US Department of Labor, Amtrak, the American Trucking Association, BNSF Railway, CSX Transportation, the Jacksonville Florida Transit Authority, the National Association of State Directors of Pupil Transportation, the National Sheriff's Association, the Society of Automotive Engineers, Uber Advanced Technologies Group, Washington Gas Light, the Washington Metropolitan Area Transit Authority, the Washington Metrorail Safety Commission, and the Washington State Department of Transportation to discuss open recommendations.

### ***Digital Services Division***

The Digital Services Division supported 12 accident launches, 11 Board meetings, and 8 other NTSB-led safety-focused events. Staff completed over 500 graphics and illustrations for use in reports and other materials; managed more than 50 print publication requests; produced more than 100 videos, podcasts, and live video streams; and fulfilled more than 1,800 website update requests.

We also worked with the Office of the Chief Information Officer to implement a digital signage system at headquarters, providing up-to-date and timely topical information to NTSB staff. The division also created and launched a new employee and engagement intranet site to provide agency-wide news, spotlight employee talent and diversity, share leadership lessons, and help employees find work resources easily. Launched in

February 2020, the site has been instrumental in helping employees, managers, and Board Members stay connected to one another during this prolonged period of agency-wide full-time telework during the pandemic. Division staff also worked with staff in the Office of the Chief Information Officer throughout the summer of 2020 to complete the upgrade of ntsb.gov.



## AVIATION SAFETY

	(\$000s)	FTEs
FY 2021 Estimate	\$33,082	120
FY 2022 Request	\$34,112	120
Increase/Decrease	\$1,030	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The mission of the Office of Aviation Safety 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.

The Office of Aviation Safety 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 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.
- Coordinates the preparation of comprehensive aviation accident and incident reports and manages aviation investigative hearings, forums, and conferences related to air carrier operations.

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- 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.
- Meteorological/environmental conditions that may have caused or contributed to an accident, and pertinent meteorological products, procedures, and services provided by government and industry.

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- 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***

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 smaller in scope than those led by IICs in the Major Investigations Division, they are conducted in a similar manner. Often, a single aviation safety investigator conducts the investigation, gathering detailed information and working with party representatives to determine the probable cause of the accident. During each investigation, these investigators 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, they 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 regional investigators in gathering the facts, developing the analysis, and drafting the final report.

See Appendix D for regional office coverage.

### ***Administrative Support Division***

The Administrative Support Division is responsible for processing budget, travel, payroll, personnel and timekeeping, procurement, contracting, and purchase card actions for the office.

## **Accomplishments and Ongoing Efforts**

This office's accomplishments include the issuance of products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 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***

Investigation reports on major accidents are adopted and issued by the Board.

#### **Rapid Descent and Crash into Water, Atlas Air Inc. Flight 3591 Boeing 767-375BCF, N1217A Trinity Bay, Texas February 23, 2019**

On February 23, 2019, at 12:39 p.m. local time, Atlas Air Inc. flight 3591, a Boeing 767-375BCF, N1217A, was destroyed after it rapidly descended from an altitude of about 6,000 ft mean sea level and crashed into a shallow, muddy marsh area of Trinity Bay, Texas,

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about 41 miles east-southeast of George Bush Intercontinental/Houston Airport, Houston, Texas. The captain, first officer, and a nonrevenue pilot riding in the jumpseat died. Atlas operated the airplane as a Title 14 *Code of Federal Regulations (CFR)* Part 121 domestic cargo flight for Amazon.com Services LLC, and an instrument flight rules flight plan was filed. The flight departed from Miami International Airport, Miami, Florida, about 11:33 a.m. local time and was destined for Houston.

The NTSB determined that the probable cause of this accident was the inappropriate response by the first officer as the pilot flying to an inadvertent activation of the go-around mode, which led to his spatial disorientation and nose-down control inputs that placed the airplane in a steep descent from which the crew did not recover. Contributing to the accident was the captain's failure to adequately monitor the airplane's flightpath and assume positive control of the airplane to effectively intervene. Also contributing were systemic deficiencies in the aviation industry's selection and performance measurement practices, which failed to address the first officer's aptitude-related deficiencies and maladaptive stress response. Also contributing to the accident was the FAA's failure to implement the Pilot Records Database in a sufficiently robust and timely manner.

We identified the following safety issues during this investigation: (1) inadvertent activation of the go-around mode; (2) flight crew performance; (3) Atlas' evaluation of the first officer, which did not identify past training deficiencies; (4) industry pilot hiring process deficiencies; (5) awareness of the potential for inadvertent activation of the go-around mode for Boeing 767 and 757 pilots; (6) adaptations of automatic ground collision avoidance technology; and (7) the need for cockpit image recorders.

The Board issued recommendations to the FAA.

Recommendations: 6 new, 6 reiterated  
Report Adopted: July 14, 2020

**Helicopter Air Ambulance Collision with Terrain, Survival Flight Inc., Bell 407  
Helicopter, N191SF  
Zaleski, Ohio  
January 29, 2019**

On January 29, 2019, about 6:50 a.m. local time, a single-engine, turbine-powered Bell 407 helicopter, N191SF, being operated as a helicopter air ambulance flight, collided with forested terrain about 4 miles northeast of Zaleski, Ohio. The certificated commercial pilot, flight nurse, and flight paramedic died, and the helicopter was destroyed. The helicopter was registered to and operated by Viking Aviation, LLC, dba Survival Flight Inc., under 14 *CFR* Part 135. Company flight-following procedures were in effect for the visual flight rules flight, which departed Mount Carmel Hospital, Grove City, Ohio, about 6:28 am and was destined for Holzer Meigs Emergency Department, Pomeroy, Ohio, about 69 nautical miles southeast, to pick up a patient. Night visual meteorological conditions existed at the

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departure location, but available weather information indicated that snow showers and areas of instrument meteorological conditions existed along the route of flight.

The NTSB determined that the probable cause of this accident was Survival Flight's inadequate management of safety, which normalized pilots' and operations control specialists' noncompliance with risk analysis procedures and resulted in the initiation of the flight without a comprehensive preflight weather evaluation, leading to the pilot's inadvertent encounter with instrument meteorological conditions, failure to maintain altitude, and subsequent collision with terrain. Contributing to the accident was the FAA's inadequate oversight of the operator's risk management program and failure to require 14 *CFR* Part 135 operators to establish safety management system programs.

We identified the following safety issues during this investigation: (1) Survival Flight's lack of comprehensive and effective flight risk assessment and risk management procedures; (2) the lack of a positive safety culture endorsed by Survival Flight management and the lack of a comprehensive safety management system; (3) the need for flight data monitoring for helicopter air ambulance operators; (4) the lack of helicopter air ambulance experience for principal operations inspectors assigned to such operations; (5) the lack of accurate terminal doppler weather radar data available on the HEMS Weather Tool; and (6) the lack of a flight recorder.

The Board issued recommendations to the FAA, the National Weather Service, and Survival Flight.

Recommendations: 14 new, 4 reiterated  
Report Adopted: May 19, 2020

**Inadvertent Activation of the Fuel Shutoff Lever and Subsequent Ditching Liberty Helicopters Inc., Operating a FlyNYON Doors-Off Flight Airbus Helicopters AS350 B2, N350LH  
New York, New York  
March 11, 2018**

On March 11, 2018, about 7:08 p.m. local time, an Airbus Helicopters AS350 B2 lost engine power during cruise flight, and the pilot performed an autorotative descent and ditching on the East River in New York, New York. The pilot sustained minor injuries, the five passengers drowned, and the helicopter was substantially damaged. The FlyNYON-branded flight was operated by Liberty Helicopters Inc., per a contractual agreement with NYONair; both companies considered the flight to be an aerial photography flight operated under the provisions of 14 *CFR* Part 91. No flight plan was filed for the intended 30-minute local flight, which departed from Helo Kearny Heliport, Kearny, New Jersey, about 6:50 p.m.

The NTSB determined that the probable cause of this accident was Liberty'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 (1) 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; (2) Liberty allowing NYONair to influence the operational control of Liberty’s FlyNYON flights; and (3) the FAA’s inadequate oversight of 14 *CFR* Part 91 revenue passenger-carrying operations. Contributing to the severity of the accident were (1) the rapid capsizing of the helicopter due to partial inflation of the emergency flotation system and (2) Liberty and NYONair’s use of the harness/tether system that hindered passenger egress.

We identified the following safety issues during this investigation: (1) the effect of the harness/tether system on the ability of each passenger to rapidly egress; (2) the emergency flotation system design, maintenance, and certification; (3) ineffective safety management at both Liberty and NYONair; (4) Liberty and NYONair’s exploitation of the aerial work/aerial photography exception at 14 *CFR* 119.1(e) to operate FlyNYON flights under Part 91 with limited FAA oversight; (5) the lack of policy and guidance for FAA inspectors to perform a comprehensive inspection of part 91 operations conducted under any of the 14 *CFR* 119.1(e) exceptions; (6) the helicopter’s lack of fuel shutoff lever protection from inadvertent activation; (7) the need for guidance and procedures for operators to assess and address passenger intoxication; and (8) the inadequacy of the review and approval process for supplemental passenger restraint systems that the FAA implemented after the accident.

The Board issued safety recommendations to the FAA, Airbus Helicopters, the European Union Aviation Safety Agency, Liberty Helicopters, and NYONair.

Recommendations: 16 new  
Report Adopted: December 10, 2019

Before the adoption of this accident investigation report, the NTSB issued a safety recommendation report entitled *Additional Harness Systems that Allow for Rapid Egress* with an urgent recommendation to the FAA to ensure that, if a harness system is used for an open-door passenger flight, it allows for rapid egress from the aircraft in the event of an emergency.

Recommendation: 1 new; urgent  
Report Adopted: March 19, 2018

**Left Engine Failure and Subsequent Depressurization Southwest Airlines Flight 1380 Boeing 737-7H4, N772SW Philadelphia, Pennsylvania April 17, 2018**

On April 17, 2018, about 11:03 a.m. local time, Southwest Airlines flight 1380, a Boeing 737-7H4, N772SW, experienced a left engine failure while climbing through flight level 320 en route to the flight’s assigned cruise altitude. The flight had departed from LaGuardia Airport, Queens, New York, about 30 minutes earlier. As a result of the engine failure, the flight crew conducted an emergency descent and diverted to Philadelphia International Airport, Philadelphia, Pennsylvania. Portions of the left engine inlet and fan cowl separated from the airplane, and fragments from the inlet and fan cowl struck the left wing, the left-side fuselage, and the left horizontal stabilizer. One fan cowl fragment

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impacted the left-side fuselage near a cabin window, and the window departed the airplane, which resulted in a rapid depressurization. The airplane landed safely in Philadelphia about 17 minutes after the engine failure occurred. Of the 144 passengers and 5 crewmembers aboard the airplane, 1 passenger received fatal injuries, and 8 passengers received minor injuries. The airplane was substantially damaged. The regularly scheduled domestic passenger flight was operating under the provisions of 14 *CFR* Part 121 with a destination of Dallas Love Field, Dallas, Texas.

The NTSB 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 and the cabin to rapidly depressurize, which resulted in the passenger fatality.

We identified the following safety issues during this investigation: (1) the need to ensure the structural integrity of the fan cowl on Boeing 737 next-generation-series airplanes after a fan--blade-out event involving CFM56-7B engines; (2) the need to determine whether other airframe/engine combinations have any critical fan blade impact locations and how impact at those locations could affect nacelle components; (3) the need to emphasize the importance of having flight attendants secured in a jumpseat during emergency landings; and (4) the need to mitigate hazards to passengers affected by an in-flight loss of seating capacity.

The Board issued recommendations to the FAA, Southwest Airlines, and the European Aviation Safety Agency.

Recommendations: 7 new  
Report Adopted: November 19, 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. These briefs may be issued by the office director under delegated authority or may be adopted by the Board. This report describes 5 of the 1,450 briefs completed in FY 2020; these briefs resulted in safety changes by the manufacturer or the FAA.

### **Airplane Impact with Power Lines Rushville, Indiana August 27, 2018**

On August 27, 2018, about 1:50 p.m. local time, a Cessna 172G, N4379L, sustained substantial damage when it was involved in an accident near Rushville, Indiana. The private pilot and the passenger sustained minor injuries. The airplane was operated as a 14 *CFR* Part 91 personal flight. During the cross-country flight, the engine "sputtered"



several times then regained power. During the descent, it sputtered again and then lost power. The pilot attempted to troubleshoot the engine power loss without applying carburetor heat but was not successful in regaining engine power. During the forced landing, she attempted to maneuver the airplane between a power line pole and several trees. The airplane struck the power lines and impacted a field in a slightly nose-down attitude, which resulted in substantial damage to the wings and fuselage. The weather conditions at the time of the accident were conducive to serious carburetor icing at glide power settings. The loss of engine power likely occurred due to carburetor icing and the pilot's failure to apply carburetor heat in conditions conducive to carburetor icing.

The NTSB determined that the probable cause of the accident was the loss of engine power due to carburetor icing and the pilot's failure to use carburetor heat in weather conditions conducive to carburetor icing.

As a result of this investigation, the FAA replaced the carburetor icing chart in their Winter Flying Tips publication with the chart found in the Pilot's Handbook of Aeronautical Knowledge. The chart initially in the Winter Flying Tips publication was incorrect.

Recommendations: None  
Brief Adopted: September 14, 2020

### **Helicopter Loss of Control Todd Mission, Texas July 20, 2018**

On July 20, 2018, about 12:15 p.m. local time, a Bell 206B, N325CT, sustained substantial damage when it was involved in an accident near Todd Mission, Texas. The private pilot and one passenger sustained minor injuries and two passengers sustained no injury. The helicopter was operated as a 14 *CFR* Part 91 personal flight. As the helicopter took off from the field, it began to rotate to the right. Once airborne, the helicopter spun several revolutions to the right. The pilot reported that she applied full left pedal with no response from the helicopter. The left skid impacted the ground, and the helicopter rolled to the left and came to rest on the left side of the fuselage. The pilot flew from the right seat, and additional cyclic, collective, and the two tail rotor pedals were installed on the left side of the helicopter. Postaccident testing in a flight training device with a passenger seated in the right seat revealed performance similar to the helicopter's accident sequence. Although the pilot had briefed the passengers about not touching any of the flight controls, it is likely that, during the takeoff, the passenger had his feet either on or up against the tail rotor pedals, which resulted in the helicopter's rotation to the right and the subsequent loss of control.

The NTSB determined that the probable cause of the accident was the passenger's inadvertent interference with the tail rotor pedals, which resulted in a loss of helicopter control during takeoff and the subsequent impact with terrain.

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As a result of this investigation, on July 7, 2020, the helicopter manufacturer, Bell, issued an Operation Safety Notice to highlight the importance of detailed passenger safety briefings before operation.

Recommendations: None  
Brief Adopted: September 14, 2020

**Airplane Landing Gear Collapse  
Floresville, Texas  
September 11, 2018**

On September 11, 2018, about 4:37 p.m. local time, a Maule M-7-235C, N969AW, was substantially damaged after the left main landing gear collapsed at a private, grass airstrip near Floresville, Texas. The flight instructor and a private pilot receiving instruction were not injured. The airplane was operated as a 14 *CFR* Part 91 instructional flight. Postaccident examination of the airplane revealed that the right inboard attachment bolt and nut were untorqued and loose. The left main landing gear inboard attachment bolt was missing and was later found on the runway; the attaching nut was not located. The airplane's original main landing gear attachment bolts had been replaced by high strength attachment bolts. While a service letter indicated that the torque on the higher strength inboard attachment bolts should be higher, the mechanic who serviced the airplane did not reference the service letter.

The NTSB determined that the probable cause of the accident was the separation of the left inboard main landing gear attachment bolt due to insufficient torque, which resulted in the collapse of the left main landing gear.

As a result of this investigation, on April 11, 2019, the airplane manufacturer, Maule, issued a service letter that updated the maintenance manuals with new high strength bolt torque requirements for all spring-gear airplane models.

Recommendations: None  
Brief Adopted: April 20, 2020

**Airplane Rejected Takeoff and Emergency Landing  
Nantucket, Massachusetts  
September 13, 2017**

On September 13, 2017, about 7:23 a.m. local time, a Cessna 402B, N836GW, was substantially damaged during a rejected takeoff at Nantucket Memorial Airport, Nantucket, Massachusetts. The commercial pilot sustained minor injuries. The airplane was being operated as a 14 *CFR* Part 91 as a personal flight. Postaccident examination of the airplane revealed that the elevator trim push rod assembly was separated from the elevator trim tab actuator, and the end of the elevator trim push rod assembly was found wedged against the elevator's main spar, resulting in full airplane nose-up trim. An airworthiness directive had previously been issued requiring replacement of the hardware at both ends of the pushrod for the elevator trim tab to prevent jamming. However, the repair station that performed the airplane's recent annual inspection did not comply with the airworthiness directive and did not replace the hardware.

The NTSB determined that the probable cause of this accident was the separation of the pushrod from the elevator trim tab actuator, which rendered controlled flight impossible. Contributing to the separation of the pushrod was the failure of maintenance personnel to properly secure it to the elevator trim tab actuator.

As a result of our investigation, on October 25, 2019, the FAA Safety Team issued a notice containing information concerning this accident and the importance of proper compliance with the airworthiness directive associated with the trim tab actuator.

Recommendations: None  
Brief Adopted: April 20, 2020

**Airplane Partial Loss of Engine Power and Forced Landing  
Bell Glade, Florida  
December 17, 2018**

On December 17, 2018, about 12:10 p.m. local time, a Cessna 152, N4886B, was substantially damaged during a forced landing near Bell Glade, Florida. The private pilot and pilot-rated passenger were uninjured. The airplane was operated as a 14 *CFR* Part 91 personal flight. During the postaccident engine examination, the No. 1 intake valve was found stuck in the valve guide, and the upper valve spring seat on the No. 1 cylinder was broken. Contact marks on the interior and end faces of the valve keeper were consistent with engine operation with a dislodged keeper while the valve spring seat was intact. Pitting and radial cracks on the intake valve head were consistent with engine operation while the valve was not seating properly. There was no evidence in the logbooks that a proper inspection of the intake valve had been completed.

The NTSB determined that the probable cause of this accident was a partial loss of engine power due to the valve keeper of the No. 1 cylinder's becoming dislodged, which ultimately resulted in the intake valve's becoming stuck in the valve guide and in the loss of compression to the cylinder.

As a result of our investigation, the engine manufacturer, Lycoming, revised the engine parts catalog to properly identify the intake valve. In addition, the FAA revised the Parts Manufacturer Approval database to properly identify the Superior SL17236 part number as an intake valve rather than an exhaust valve.

Recommendations: None  
Brief Adopted: April 13, 2020

**Domestic Investigative Workload Summarized by State**

The following table summarizes by state or territory statistical information on domestic accident and incident investigations initiated in FY 2020. Investigation types are defined after the table.

State	Major Aviation	Field Aviation	Limited Aviation	Truncated Aviation	Data Collection Aviation (C-form)	Incident Aviation	Total
ALABAMA	0	3	11	0	5	0	19
ALASKA	1	2	24	0	55	0	82
ARIZONA	0	3	15	0	18	0	36
ARKANSAS	0	0	9	0	6	0	15
CALIFORNIA	1	10	49	0	44	2	106
COLORADO	0	1	13	0	23	0	37
CONNECTICUT	1	0	2	0	4	0	7
DELAWARE	0	0	0	0	3	0	3
FLORIDA	0	8	39	3	46	0	96
GEORGIA	0	6	13	0	16	1	36
GULF OF MEXICO	0	1	1	0	1	0	3
HAWAII	1	1	2	0	3	0	7
IDAHO	0	2	7	0	21	0	30
ILLINOIS	0	2	10	0	12	0	24
INDIANA	0	3	5	0	8	0	16
IOWA	0	0	8	0	5	0	13
KANSAS	0	1	3	1	5	0	10
KENTUCKY	0	1	4	0	5	0	10
LOUISIANA	1	1	8	0	13	0	23
MAINE	0	0	2	0	2	1	5
MARYLAND	0	1	4	0	9	0	14
MASSACHUSETTS	0	2	2	0	5	0	9
MICHIGAN	0	1	11	0	12	0	24
MINNESOTA	0	1	8	0	14	0	23
MISSISSIPPI	0	0	4	0	3	0	7
MISSOURI	0	1	14	0	9	0	24
MONTANA	0	1	7	0	11	0	19
NEBRASKA	0	0	4	1	5	0	10
NEVADA	0	3	7	0	15	0	25
NEW HAMPSHIRE	0	0	1	0	3	1	5
NEW JERSEY	0	1	1	0	3	0	5
NEW MEXICO	0	1	4	0	6	0	11
NEW YORK	0	0	3	0	16	0	19
NORTH CAROLINA	0	4	11	0	13	0	28
NORTH DAKOTA	0	0	4	0	0	0	4
OHIO	0	0	10	0	13	0	23
OKLAHOMA	0	0	9	0	6	0	15

State	Major Aviation	Field Aviation	Limited Aviation	Truncated Aviation	Data Collection Aviation (C-form)	Incident Aviation	Total
OREGON	0	1	13	0	7	0	21
PENNSYLVANIA	0	2	7	0	15	0	24
PUERTO RICO	0	0	4	0	2	0	6
RHODE ISLAND	0	0	1	0	1	0	2
SOUTH CAROLINA	0	0	9	0	5	0	14
SOUTH DAKOTA	0	2	3	0	2	0	7
TENNESSEE	0	0	15	0	10	0	25
TEXAS	0	8	56	4	47	0	115
UTAH	0	1	15	1	10	0	27
VERMONT	0	0	0	0	3	0	3
VIRGINIA	0	1	4	0	6	0	11
WASHINGTON	0	0	9	0	16	0	25
WEST VIRGINIA	0	2	0	0	0	0	2
WISCONSIN	0	1	4	0	8	0	13
WYOMING	0	0	4	0	5	0	9
<b>Total</b>	<b>5</b>	<b>79</b>	<b>473</b>	<b>10</b>	<b>575</b>	<b>5</b>	<b>1147</b>

Note: In addition to the accidents listed above, there were also two missing aircraft investigations in California and the Pacific Ocean.

**Major Investigation:** A major investigation is a significant event, involving the launch of a team consisting of an IIC and one or more additional 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 involves at least one NTSB investigator traveling 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, and there is low public visibility and interest, 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 more quickly than field or limited investigations.

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**Data Collection Investigation:** This category of investigation does not involve investigator travel and does not require significant investigative efforts; the result is a brief report. 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.

**Missing Aircraft Investigation:** This category applies to occurrences of a missing aircraft. If the aircraft is later found, the category is changed to the appropriate category of those listed above.

## ***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 here in the United States and overseas. ICAO Annex 13 protocols also define the agency’s engagement with

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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 due to our participation in these foreign investigations.

In FY 2020, the office was notified of and assisted on 225 international investigations. Of these, investigators launched or traveled in support of five. Several accidents, including those described below, required significant US involvement:

- On January 8, 2020, Ukraine International Airlines flight 752, a Boeing 737-800, crashed shortly after takeoff from Tehran Imam Khomeini International Airport, Tehran, Iran, killing all 167 passengers and 9 crew onboard. The accident was investigated by the Iranian Aircraft Accident Investigation Board. 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 February 5, 2020, Pegasus flight PC2193, a Boeing 737-800, overran the end of runway 6 after landing at Istanbul Sabiha Gökçen, Istanbul, Turkey, killing three passengers. The accident is being investigated by the Turkish Directorate General for Civil Aviation. 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 March 18, 2020, Vietnam Airlines flight 920, an Airbus A321, powered by two International Aero Engines V2533-A5 turbofan engines, experienced a No. 2 (right) engine high pressure turbine disk rupture and uncontainment during the takeoff roll from Tan Son Nhat International Airport, Ho Chi Minh City, Vietnam. The accident is being investigated by the Civil Aviation Authority of Vietnam. 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 engines.
- On May 22, 2020, Pakistan International Airlines flight 8303, an Airbus A320, crashed into a residential area during a go-around at Karachi-Jinnah International Airport, Karachi, Pakistan, killing 97 passengers and crew onboard. The accident is being investigated by the Civil Aviation Authority of Pakistan. 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 engines.

### ***US Comments on 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, including this one:

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**Boeing 737 MAX, Ethiopia**  
**Addis Ababa Bole International Airport, Addis Ababa, Ethiopia**  
**March 10, 2019**

On March 10, 2019, Ethiopian Airlines flight 302, a Boeing 737 MAX, crashed shortly after takeoff. All 157 passengers and crew onboard were fatally injured. The accident is being investigated by the Ethiopian Civil Aviation Authority. The NTSB US-accredited representative and technical advisors provided comments on the draft interim report in February 2020. The interim report was published in March 2020.

***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 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.”

**Install Flight Data, Audio, and Image Recorder Systems on Turbine-Powered Helicopters**

These recommendations address the need for crash-resistant flight recorder systems and crash-protected image recorder systems on existing and newly manufactured turbine-powered helicopters. These recommendations are derived from several NTSB investigations of turbine-powered helicopter accidents in which the lack of a crash-resistant or crash-protected flight recording system that records parametric data, cockpit audio, and images hindered our understanding of the accident circumstances and, thus, allowed potential safety issues to go unaddressed.

The safety issue identified in this report was the need for operators to install crash-resistant data, audio, and image recorders in the absence of FAA regulations.

The Board issued safety recommendations to Airbus Helicopters, Bell, Leonardo Helicopter Division, MD Helicopters, Robinson Helicopter Company, and Sikorsky.

Recommendations: 4 new  
Report Adopted: May 19, 2020

**Revise Processes to Implement Safety Enhancements for Alaska Aviation Operations**

This recommendation was derived from the Most Wanted List Roundtable: *Alaska Part 135 Flight Operations—Charting a Safer Course*. Because the NTSB continues to investigate the same types of accidents involving Title 14 CFR Part 135 flight operations in Alaska, in September 2019 we convened a panel of Part 135 operators, safety experts, and government officials to discuss what can be done to address Part 135 safety issues in the state. Although the roundtable focused on Part 135 operations, some of the proposals discussed, such as improved pilot training (particularly concerning controlled flight into terrain avoidance)



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and consistently managing weather risks, are applicable to all operations in Alaska, which has a higher overall aviation accident rate than the rest of the United States. Specifically, for the period from 2008 to 2017, the accident rate in Alaska was 2.35 times higher than that for the rest of the United States; the fatal accident rate in the state was 1.34 times higher.

We identified Alaska’s need to prioritize and integrate FAA safety enhancements to improve aviation safety as a safety issue.

The Board issued one safety recommendation to the FAA.

Recommendations: 1 new  
Report Adopted: February 13, 2020

### **Reported Flight Control System Difficulty on Embraer EMB-175**

On November 6, 2019, the flight crew of a Republic Airways Embraer EMB-175 reported a flight control difficulty involving pitch in the airplane nose-up direction shortly after takeoff from Hartsfield-Jackson Atlanta International Airport, Atlanta, Georgia. Although the cause of the difficulties reported by this flight crew have not been determined, in FY 2020 the NTSB issued recommendations to address safety issues that we identified during the initial stage of the investigation.

The preliminary findings in the investigation identified the following safety issues: (1) the need to inspect for chafing around the wires connecting the horizontal stabilizer actuator control electronics to the captain’s pitch trim switch and autopilot trim disconnect button; (2) the need for revised design and maintenance documentation; (3) the incorporation of an Embraer service bulletin to prevent incorrect installation of pitch trim switches; and (4) improved pitch trim runaway checklists.

The Board issued safety recommendations to the National Civil Aviation Agency of Brazil and the FAA.

Recommendations: 10 new  
Report Adopted: January 16, 2020

### ***Safety Alerts***

Safety alerts are brief information sheets that pinpoint a particular safety issue. They contain information based on findings of investigations and enhance the dissemination of safety information to the traveling public.

Safety alerts are brief information sheets that pinpoint a particular 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

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distributed at outreach events that staff attends throughout the year. Through FY 2020, the office developed the following safety alerts for issuance by the Board:

- **Stay in the Groove: Check Ignition Switch/Key Integrity: Worn surfaces on keys and internal switch components can result in switch positioning errors and unintended engine startup, SA-080**

Over time, keys or key-type ignitions can become worn, which can then result in the magneto sparking even when the ignition is not in the *on* position. This can result in the engine starting unexpectedly. Pilots and mechanics must stay vigilant to ensure that the ignition system maintains its integrity. (Adopted: January 2020).

- **Maintain Airplane Control with One Engine Inoperative: Be prepared, know how to recover when one engine becomes inoperative during critical phases of flight, SA-081**

An unexpected loss of power in one engine during a critical phase of flight can result in a fatal accident if the pilot is not familiar with the procedures and checklists for one engine inoperative flight operations. Obtaining training, maintaining proficiency, and staying focused are critical to ensuring that the pilot can safely land the airplane with one engine nonoperational. (Adopted: January 2020).

## ***Other Efforts and Focus Areas***

### **Aviation Report Timeliness Project**

The Office of Aviation Safety has implemented the Aviation Report Timeliness Project to improve the efficiency of our investigations through the use of structured, data-driven management techniques and the implementation of incremental process changes. The objective is to streamline existing procedures to improve timeliness while maintaining or improving quality. The team evaluated our investigation process using data to identify barriers to timeliness and to establish the standards and guidance needed for quality reports. Areas of evaluations included case distribution and complexity, scope of investigations, report review, project management, remote workforce management and opportunities, and human capital. In early 2020, the team trained all investigators on the revised report processes that were implemented throughout the office beginning March 15, 2020. We are using early indicators to monitor whether the revised processes and procedures are being used; we are immediately addressing any outliers. The managers meet bi-weekly to discuss the program and provide feedback; investigators provide feedback through survey or direct communication with the team. Additionally, quarterly updates and training on the Aviation Report Timeliness Project are provided to all staff. At the end of September 2020, work plans had been developed for 98 percent of the investigations begun since March 15. The pandemic's impact on the agency's ability to launch or travel on investigations has made it difficult to evaluate the success of the program, but the office continues to monitor implementation and make improvements when needed.

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## **Aviation Safety Actions and Issues Program**

The Office of Aviation Safety has monitored aviation safety actions resulting from aviation investigations since 2006. Over time, this program has developed into a multi-tiered safety issue development program that covers all levels of the safety issue identification and resolution process. To facilitate communication on aviation safety related issues, the Aviation Safety Actions SharePoint site was developed for all office staff to track safety issues; to disseminate the primary safety issues that the office is working on, including the development of safety recommendations and safety alerts; and to communicate focused safety issue areas that we are emphasizing (based, in part, on the MWL and multiple investigations). This site has now been incorporated into the Aviation SharePoint site. For safety issue areas in development, staff meets every 5 weeks to discuss these issues. As a result of these discussions, the safety issues may develop into special projects, voluntary industry action, or board-adopted products. After each meeting, office staff receives a spreadsheet containing meeting notes regarding the developing issues discussed. The office also uses a coding taxonomy to categorize all safety alerts, safety recommendations, and safety accomplishments to identify the issue area associated with each action more readily. This information is shared via a user-friendly dashboard, using a data visualization tool that allows staff to focus on issue areas they may be working on and to develop new ideas to improve aviation safety.

## **Unmanned Aircraft Program**

The Office of Aviation Safety 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 investigate accidents and incidents involving unmanned aircraft effectively and comprehensively. The other prong is operations, which uses sUAS and advanced photogrammetry and geographic information system 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. The office has developed contacts with most of the main participants in the recent Part 135 delivery segment and is updating the accident incident regulations to align with the growth in the industry more thoroughly by using the technical knowledge obtained through these contacts. Maintaining our proficiency in conducting investigations is critical as the number and complexity of unmanned aircraft accidents and incidents increases, as demonstrated by numerous recent reports of midair collisions, accidents involving urban air mobility prototypes, and incidents involving public safety drones.

Under operations, we have been supporting accident investigations for over 4 years, reaching 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 has been 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 search for missing

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wreckage without engaging in potentially dangerous foot searches. For example, drone data were used to document the wreckage and terrain for the Calabasas, California, helicopter accident that claimed the lives of nine people; to examine the site of a multiple fatal King Air accident in Addison, Texas; and to successfully search for missing components of a Citation Jet accident in Fairmount, Georgia.

The unmanned aircraft program will continue to keep up with this extremely dynamic and explosively growing segment of aviation through additional investigations of significant accidents and incidents, increased outreach, and growing 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 members serving on numerous safety groups.

### **Commercial Space**

The NTSB has been involved in commercial space investigations for over 30 years. However, the growth of FAA-licensed, commercial space transportation operations has continued to accelerate under the oversight of the FAA's Office of Commercial Space Transportation. According to the FAA, in FY 2020, 31 of these launches occurred in the United States; this number is expected to continue to increase consistently over the next 10 years.

To prepare for this growing number of commercial space launches and reentries, the NTSB has been developing specific and comprehensive policies and procedures to ensure that the agency is positioned to investigate accidents effectively in this burgeoning industry. The Major Investigations Division is working to establish strong relationships with numerous commercial space stakeholders, and the agency has invested a significant amount of time and funding to train our cross-division group of subject matter experts for commercial space investigations. To grow and maintain technical proficiency and engagement with industry, we will continue to execute a robust plan of outreach and training through attendance at industry conferences, subscriptions to publications, observation of multiple launches, and participation in externships.

### **Helicopter Association International (HAI) Safety Symposium: Wanted Alive (NTSB Most Wanted List and Accident Case Study) January 27, 2020**

The NTSB initiated the symposium discussion with an overview of the 2019-2020 MWL and a presentation of lessons learned and recommendations from our investigation into the AS-350 helicopter accident that occurred on March 11, 2018, in New York City. The expert panel then examined the issues identified in the investigation and identified strategies for overall safety improvements, including those recommended in the MWL.

**Panel Discussion: Improving the Safety of Part 135 Operations  
March 2, 2020**

An NTSB presentation on Safety Management Systems and Flight Data Monitoring was followed by Chairman Sumwalt and Member Graham’s hosting a discussion on Part 135 safety.

**Ongoing Significant Aviation Accident and Incident Investigations**

<b>Location</b>	<b>Date</b>	<b>Description</b>	<b>Fatalities</b>
Calabasas, California	1/26/2020	Collision with terrain	9
Lafayette, Louisiana	12/28/2019	Crash after takeoff	5
Lihue, Hawaii	12/26/2019	Helicopter crash during air tour	7
Dutch Harbor, Alaska	10/17/2019	Crash during landing	1
Windsor Locks, Connecticut	10/02/2019	Crash after loss of engine power and return to airport	7
Big Grand Cay, Bahamas	7/04/2019	Crash after takeoff	7
Mokuleia, Hawaii	6/21/2019	Crash after takeoff	11
Addison, Texas	6/10/2019	Crash after takeoff	10
Ketchikan, Alaska	5/13/2019	Mid-air collision between air tour planes	6
Jacksonville, Florida	5/03/2019	Runway overrun during thunderstorm	0

Note: At the close of FY 2020, we were continuing to devote significant resources to the accident investigations listed and anticipated producing an accident report or brief upon the completion of each investigation.

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## HIGHWAY SAFETY

	(\$000s)	FTEs
FY 2021 Estimate	\$8,829	31
FY 2022 Request	\$9,096	31
Increase/Decrease	\$267	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of Highway Safety investigates crashes that have significant safety implications nationwide, highlight national safety issues, involve the loss of numerous lives, or generate high interest because of emerging technologies or their circumstances. Such investigations may focus on collapses of bridges spanning roadways or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), and collisions at highway–railroad grade crossings. This office also investigates crashes 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 crashes, with the goal of making recommendations to prevent similar events and to reduce injuries and fatalities. Our investigations result in recommendations that, if implemented, reduce or eliminate the risks identified in the investigations and provide policymakers with unbiased analysis.

The Office of Highway Safety comprises the Investigations Division and the Report Development Division.

### *Investigations Division*

The Investigations Division manages the multidisciplinary go-teams launched to crash sites to collect the factual, and develop the analytical, information for investigations. Currently, major highway 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. To enhance geographic coverage

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and reduce response time, team members are located throughout the country, including in California, Colorado, Oregon, Tennessee, Texas, Washington, Wyoming, and Washington, DC.

Division 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 Report Development Division manages the development of 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 issuance of products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 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***

Investigation reports on major accidents are adopted and issued by the Board.

#### **Stretch Limousine Run-Off-Road Crash Schoharie, New York October 6, 2018**

On October 6, 2018, about 1:55 p.m. local time, a 2001 Ford Excursion XLT stretch limousine, operated by Prestige Limousine and Chauffeur Service, was traveling south on New York State Route 30 (NY-30) near Schoharie, Schoharie County, New York. The limousine, occupied by a 53-year-old driver and 17 passengers, was descending a downhill grade that began about 1.81 miles north of a T-intersection with New York State Route 30A (NY-30A). The posted speed limit was 55 mph. Although the driver likely applied the brakes while descending the hill, the brake system failed to effectively slow the limousine down the grade, and the vehicle's speed increased to over 100 mph. The driver steered the vehicle over the double pavement striping to avoid a car stopped at the NY-30/NY-30A intersection, proceeded past a stop sign, crossed the intersection, and entered the driveway of a restaurant parking lot. The limousine struck an unoccupied 2015 Toyota Highlander sport utility vehicle (SUV) that was parked in a grassy field adjacent to the driveway. Two pedestrians who were standing near the SUV were struck by it when the SUV was forced

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forward by the limousine. The limousine continued across the edge of the driveway and into a ravine, where it struck an earthen embankment and several trees. As a result of the crash, 20 people died, including all 18 limousine occupants and the 2 pedestrians.

The NTSB determined that the probable cause of the Schoharie, New York, crash was Prestige Limousine and Chauffeur Service’s egregious disregard for safety, in dispatching a stretch limousine with an out-of-service order for a passenger charter trip, resulting in the failure of its brake system while descending the steep grade of New York State Route 30. Contributing to the crash was the New York State Department of Transportation’s ineffective oversight of Prestige Limousine, despite its knowledge of the carrier’s multiple out-of-service violations and lack of operating authority, as well as the department’s inadequate repair verification process. Further contributing to the crash was the New York State Department of Motor Vehicles’ inadequate oversight of state-licensed inspection stations and its failure to properly register the limousine, which enabled Prestige Limousine to circumvent the state’s safety regulations and more rigorous inspection requirements.

We identified the following safety issues during this investigation: (1) inadequate brake system maintenance, (2) vehicle alteration affecting compliance with applicable Federal Motor Vehicle Safety Standards, (3) drivers falsifying medical histories in medical certification examinations for commercial driver’s licenses, (4) ineffective state oversight of intrastate motor carrier operations, and (5) insufficient occupant protection for limousine passengers.

The Board issued safety recommendations to the Federal Motor Carrier Safety Administration, the State of New York, the State of New York Department of Motor Vehicles, and the National Limousine Association.

Recommendations: 6 new  
Report Adopted: September 29, 2020

Before we completed the Schoharie, New York, accident investigation, the NTSB issued a safety recommendation report entitled *Providing Occupant Protection for Limousine Passengers*. The report focused on the importance of maintaining adequate seat integrity, providing well-designed passenger lap/shoulder belts, and encouraging seat belt use.

Recommendations: 4 new, 1 reiterated  
Recommendations Adopted: September 13, 2019

### **Vehicle Collision with Student Pedestrians Crossing High-Speed Roadway to Board School Bus Rochester, Indiana October 30, 2018**

About 7:12 a.m. local time on October 30, 2018, a 2015 Thomas Built school bus, operated by Tippecanoe Valley School Corporation, was traveling north in the 4600 block of State Route 25 (SR-25) in Rochester, Fulton County, Indiana, on its morning route. The school bus stopped at its designated location to pick up students, and the driver activated



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the bus’s red warning lights and stop arm. Ten students and a parent were waiting for the school bus at the mobile home park on the other side of the road from the bus’s pickup stop. A “Watch For School Bus” warning sign is posted for southbound traffic on SR-25 about 868 feet before the mobile home park. There is no roadway lighting at this location, and conditions were dark.

After being signaled by a wave from the school bus driver to cross, four of the students entered the southbound roadway. A 2017 Toyota Tacoma pickup truck traveling south on SR-25 failed to stop for the school bus and struck the four children. As a result of the crash, a 9-year-old female and two 6-year-old males were fatally injured, and an 11-year-old male sustained serious injuries. None of the other people waiting for the bus or any occupants of the pickup truck and school bus were injured.

The NTSB determined that the probable cause of the Rochester, Indiana, crash was the pickup truck driver’s failure to stop for the school bus for unknown reasons, despite its clearly visible warning lights and stop arm, as well as a roadway warning sign indicating an upcoming school bus stop. Contributing to the cause of the crash was the Tippecanoe Valley School Corporation’s (1) inadequate safety assessment of school bus routes, resulting in the prevalence of bus stops that required student pedestrians to cross a 55 mph roadway to board a bus, increasing the risk of injury during a collision, and (2) failure to establish a clear policy regarding surrounding traffic for school bus drivers to follow in determining when it was safe to signal students to cross a roadway to board a school bus.

We identified the following safety issues during this investigation: (1) deficiencies in establishing safe school bus routes and stop locations, (2) the failure of other drivers to stop or otherwise respond safely when approaching a school bus that is stopped with its warning lights on and stop arm extended, and (3) the need for greater use of technologies to prevent collisions with, and mitigate injuries of, student pedestrians, including vehicle-to-everything, pedestrian automatic emergency braking, and school bus safety-enhancing technologies.

The Board issued safety recommendations to the National Highway Traffic Safety Administration, multiple states and the District of Columbia, the Indiana Department of Education, the National Association of State Directors of Pupil Transportation Services, National Association for Pupil Transportation, and National School Transportation Association, the International Association of Chiefs of Police, National Sheriffs’ Association, and National Association of School Resource Officers, and the Tippecanoe Valley School Corporation.

Recommendations: 12 new, 3 reiterated  
Report Adopted: March 31, 2020

**Collision Between a Sport Utility Vehicle Operating with Partial Driving  
Automation and a Crash Attenuator  
Mountain View, California  
March 23, 2018**

On March 23, 2018, at 9:27 a.m. local time, a 2017 Tesla Model X P100D electric-powered SUV, occupied by a 38-year-old male driver, was traveling south on US Highway 101 in

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Mountain View, Santa Clara County, California. While approaching a paved gore area dividing the main travel lanes of US-101 from the SR-85 left-exit ramp, the SUV moved to the left and entered the gore. The vehicle continued traveling through the gore and struck a damaged and nonoperational crash attenuator at a speed of about 71 mph. As a result of the collision, the SUV rotated counterclockwise and the front body structure separated from the rear of the vehicle. The Tesla was involved in subsequent collisions with two other vehicles, a 2010 Mazda 3 and a 2017 Audi A4. System performance data downloaded from the Tesla indicated that the driver was operating the SUV using the Traffic-Aware Cruise Control (an adaptive cruise control system) and Autosteer system (a lane-keeping assist system), which are advanced driver assistance systems in Tesla’s “Autopilot” suite. The driver was transported to a local hospital, where he died from blunt-force trauma injuries. The driver of the Mazda sustained minor injuries; the driver of the Audi was uninjured.

The NTSB determined that the probable cause of the crash was the Tesla Autopilot system’s steering the sport utility vehicle into a highway gore area due to system limitations, and the driver’s lack of response due to distraction, likely from a cell phone game application, and overreliance on the Autopilot’s partial driving automation system. Contributing to the crash was the Tesla vehicle’s ineffective monitoring of driver engagement, which facilitated the driver’s complacency and inattentiveness. Contributing to the severity of the driver’s injuries was the vehicle’s impact with a crash attenuator barrier that was damaged and nonoperational at the time of the collision due to the California Highway Patrol’s failure to report the damage following a previous crash, and systemic problems with the California Department of Transportation’s maintenance division in repairing traffic safety hardware in a timely manner.

We identified the following safety issues during this investigation: (1) driver distraction, (2) risk mitigation pertaining to monitoring driver engagement, (3) risk assessment pertaining to operational design domain, (4) the limitations of collision avoidance systems, (5) insufficient federal oversight of partial driving automation systems, (6) the need for event data recording requirements for driving automation systems, and (7) highway infrastructure issues.

The Board issued safety recommendations to the National Highway Traffic Safety Administration, Occupational Safety and Health Administration, SAE International, Manufacturers of Portable Electronic Devices (Apple, Google, HTC, Lenovo, LG, Motorola, Nokia, Samsung, and Sony), and to Apple Inc.

Recommendations: 9 new, 7 reiterated  
Report Adopted: February 25, 2020

Before we completed the Mountain View, California, accident investigation, the NTSB issued a safety recommendation report entitled *Addressing Systemic Problems Related to the Timely Repair of Traffic Safety Hardware in California*. The Board issued one recommendation to the California State Transportation Agency.

Recommendations: 1 new  
Report Adopted: August 12, 2019

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**Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian**  
**Tempe, Arizona**  
**March 18, 2018**

On March 18, 2018, at 9:58 p.m. local time, an automated test vehicle, based on a modified 2017 Volvo XC90 SUV, struck a female pedestrian walking across the northbound lanes of N. Mill Avenue in Tempe, Arizona. The SUV was operated by the Advanced Technologies Group of Uber Technologies Inc., which had modified the vehicle with a proprietary developmental automated driving system (ADS). A female operator occupied the driver's seat of the SUV, which was being controlled by the ADS. The SUV was completing the second loop on an established test route that included part of northbound N. Mill Avenue. The vehicle had been operating about 19 minutes in autonomous mode—controlled by the ADS—when it approached the collision site in the right lane at a speed of 45 mph and the pedestrian began walking across N. Mill Avenue where there was no crosswalk, pushing a bicycle by her side. The ADS detected the pedestrian 5.6 seconds before impact. Although the ADS continued to track the pedestrian until the crash, it never accurately classified her as a pedestrian or predicted her path. Video from the SUV's inward-facing camera showed that the operator was glancing away from the road for an extended period while the vehicle was approaching the pedestrian. The operator redirected her gaze to the road ahead about 1 second before impact. ADS data show that the operator began steering left 0.02 seconds before striking the pedestrian at a speed of 39 mph. The pedestrian died in the crash. The vehicle operator was not injured. Toxicological tests on the pedestrian's blood were positive for drugs that can impair perception and judgment.

The NTSB determined that the probable cause of the crash was the failure of the vehicle operator to monitor the driving environment and the operation of the automated driving system because she had been visually distracted throughout the trip by her personal cell phone. Contributing to the crash were the Uber Advanced Technologies Group's (1) inadequate safety risk assessment procedures, (2) ineffective oversight of vehicle operators, and (3) lack of adequate mechanisms for addressing operators' automation complacency—all a consequence of its inadequate safety culture. Further factors contributing to the crash were (1) the impaired pedestrian's crossing of N. Mill Avenue outside a crosswalk, and (2) the Arizona Department of Transportation's insufficient oversight of automated vehicle testing.

We identified the following safety issues during this investigation: Uber Advanced Technologies Group's inadequate safety culture and the need for safety risk management requirements for testing automated vehicles on public roads.

The Board issued safety recommendations to the National Highway Traffic Safety Administration, the state of Arizona, American Association of Motor Vehicle Administrators, and to Uber Technologies Inc., Advanced Technologies Group.

Recommendations: 6 new  
Report Adopted: November 19, 2019

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**Pedestrian Bridge Collapse Over SW 8th Street  
Miami, Florida  
March 15, 2018**

On March 15, 2018, about 1:46 p.m. local time, a partially constructed pedestrian bridge crossing an eight-lane roadway in the city of Miami, in Miami-Dade County, 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–University City Prosperity Project. On the day of the collapse, a construction crew was working on retensioning the post-tensioning rods within member 11, connecting the bridge canopy and the deck at the north end. About 1:46 p.m., a video camera on a construction pickup truck traveling east, approaching the bridge, recorded the collapse sequence. The video showed the blowout of the concrete north of truss member 12, and the truss losing geometric stability. Eight vehicles that were located below the bridge were fully or partially crushed, seven of which were occupied. One bridge worker and five vehicle occupants died. Five bridge workers and five other people were injured.

The NTSB determined that the probable cause of the Florida International University pedestrian 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 general contractor for the project); FIGG; Bolton, Perez and Associates Consulting Engineers; Florida International University ; 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.

We identified the following safety issues during this investigation: (1) bridge design and construction plan errors and unique bridge characteristics and mechanisms of failure, (2) the independent peer review of complex bridge design, (3) the shortcomings in oversight of evaluation of and response to significant observed bridge structure distress prior to collapse, and (4) the lack of redundancy guidelines in specifications for pedestrian and concrete truss bridges.

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The Board issued safety recommendations to the Federal Highway Administration, the Florida Department of Transportation, the American Association of State Highway and Transportation Officials, and FIGG Bridge Engineers Inc.

Recommendations: 11 new  
Report Adopted: October 22, 2019

### ***Accident Investigation 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 describes two of the five accident briefs completed through September 30, 2020.

#### **Collision Between Car Operating with Partial Driving Automation and Truck-Tractor Semitrailer Delray Beach, Florida March 1, 2019**

At 6:17 a.m. local time on March 1, 2019, a 2018 Tesla Model 3 passenger car was southbound in Delray Beach, Palm Beach County, Florida, when it struck a 2019 International truck-tractor in combination with a semitrailer. The combination vehicle (truck), operated by FirstFleet Inc., was traveling east on a private driveway/access road for the Pero Family Farms agricultural facility and was attempting to cross the southbound lanes of US 441 and turn left into the northbound lanes. As the truck approached the stop sign at the driveway's intersection with US 441, the driver slowed but did not come to a full stop before beginning to cross the southbound lanes of the highway. The car driver, traveling at a recorded speed of 69 mph with Autopilot engaged, did not apply the brakes or take any other evasive action to avoid the truck, which was crossing in front of him at about 11 mph. The car hit the left side of the semitrailer, and the roof of the car was sheared off as the vehicle underrode the semitrailer and continued south. The car then coasted to a stop in the median between the southbound and northbound lanes, about 1,680 feet from where it struck the semitrailer. The 50-year-old male car driver died; the 45-year-old male truck driver was not injured.

The NTSB determined that the probable cause of the Delray Beach, Florida, crash was the truck driver's failure to yield the right of way to the car, combined with the car driver's inattention due to overreliance on automation, which resulted in his failure to react to the presence of the truck. Contributing to the crash was the operational design of Tesla's partial automation system, which permitted disengagement by the driver, and the company's failure to limit the use of the system to the conditions for which it was designed. Further contributing to the crash was the failure of the National Highway Traffic Safety Administration to develop a method of verifying manufacturers' incorporation of acceptable system safeguards for vehicles with level 2 automation capabilities that limit the use of automated vehicle control systems to the conditions for which they were designed.

We identified the following safety issues during this investigation: (1) Autopilot

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performance, (2) Autopilot driver monitoring system, (3) Autopilot operational design domain limitations and (4) collision avoidance system limitations.

Recommendations: None  
Brief Adopted: January 22, 2020

**Single-Vehicle Run-Off-Road Crash and Fire  
Fort Lauderdale, Florida  
May 8, 2018**

On May 8, 2018, at 6:46 p.m. local time, 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 Fort Lauderdale, Florida, at a recorded speed of 116 mph where the posted speed limit is 30 mph. At the crash location, 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 had 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. The car reentered the road, mounted the curb on the east side of the roadway, struck a metal light pole, rotated, and came to rest in the driveway of an adjacent residence. The car was engulfed in fire. 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.

The NTSB determined that the probable cause of the crash and vehicle fire 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.

We identified the following safety issues during this investigation: (1) speed and (2) high voltage Lithium-ion batteries.

Recommendations: None  
Brief Adopted: December 13, 2019

***Other Efforts and Focus Areas***

**Webinar: Vehicle Collision with Student Pedestrians Crossing High Speed Roadway to Board School Bus  
May 13, 2020**

The NTSB's Office of Highway Safety planned to hold a public Board meeting to discuss its investigation of a *Vehicle Collision with Student Pedestrians Crossing a High-speed Roadway to Board a School Bus* that occurred in Rochester, Indiana, in which a pickup truck failed to stop for a school bus, killing three children and seriously injuring a fourth

(the accident is discussed in more detail above). Because of the pandemic and the resulting rapid changes impacting school transportation providers in late March and early April, the NTSB voted to approve the report electronically rather than in the planned Board meeting and to engage stakeholders via a webinar in May that included a series of technical presentations regarding the investigation, the Board's findings, and the resultant safety recommendations.

## Ongoing Significant Highway Accident Investigations

Location	Date	Description	Fatalities
North Charleston, South Carolina	7/07/2020	A 2018 Ford F-350 pickup truck collided with a 2017 state patrol vehicle and a 2005 tow truck that were parked in the traffic lanes while working an earlier crash. The police officer and tow truck operator were out of their vehicles at the time of the crash.	1
Arlington, Wisconsin	6/12/2020	A 2013 Freightliner truck-tractor in combination with a 2017 Utility semitrailer struck a 2021 Kia passenger vehicle, which was at the end of a traffic queue resulting from two previous crashes. Four people were fatally injured in the multivehicle collision.	4
Pala Mesa, California	2/22/2020	A medium size bus with a 2014 Freightliner chassis departed the roadway to the right and collided with a roadside barrier. Following the collision, the bus rolled down an embankment and came to rest on its roof.	3
Mt. Pleasant, Pennsylvania	1/05/2020	A motorcoach overturned on the roadway resulting in a multivehicle crash involving three truck-tractor semitrailer combination vehicles.	5
Belton, South Carolina	12/17/2019	A medium-size bus with a Ford F-350 chassis and a 15-passenger Goshen body was impacted by a passenger vehicle that crossed the centerline.	1
Bryce Canyon City, Utah	9/30/2019	A medium-size bus departed the roadway and as the driver attempted to regain control, the vehicle rolled over.	4
Randolph, New Hampshire	6/21/2019	A pickup truck crossed the centerline and collided with a group of motorcyclists; a postcrash fire ensued.	7
Alachua, Florida	1/03/2019	A 2018 truck-tractor in combination with a van semitrailer impacted a passenger car, crashed through the median, and struck a 2006 Chevy van, causing the van to roll over. Additional vehicle collisions also occurred as a result.	7

Note: At the close of FY 2020, we were continuing to devote significant resources to the accident investigations listed and anticipated producing an accident report or brief for adoption upon the completion of each investigation.

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## MARINE SAFETY

	<b>(\$000s)</b>	<b>FTEs</b>
FY 2021 Estimate	\$5,509	20
FY 2022 Request	\$5,602	20
Increase/Decrease	\$93	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of Marine Safety 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 with by the NTSB Chairman, to life, property, or the environment by hazardous materials.

For select major marine casualties, the office 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 report. Most of these investigation reports are issued by the office director through delegated authority; briefs involving public/nonpublic marine accidents and briefs that contain safety recommendations are adopted and issued by the Board.

The office 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



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vessels anywhere in the world. Accidents involving foreign-flagged vessels accounted for 27 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), the office 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 vacation on cruise ships. In March 2020, however, the Centers for Disease Control and Prevention issued a “No Sail Order” for cruise ships in US waters; as a result, US citizen travel aboard cruise ships was reduced by at least 60 percent in FY 2020.

The 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, office staff attended only three IMO sub-committee meetings in London, United Kingdom; they included Navigation, Communications and Search and Rescue; Ship Design and Construction; and Ship Systems and Equipment.

As part of the international program, the office coordinates with other US and foreign agencies to ensure consistency with IMO conventions, most notably for joint US/flag-state marine accident investigations. We also cooperate with other accident investigation organizations worldwide at annual meetings (held virtually), such as the Marine Accident Investigators’ International Forum (MAIIF), Europe MAIIF, and MAIIF Americas, which track 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 these investigations maintain public confidence in marine transportation systems and provide policymakers with unbiased analysis.

The Office of Marine Safety comprises 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. Currently, major accident investigations are conducted by one of two teams with either five or six investigators on each team, led by an IIC and including subject-matter experts in nautical operations, marine engineering and naval architecture, survival factors, human performance, and, when needed, a subject-matter expert from the Office of Research and Engineering.

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## ***Product Development Division***

The Product Development Division administers the investigative quality management program. The division consists of 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 office correspondence.

## **Accomplishments and Ongoing Efforts**

This office's accomplishments include issuance of products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 are highlighted below, along with information about other efforts and focus areas important to both the current and future mission of the agency.

### ***Accident Reports***

Investigation reports on major accidents are adopted and issued by the Board.

#### **Collision between US Navy Destroyer *Fitzgerald* and Philippine-Flag Container Ship *ACX Crystal* Sagami Nada Bay off Izu Peninsula, Honshu Island, Japan July 17, 2017**

About 1:30 a.m. local time on June 17, 2017, the US Navy Destroyer *Fitzgerald* with 315 persons on board was southbound at a speed of about 22.1 knots in the bay of Sagami Nada off Japan's Honshu Island after departing the US Navy Base at Yokosuka, Japan, bound for the Philippines. The Philippine-flag container ship *ACX Crystal*, operated by Sea Quest Ship Management Inc., with 20 crewmembers on board was east-northeast-bound at a speed of about 18.5 knots, headed to Tokyo, Japan, from Nagoya, Japan. As the distance between the two ships continuously decreased, neither vessel radioed the other. Seconds before the collision, the watch officers attempted to maneuver the vessels to avoid impact, but the actions were too late, and the ships collided. Seven *Fitzgerald* crewmembers died in the accident, and three crewmembers suffered serious injuries. The destroyer sustained extensive damage to its forward starboard side. The *ACX Crystal* sustained damage to its bow; no injuries were reported.

The NTSB was the lead federal agency in this accident investigation and delegated our authority to the Coast Guard to gather documents and perform interviews on our behalf; we developed the analysis and probable cause based on the evidence gathered by the Coast Guard and additional documentation provided by the Navy.

The NTSB determined that the probable cause of the collision between US Navy Destroyer *Fitzgerald* and container ship *ACX Crystal* was the failure of the *Fitzgerald*'s bridge team to take early and substantial action to avoid collision as the give-way vessel in a crossing situation. Contributing was ineffective communication and cooperation among the

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*Fitzgerald* crew on the bridge and in the combat information center, and the insufficient planning of the commanding officer of the *Fitzgerald* for the hazards of the vessel's intended transit. Also contributing was the Navy's ineffective oversight of the *Fitzgerald* in the areas of operations scheduling, crew training, and fatigue mitigation. Also contributing to the accident was the *ACX Crystal* watch officer's lack of early detection of the Navy vessel and insufficient actions to avoid collision once in doubt as to the destroyer's intentions.

This report identified the following safety issues: (1) the *Fitzgerald* crew's fatigue, (2) the practice of US naval vessels not to broadcast automatic identification system information, (3) the failure of both vessels to follow required actions in accordance with the International Regulations for the Prevention of Collisions at Sea, (4) the *Fitzgerald* commanding officer's failure to adequately assess the hazard presented by the vessel's intended transit, and (5) insufficient oversight by the US Navy.

The Board issued four safety recommendations to the US Navy and Sea Quest Ship Management Inc.

Recommendations: 4 new  
Report Adopted: August 3, 2020

### **Sinking of Amphibious Passenger Vessel *Stretch Duck 7* Table Rock Lake, near Branson, Missouri July 19, 2018**

About 7:08 p.m. local time on July 19, 2018, the *Stretch Duck 7*, a 33-foot-long, modified World War II-era DUKW amphibious passenger vessel that was operated by Ripley Entertainment Inc. doing business as (dba) Ride The Ducks Branson, sank during a storm with heavy winds that moved rapidly on Table Rock Lake near Branson, Missouri. Seventeen of the 31 persons aboard died. Several hours prior to the accident, the National Weather Service had issued a severe thunderstorm watch for the area, followed by a severe thunderstorm warning a minute before the vessel departed the shoreside boarding facility—a roadside building about 6 miles away from the lake where the tours commenced and concluded. Due to the approaching weather, the manager-on-duty advised the captain and driver as passengers were boarding the vessel to complete the lake portion of the tour before the land tour (which normally occurred first). In addition, three other company vessels also began waterborne tours following the severe thunderstorm warning. About 5 minutes after the *Stretch Duck 7* entered the water, the leading edge of a storm front, later determined to be a “derecho,”<sup>1</sup> passed through the area generating strong winds and waves reportedly 3–5 feet high, with the highest wind gust recorded at 73 mph. The *Stretch Duck 54*, which entered the lake about 2 minutes before the *Stretch Duck 7* and was conducting a tour on the lake, was able to exit the water after experiencing the severe weather. During its effort to reach land, the *Stretch Duck 7* took on water and sank approximately 250 feet away from the exit ramp. Several first responders, along with

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<sup>1</sup>A line of intense, widespread, and fast-moving windstorms that can cause hurricane-force winds, tornadoes, heavy rains, and flash floods.

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the crewmembers and passengers aboard a paddle wheeler moored nearby, rescued and triaged 14 passengers, 7 of whom were transported to a local hospital. Loss of the vessel was estimated at \$184,000. Investigators retrieved and reviewed audio and video data from the vessel’s digital video recorder system, which provided first-hand observation of the circumstances leading up to the accident.

The NTSB determined that the probable cause of the sinking of the amphibious passenger vessel *Stretch Duck 7* was Ripley Entertainment Inc. dba Ride The Ducks Branson’s continued operation of waterborne tours after a severe thunderstorm warning was issued for Table Rock Lake, exposing the vessel to a derecho, which resulted in waves flooding through a non-weathertight air intake hatch on the bow. Contributing to the sinking was the Coast Guard’s failure to require sufficient reserve buoyancy in amphibious vessels. Contributing to the loss of life was the Coast Guard’s ineffective action to address emergency egress on amphibious passenger vessels with fixed canopies, such as the *Stretch Duck 7*, which impeded passenger escape.

The safety issues identified in this accident, some of which have been identified in previous accidents involving amphibious passenger vessels, included the following: (1) company oversight, (2) engine compartment ventilation closures, (3) reserve buoyancy, (4) survivability, and (5) Coast Guard oversight.

The Board issued six new safety recommendations to the US Coast Guard and Ripley Entertainment Inc., dba Ride The Ducks Branson.

Recommendations: 6 new  
Report Adopted: April 28, 2020

Before releasing this final report, the Board issued a Safety Recommendation Report, described in the corresponding section below.

### ***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’s director under delegated authority or may be adopted by the Board. This report describes 11 of the 45 briefs completed in FY 2020.

#### **Fire at Jackson County Park Marina Lake Guntersville/Tennessee River, Scottsboro, Alabama January 27, 2020**

On January 27, 2020, about 12:35 a.m. local time, fire broke out aboard the *Dixie Delight*, a 43-foot liveaboard houseboat, tied to Dock B at Jackson County Park Marina in Scottsboro, Alabama. The owner of the vessel attempted to extinguish the fire and push the burning vessel away from the dock, but the blaze engulfed the *Dixie Delight* and then spread to neighboring vessels and the wood-framed covered dock. The fire trapped 17 people on the dock. In the process of attempting to escape, eight people died. An

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estimated 4,000 gallons of fuel and lube oil were released, with the majority consumed during the fire. The value of Dock B and the 35 vessels destroyed was estimated at more than \$500,000.

The National Transportation Safety Board determined that the probable cause of the fire aboard the *Dixie Delight* and subsequent fire at Dock B was a fire of unknown source, originating aboard the *Dixie Delight* in the vicinity of the vessel's electrical panel. Contributing to the severity of the fire and loss of life were the limited fire safety practices of Jackson County and the marina.

Recommendations: None  
Brief Adopted: September 3, 2020

**Contact of Crane Barge *Mr Ervin*, Pushed by Towing Vessel *Kristin Alexis*, with Sunshine Bridge  
Lower Mississippi River, mile 167.4, St. James Parish, Louisiana  
October 12, 2018**

On October 12, 2018, about 1:41 a.m. local time, the towing vessel *Kristin Alexis* was transiting with the crane barge *Mr Ervin* upbound on the Lower Mississippi River near St. James, Louisiana, when the crane struck the deck of the Sunshine Bridge while passing under the west channel span. No pollution or injuries to the six crewmembers on board the *Kristin Alexis* were reported. The bridge was completely closed to vehicular traffic for 49 days while repairs were made, which resulted in significant traffic impacts. Damage to the bridge was \$6.7 million, while crane damage was estimated at \$8,500.

The NTSB determined that the probable cause of the *Mr Ervin* crane barge striking the Sunshine Bridge was the inadequate voyage planning and watch turnover between the captain and pilot, resulting in the pilot's transiting beneath the bridge's west span instead of its channel span. Contributing to the accident was the lack of company oversight. Also contributing to the accident was the charted information for the bridge used by the pilot, which did not reflect the actual vertical clearance of the west span.

This report identifies the following safety issues: (1) prior to getting under way, the captain could have used his stop work authority to stop the transit until he was comfortable with the vessel and tow's configuration; (2) the company's voyage planning guidance was insufficient; (3) the captain and pilot did not complete a thorough watch hand over; (4) the company did not verify that crews understood and implemented the safety management system; (5) the pilot assumed that the tow had sufficient overhead to transit the west span because the vessel's electronic charts system did not reflect actual minimum vertical clearance for the west span of the Sunshine Bridge; (6) contrary to National Oceanic and

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Atmospheric Administration guidance, when there are multiple navigable bridge spans, the agency’s navigational charts do not consistently list vertical clearances for each span.

The Board issued three new safety recommendations to Marquette Transportation Company and the National Oceanic and Atmospheric Administration.

Recommendations: 3 new  
Brief Adopted: July 16, 2020

**Capsizing and Sinking of Workboat *MSRC 8-1*  
Boothville Anchorage, Lower Mississippi River, Boothville, Louisiana  
January 16, 2019**

About 10:38 a.m. local time on January 16, 2019, the workboat *MSRC 8-1*, which operated from the oil spill response vessel *Louisiana Responder*, capsized during an oil spill boom deployment exercise in the Lower Mississippi River near Boothville, Louisiana (mile 18), trapping both of its crew inside. Although the crew of the *Louisiana Responder* and the Coast Guard worked to rescue the trapped *MSRC 8-1* crew, the boat sank. One crewmember died in the sinking; the other crewmember was not found and is presumed dead. The *MSRC 8-1* was declared a constructive total loss with damage estimated at \$250,000. A sheen of oil was sighted on the water after the vessel sank; no other pollution was reported.

The NTSB determined the probable cause of the capsizing of the workboat *MSRC 8-1* was the boat’s becoming perpendicular to a strong river current for an undetermined reason while tethered to the *Louisiana Responder*. Contributing to the accident was the unforeseen risk associated with conducting the exercise in a strong current, which also contributed to the severity of the outcome by hampering rescue efforts.

Recommendations: None  
Brief Adopted: July 2, 2020

**Contact of *Mary Lucy Lane* Tow with Markland Locks and Workboat *Gibson*  
Warsaw, Kentucky  
December 18, 2018**

About 3:55 p.m. local time on December 18, 2018, the US-flag towing vessel *Mary Lucy Lane*, with eight crewmembers on board and pushing a tow of 12 barges, was locking southbound at the Markland Locks & Dam (L&D) at mile 531.5 on the Ohio River, when the tow struck the lock’s wall, then its guard wall. Several barges broke loose and continued forward, one of which collided with the moored US Army Corps of Engineers workboat *Gibson*. No injuries or pollution resulted from the accident. Damage to the *Mary Lucy Lane*, the barges, and the dam was estimated at \$321,943; the Corps of Engineers estimated the cost to replace the *Gibson* at \$1.8 million.

The NTSB determined that the probable cause of the contact of the *Mary Lucy Lane* tow with the Markland Locks and workboat *Gibson* was a strong outdraft above the dam caused

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by the extreme high flow conditions, which overwhelmed the pilot's ability to control the *Mary Lucy Lane* tow before locking.

Recommendations: None  
Brief Adopted : May 16, 2020

**Grounding and Sinking of Recreational Vessel *Silver Lining*  
Hood Canal, southwest of Hood Canal Bridge, Washington  
July 23, 2019**

On July 23, 2019, about 3:00 p.m. local time, the US-flagged recreational yacht *Silver Lining* hit a submerged rock southwest of the Hood Canal Bridge in Hood Canal, Washington. The vessel sustained damage to the hull, propellers, and rudders, and took on water. The eight people on board safely departed the vessel. The flooding could not be controlled, and a salvage company moved the vessel to shallow water, where it later sank. There were no reports of injuries or release of fuel oil into the marine environment. The property damage was determined to be \$500,000.

The NTSB determined that the probable cause of the grounding and sinking of the recreational yacht *Silver Lining* was the vessel's operator not properly determining the yacht's position approaching the west span of the Hood Canal Bridge from the south, resulting in damage and uncontrolled flooding after striking the charted Sisters underwater shoal.

Recommendations: None  
Brief Adopted: May 5, 2020

**Engine Room Fire aboard Bulk Carrier *St. Clair*  
Toledo, Ohio  
February 16, 2019**

About 9:00 p.m. local time on February 16, 2019, a fire was reported on the US-flagged bulk carrier *St. Clair* while the vessel was laid-up for the winter at the CSX TORCO Iron Ore Terminal at the mouth of the Maumee River in Toledo, Ohio. No one was on board. The fire was extinguished approximately 36 hours later by shoreside firefighters. No pollution or injuries were reported. The estimated property damage exceeded \$150 million.

The NTSB determined that the probable cause of the fire aboard the bulk carrier *St. Clair* was the ignition of combustible material in the vicinity of an engine room workshop, likely due to the use of portable space heaters or smoldering smoking materials, which spread to other areas of the vessel. Contributing to the extent of the fire damage was the lack of operating procedures for continuous active monitoring of the vessel while in lay-up status.

Recommendations: None  
Brief Adopted: April 2, 2020

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**Overpressurization and Rupture of Cargo Tank on Cargo Vessel *Fairchem Filly*  
Deer Park, Texas  
May 30, 2019**

On May 30, 2019, about 7:50 a.m. local time, the Marshall Islands-flagged chemical tanker *Fairchem Filly*, with a crew of 22, experienced an over pressurization of the number 3 port and starboard cargo tanks while discharging liquid hexene at Vopak Terminal in Deer Park, Texas. The over pressurization resulted in damage to the number 3 port cargo tank and the tank top (deck). All cargo was contained on board the double-hulled vessel, with no pollution or injuries reported. Damage to the *Fairchem Filly* was estimated at \$750,000, and the contaminated cargo was an estimated \$100,000 loss.

The NTSB determined that the probable cause of the over pressurization and rupture of the 3 port cargo tank aboard the *Fairchem Filly* during offloading was the vessel and terminal personnel involved not following policies and procedures related to cargo discharge and nitrogen-blanketing operations. Contributing to the casualty was the lack of effective communication between the vessel and terminal personnel and the decision of the vessel's Person in Charge to continue discharge operations after being unable to communicate with the terminal.

Recommendations: None  
Brief Adopted: March 26, 2020

**Contact of Cruise Ship *Norwegian Epic* with San Juan Cruise Port Pier 3  
San Juan, Puerto Rico  
February 12, 2019**

On February 12, 2019, about 5:24 p.m. local time, the Bahama-flagged cruise ship *Norwegian Epic* was docking at San Juan Cruise Port, Pier 3 east, in San Juan, Puerto Rico, when the vessel's port bow contacted two of the pier's mooring dolphins. None of the 6,023 persons on board were injured, and there was no reported pollution. Damage to the mooring dolphins and connecting catwalks was estimated at \$3.5 million, and damage to the vessel was estimated at \$200,000.

The NTSB determined that the probable cause of the contact of the cruise ship *Norwegian Epic* with San Juan Cruise Port Pier 3 was a lack of communication and coordination between the master and pilot, which resulted in a poorly executed docking maneuver.

Recommendations: None  
Brief Adopted: January 29, 2020



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**Grounding of Fishing Vessel *Imperial*  
Point Reyes, California  
November 19, 2018**

On November 19, 2018, about 4:45 a.m. local time, the US-flagged fishing vessel *Imperial* was transiting the Gulf of the Farallones, 25 miles northwest of San Francisco, California. While en route to pick up a string of crab pots, the vessel grounded near Point Reyes, California. The five crewmembers remained with the vessel until they were assisted by a Coast Guard vessel. The *Imperial* later was towed to port. No pollution or injuries were reported. Damage to the vessel was estimated at \$950,000.

The NTSB determined that the probable cause of the grounding of the fishing vessel *Imperial* was the captain's failure to monitor the vessel's track as a result of falling asleep due to an accumulated sleep deficit after 4 days of continuous operations, and the decision not to activate the vessel's installed wheelhouse watch alarm. Contributing to the accident was the vessel owner's lack of measures to mitigate crew fatigue and the nature of the derby-style Dungeness fishery in the state of California, which results in continuous fishing operations at the beginning of the season.

Recommendations: None  
Brief Adopted: November 22, 2019

**Contact of the Cruise Ship *Nippon Maru* with Mooring Dolphins  
Apra Harbor, Guam  
December 30, 2018**

At 9:13 p.m. local time on December 30, 2018, the stern of the Japanese-flagged passenger vessel *Nippon Maru* 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.

The NTSB determined that the probable cause of the passenger vessel *Nippon Maru*'s contact with the mooring dolphins at the US Navy wharf D in Apra Harbor, Guam, was alcohol impairment of the master while he conducted the vessel, resulting in an errant astern engine input.

Recommendations: None  
Brief Adopted: October 23, 2019

**Contact of Cruise Ship *Carnival Horizon* with Manhattan Cruise Terminal Pier 90  
New York City, New York  
August 28, 2018**

On the morning of August 28, 2018, the Panama-flagged cruise ship *Carnival Horizon*, with a total of 6,361 people on board, was maneuvering to berth no. 2 at Manhattan Cruise

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Terminal’s Pier 88 in New York City, New York, when its bow struck the southwest corner of adjacent Pier 90. No one was injured and no pollution occurred, but Pier 90’s walkway, roof parking garage, and facilities suffered extensive structural damage, and the ship sustained minor damage above the waterline, totaling about \$2.5 million in cumulative damage.

The NTSB determined that the probable cause of the *Carnival Horizon*’s contact with Pier 90 was the ineffective interaction and communication between the master and the docking pilot who were maneuvering the vessel, and the bridge team’s ineffective oversight of the docking maneuver. Contributing was the placement of the third officer in a location without view of the bow to monitor the close approach to Pier 90.

Recommendations: None  
Brief Adopted: October 22, 2019

### ***Investigative Hearing***

Investigative hearings are public hearings related to investigations in which the agency is authorized to obtain testimony under oath. When the Coast Guard, as part of the investigation of a major marine casualty, holds a Marine Board of Investigation (MBI) Hearing, NTSB investigators join in as an equal partner. Consistent with Coast Guard responsibility to direct the course of the investigation, those NTSB investigators designated by the MBI may (1) make recommendations about the scope of the investigation, (2) call and examine witnesses, (3) submit or request additional evidence.

### **Capsizing of the Vehicle Carrier MV *Golden Ray*, September 8, 2019 Investigative Hearing September 14 to September 22, 2020**

The Coast Guard held a virtual MBI from September 14 to 22, 2020, into the events leading to the capsizing of the vehicle carrier motor vessel (MV) *Golden Ray* in Brunswick, Georgia. The *Golden Ray* was a 2-year-old Marshall Islands-flagged vessel that was classified by Korean Registry. A member of the NTSB’s Office of Marine Safety served as an equal partner on the MBI and participated along with representatives from the Marshall Islands, Korean Maritime Safety Tribunal, Brunswick Bar Pilots’ Association, and the vessel owner. Thirteen witnesses were called to testify, including the master of the vessel, the pilot who was onboard at the time of the casualty, and shoreside personnel who oversaw the loading of the vessel prior to the incident. The hearing clarified the events that occurred before, during, and after the vessel capsized, and the Coast Guard’s Marine Safety Center issued a report that determined that the vessel had not been in compliance with IMO requirements for stability when it departed the dock prior to the casualty.

### ***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

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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.”

**Improving Vessel Survivability and Passenger Emergency Egress of DUKW Amphibious Passenger Vessels  
Tabletop Lake, Branson, Missouri  
July 29, 2018**

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

Findings:

- Having been constructed with a low freeboard and without compartmentalization, or subdivision, the *Stretch Duck 7* lacked adequate reserve buoyancy, and therefore quickly sank once water entered the vessel after it encountered severe weather.
- 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 resulted in an increased number of fatalities.

Two new safety recommendations were issued to the Coast Guard.

Recommendations: 2 new  
Report Adopted: November 6, 2019

**Public Forums**

A forum is a public proceeding focused on a specific topic where invited participants provide presentations and are available for questions.

**Seafl oor Workshop  
September 29, 2020**

The NTSB *Seafl oor Workshop* was developed to help retain expertise learned from NTSB investigations at the seafloor, such as the 2015-2016 search for the *El Faro*. The project shares lessons from current aviation and marine investigations with interested stakeholders who may need to plan future operations.

The 2020 NTSB *Seafl oor Workshop* was configured for a virtual meeting, separated into two events. The first, on September 29, 2020, was held primarily to review the 2019 program and to re-engage participants and introduce new ones. Nearly 50 participants

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representing investigative agencies from numerous countries, seafloor technology companies, and science organizations joined the call. Representation came from all over the world, including Australia, Indonesia, Singapore, Canada, Cape Verde Islands and Europe. The second meeting was scheduled for December 16, 2020.

### ***Support to Foreign Accident Investigations***

In FY 2020, the Office of Marine Safety participated with the Coast Guard as a substantially interested state in the investigation of one serious marine casualty involving a foreign-flagged vessel in international waters, the MV *Viking Sky*. The passenger ship experienced machinery/equipment damage with loss of power during stormy seas and high winds, causing it to drift close to shore off the coast of Molde, Norway, on March 23, 2019. Eighteen people were injured during the evacuation by Norwegian national rescue services. There were no fatalities.

### ***Other Efforts and Focus Areas***

#### **Conferences and Presentations**

- L. LaRue presented recent NTSB investigations at the MAIIF 2019 General Meeting in Naples, Italy, October 12-19, 2019.
- B. Curtis hosted a meeting and presentation for Rear Admiral Timmie, US Coast Guard, to meet NTSB senior management and Office of Marine Safety management at NTSB headquarters, Washington, DC, on October 23, 2019.
- E. Stolzenberg presented on Small Passenger Vessel (SPV) Fires at the Passenger Vessel Association (PVA) Rivers Regional Meeting in Chicago, Illinois, on October 24, 2019.
- B. Curtis presented on SPV Fires at the PVA Western Regional Meeting at Lake Tahoe, Nevada, on October 29, 2019.
- E. Stolzenberg presented on SPV Fires at the PVA Northern Virginia Meeting in Alexandria, Virginia, on November 5, 2019.
- R. Jones presented at the Navigation Risk Assessment Conference at the State University of New York Maritime College in Ft. Schuyler, New York, on November 12, 2019.
- B. Curtis provided testimony on SPV Safety to the House Sub-Committee on Coast Guard and Marine Transportation in Washington, DC, on November 14, 2019.
- B. Curtis hosted a meeting and presentation for Transportation Safety Board of Canada Marine Director Cliff Harvey in Washington, DC, on November 21, 2019.
- M. Turrell presented at the Conference on Seafloor Recovery Technologies sponsored by the Republic of Marshall Islands Registry in London, United Kingdom, and Athens, Greece, December 2-8, 2019.
- B. Curtis presented on SPV and Inland Western Rivers marine vessel safety at the 2019 National Work Boat Conference in New Orleans, Louisiana, December 4-6, 2019.
- M. Kucharski presented on Office of Marine Safety investigation procedures at a

meeting of the National Association of Forensic Engineers in San Diego, California, on January 11, 2020.

- L. Larue participated on panel Transportation Research Board discussion on Autonomous Shipping, Washington, DC, January 15, 2020.
- M. Muise attended working group of IMO Sub-Committee on Navigation, Communications and Search and Rescue 7th Session (VTS Guidelines, GMDSS revisions, Polar Code Revisions), London, United Kingdom, January 15-24, 2020.
- D. Flaherty attended working group of IMO Sub-Committee on Ship Design and Construction, 7th Session, London, United Kingdom, February 3-7, 2020.
- B. Curtis presented on NTSB processes at annual PVA Maritrends conference, Tampa, Florida, February 2-4, 2020.
- A. Ehlers attended a working group of IMO Sub-Committee on Ship Systems and Equipment, 7th Session (Office of Marine Safety staff prepared for and participated in the US delegation to the working group on the “Onboard Lifting Appliances and Anchor Handling Winches”) London, United Kingdom, February 3-7, 2020.
- M. Turrell gave a virtual presentation to The Chatham Marconi Maritime Center’s Ed Fouhy Distinguished Speaker Series, discussing NTSB operations and the SS *El Faro* sinking, on August 27, 2020.

Remaining in-person conferences and presentations for FY 2020 were either canceled or postponed.

### **Investments in technology or systems that improve efficiency or accuracy of data or processes**

Staff worked with staff from the Office of the Chief Information Officer to develop the NTSB’s Marine SAFTI database, based on the international marine taxonomy adopted by the European Maritime Safety Agency’s European Maritime Casualty Information Platform. Our modified database, which became operational on October 1, 2019, will enhance the efficiency and accuracy of marine data as an investigative tool.

### **Ongoing Significant Marine Accident Investigations**

<b>Location</b>	<b>Date</b>	<b>Description*</b>	<b>Fatalities</b>
Ekuk Beach, Alaska (15 miles from Bristol Bay)	8/31/2020	Barge <i>SM-3</i> (US), grounding/stranding	0
Epic Dock, Inner Harbor, Corpus Christi, Texas	8/21/2020	Dredge <i>Waymon L. Boyd</i> (US), a gas pipe near the Epic Dock, fire/explosion	5
Fort Pierce, Florida	8/19/2020	Towing vessel <i>Old Glory</i> (US), South Causeway Bridge, contact	0
New Orleans, Louisiana	8/02/2020	Cargo vessel <i>CMA CGM BIANCA</i> (Malta), hull/machinery/equipment damage	0
Soo Locks, Sault Ste. Marie, Michigan	7/05/2020	Bulk carrier <i>Atlantic Huron</i> (Canada) struck the west center pier wall at the entrance of the Soo Locks, St. Mary’s River, contact	0
Off Hilo, Hawaii	6/22/2020	Towing vessel <i>Hoku-Loa</i> (US), hull/machinery/equipment damage	0

Location	Date	Description*	Fatalities
South of Martha's Vineyard, Massachusetts	6/17/2020	Fishing vessel <i>Rebecca Mary</i> (US), flooding	0
West side of Blount Island, St. John's River, Jacksonville, Florida	6/04/2020	Cargo vessel <i>Hoegh Xiamen</i> (Norway), fire/explosion	0
Harvey, Louisiana	5/17/2020	Towing vessel <i>Alton St. Amant</i> (US), flooding	0
New Orleans (Westwego), Louisiana	5/09/2020	Cargo vessel <i>Nomadic Milde</i> (MI), bulk carrier <i>Atlantic Venus</i> (Panama), and Cornerstone Chemical dock, collision/contact	0
Larose, Louisiana	4/16/2020	Work boat <i>Iron Maiden</i> (US), fire/explosion	0
Luling, Louisiana	3/15/2020	Towing vessel <i>Cooperative Spirit</i> (US), Luling-Destrehan Bridge, contact	0
Point Coupee Parish, Louisiana	2/26/2020	Towing vessel <i>City of Cleveland</i> (US), fire/explosion	0
Destrehan, Louisiana	1/26/2020	Towing vessels <i>RC Creppel</i> (US), <i>Cooperative Spirit</i> (US), motor vessel <i>Glory First</i> (MI), collision	3
Galveston, Texas	1/14/2020	Fishing vessel <i>Pappy's Pride</i> (US), tanker <i>Bow Fortune</i> (NO), collision	3
Joliet, Illinois	1/01/2020	Towing vessel <i>William C</i> (US), Rock Island RR bridge, contact	0
Sutwick Island, Alaska	12/31/2019	Fishing vessel <i>Scandies Rose</i> (US), capsizing/listing	5
Daufuskie Island, South Carolina	12/19/2019	Fishing vessel <i>Miss Annie</i> (US), grounding/stranding	0
Miami, Florida	12/19/2019	Recreational vessel <i>Andiamo</i> (MI), fire/explosion	0
Ferndale, Washington	12/15/2019	Tanker <i>Levant</i> (MI), Petrogas Ferndale Wharf, contact	0
Jacksonville, Florida	12/03/2019	Fishing vessels <i>Triton</i> (US), <i>Iris Marie</i> (US), fire/explosion	0
Hampton, Virginia	11/17/2019	Barge <i>YD71</i> (US), Backroe Fishing Pier, contact	0
Port Arthur, Texas	11/14/2019	Offshore supply vessel <i>Cheremie Bo Truc No. 22</i> (US), articulated tug/barge <i>Mariya Moran-Texas</i> (US), collision	0
Lemont, Illinois	11/04/2019	Barge <i>IB1940</i> (US), fire/explosion	0
Jean Lafitte, Louisiana	10/08/2019	Towing vessel <i>Susan Lynn</i> (US), fire/explosion	0
Chesapeake, Virginia	09/23/2019	Towing vessel <i>G.M. McAllister</i> (US), NGL Energy Partners pier, contact	0
Channelview, Texas	9/20/2019	Multiple barges, Interstate 10 bridge, contact	0
Southwest Pass, Louisiana	9/08/2019	Offshore supply vessel <i>Kristen Faye</i> (US), overturning	0
Dennis, Mississippi	9/08/2019	Towing vessel <i>Savage Voyager</i> (US), Jamie L. Whitten lock, contact	0
Santa Cruz Island, Ventura, California	9/02/2019	Small passenger vessel <i>Conception</i> (US), fire/explosion	34
800 nm northwest of Guam	8/04/2019	Towing vessel <i>Mangilao</i> (US), flooding	0

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<b>Location</b>	<b>Date</b>	<b>Description*</b>	<b>Fatalities</b>
Laplace, Louisiana	5/16/2019	Tanker <i>American Liberty</i> (US), cargo vessel <i>African Griffon</i> (BH), cargo vessel <i>Ever Grace</i> (BH) and barge <i>Don D</i> (US), collision	0
Houston Ship Channel, Texas	5/10/2019	Tanker <i>Genesis River</i> (Panama), towing vessel <i>Voyager</i> (US), barges <i>3001ST</i> (US), <i>MMI3041</i> (US), collision	0

Note: At the close of FY 2020, we were continuing to devote significant resources to the accident investigations listed and anticipated producing an accident report or brief for adoption upon the completion of each investigation.

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## RAILROAD, PIPELINE, AND HAZARDOUS MATERIALS INVESTIGATIONS

	(\$000s)	FTEs
FY 2021 Estimate	\$9,029	32
FY 2022 Request	\$9,311	32
Increase/Decrease	\$282	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of Railroad, Pipeline, and Hazardous Materials Investigations 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***

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 Federal Railroad Administration (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***

System Safety Division staff supports the investigations led by the Railroad Division and the Pipeline and Hazardous Materials Division. The division 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 to ensure they are logical and well-organized. In addition, the division's editors ensure the quality of NTSB responses to notices of proposed rulemaking, papers, congressional testimony, and speeches on matters pertaining to railroad, pipeline, and hazardous materials safety. The division is also responsible for the effective development of the NTSB's transportation safety policy, guidance, protocols,

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applicable portions of 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 products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 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***

Investigation reports on major accidents are adopted and issued by the Board.

#### **CSX Transportation Train Collision Carey, Ohio August 12, 2019**

On August 12, 2019, about 5:09 a.m. local time, westbound CSX Transportation freight train H70211 collided with the side of eastbound CSX Transportation freight train W31411 at a switch near Carey, Ohio. The trains were operating on the CSX Transportation Columbus Subdivision, which extends 90.6 miles from Columbus, Ohio, to Fostoria, Ohio. Each train's crew consisted of a conductor and a train engineer. The lead locomotive of the westbound train and railcars loaded with refuse in positions 1 through 4 were derailed onto their sides from the collision. The eastbound train derailed 21 railcars, loaded with frac sand, in positions 6 through 26. As a result of the collision, the eastbound and westbound train engineers suffered minor injuries. Collision damage was estimated at \$4.9 million. No placarded hazardous material railcars derailed.

The National Transportation Safety Board determined that the probable cause of the train collision near Carey, Ohio, was the failure of the westbound train engineer to respond to the signal indications requiring him to slow and stop the train prior to Control Point Springs because of his impairment due to the effects of alcohol. Contributing to the collision was the design of the positive train control system, which allowed continued operation in restricted mode on the main track.

We identified the following safety issues during this investigation: (1) train handling and performance, (2) CSX Transportation's random drug- and alcohol-testing program, (3) inward- and outward-facing image recorders, and (4) railroad switching operations in territory with positive train control.

The Board issued safety recommendations to the US Department of Transportation, the Federal Railroad Administration, the Association of American Railroads, the American Short Line and Regional Railroad Association, the National Railroad Passenger

Corporation, the Alaska Railroad Corporation, the American Public Transportation Association, and CSX Transportation.

Recommendations: 6 new  
Report adopted: September 15, 2020

**CSX Transportation Railway Maintenance Machine Operator Fatality  
Wartrace, Tennessee  
March 12, 2018**

On March 12, 2018, about 2:15 p.m. local time, a CSX Transportation equipment operator was fatally injured while working with a CSX model BR-201202 ballast regulator (roadway maintenance machine) on the main track near Wartrace, Tennessee, on the CSX Chattanooga Subdivision. The CSX manager of work equipment was traveling on the highway in the area when he saw the ballast regulator operator climb into the ballast regulator cab. Shortly thereafter, he heard a radio transmission from the operator reporting a problem with a proximity switch on the ballast regulator. The manager drove toward the ballast regulator to assist the operator and saw him under the east ballast regulator wing. The operator died at the scene.

The National Transportation Safety Board determined that the probable cause of this accident was the ballast regulator operator's attempt to repair the machine without powering it off and using lockout/tagout procedures, which re-established the electrical connection to the proximity sensor, allowing the machine to move and strike the operator while he was out of the cab, resulting in his death.

We identified the following safety issues during this investigation: (1) rules compliance and (2) operator presence controls. The Board issued safety recommendations to the Federal Railroad Administration, the American Railway Engineering and Maintenance-of-Way Association, and CSX Transportation.

Recommendations: 4 new  
Report adopted: July 24, 2020

**Long Island Rail Road Roadway Worker Fatality  
Queens Village, New York  
June 10, 2017**

On June 10, 2017, at 10:12 a.m. local time, Long Island Rail Road train 7623 on track 3 approached a five-member crew of roadway workers at the interlocking in Queens Village, New York. The foreman and three roadway workers were inspecting and making minor repairs to track 1 within the interlocking. A fifth roadway worker was clear of the tracks, keeping pace with the work group. Upon seeing train 7623 approach, the watchman/lookout sounded a handheld horn, yelled at the other workmen, and raised a disc that told the locomotive engineer to sound the train's horn, which he did. Three of the roadway workers remained on track 1, but the foreman stepped into the path of the train on track 3 and was killed. The train was traveling about 78 mph when the locomotive engineer applied the emergency brakes, just before impact.

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The NTSB determined that the probable cause of the accident was Long Island Rail Road’s decision to use train approach warning to protect the roadway workers on active tracks. Contributing to the accident was Long Island Rail Road’s and the International Association of Sheet Metal, Air, Rail and Transportation Workers’ allowance of overtime work scheduling without properly considering and mitigating workers’ risk of fatigue.

We identified the following safety issues during this investigation: (1) roadway worker protection, (2) roadway worker on-track safety briefings, (3) worker fatigue, (4) management oversight, and (5) Federal Railroad Administration regulations.

The Board issued safety recommendations to the Federal Railroad Administration; the Metropolitan Transportation Authority; and the International Association of Sheet Metal, Air, Rail, and Transportation Workers.

Recommendations: 6 new  
Report adopted: April 29, 2020

Before the adoption of this report, the NTSB issued a safety recommendation report titled *Train Approach Warning and Predetermined Place of Safety*, which included two urgent safety recommendations issued to the Metropolitan Transportation Authority to ensure that roadway workers are complying with (1) its operating rules and procedures and (2) Federal Railroad Administration regulations regarding roadway worker protection.

Recommendations: 2 new (urgent)  
Report adopted: February 13, 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 may be adopted by the Board. This report describes three of the four briefs completed in FY 2020.

### **Union Pacific Railroad Derailment and Employee Fatality Arlington, Texas September 22, 2017**

On September 22, 2017, about 11:06 a.m. local time, Union Pacific Railroad train Y-GW51R-22 derailed during a coupling operation in the UP Great Southwestern Yard in Arlington, Texas. At the time, a helper controlled the train remotely from the rear car. A foreman on the lead locomotive of the train was in radio communication with the helper. As the train traveled in reverse through a switch at a speed of 8 mph to couple with eight cars on track 001, the train’s emergency brakes activated, and a “man down” broadcast message went out over the railroad radio. The foreman attempted to radio the helper, received no response, and went to the rear of the train, where he saw that a car had derailed. The helper, between the third and fourth cars of the train, died from injuries sustained during the accident.

The NTSB determined that the probable cause of the switching employee fatality was a single car derailment caused by a loose, improperly fastened rail joint, which allowed the car's wheel to climb the mismatched rail. Contributing to the accident was the designation of the accident track as excepted track under the current FRA Track Safety Standards, which allowed inadequate track conditions to exist on track used regularly.

Recommendations: None  
Brief Adopted: September 16, 2020

**CSX Freight Train Derailment and Bridge Collapse  
Alexandria, Virginia  
May 19, 2018**

On May 19, 2018, at 7:02 a.m. local time, southbound CSX freight train X41518 derailed near milepost 102.9 as it approached a bridge overpass in Alexandria, Virginia. As a result of the derailment, the CSX bridge supporting main track one was extensively damaged and collapsed at the approaching abutment wall. The bridge structure and 8 of the 31 derailed railcars fell upon the tracks below, owned by Norfolk Southern Railway. The train crew was uninjured. A severe thunderstorm warning had been in effect for the area until about 4 hours before the time of the derailment, and about 5.5 inches of rain had fallen in the area during the 10-day period prior to the derailment.

The NTSB determined that the probable cause of the CSX train derailment and subsequent bridge collapse on May 19, 2018, was a subgrade fill failure of the track structure that displaced a large area of ballast under the low rail of the track near milepost CFP 102.9, resulting in a cross-level deviation of the track significant enough to allow a wheel climb derailment.

We identified the following safety issue during this investigation: the soil was weak and saturated, and the heavy rains caused the subgrade fill to subside.

Recommendations: None  
Brief Adopted: April 1, 2020

**Derailment of Metro-North Railroad Commuter Train  
Rye, New York  
May 18, 2017**

On May 18, 2017, at 4:56 p.m. local time, 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 had originated from Stamford, Connecticut, and was destined for Grand Central Terminal in Manhattan, New York, when 5 of the 12 cars derailed. Train 1373 was carrying 185 passengers, 12 of whom suffered minor injuries. Four crewmembers also reported minor injuries.

The NTSB determined that the probable cause of this derailment was the engineer of Metro-North Railroad 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 positive train control system, which would have stopped the train in advance of the speed-restricted area.

We identified the following safety issues during this investigation: (1) operating on tracks where a track condition had been reported and (2) train crew communication of speed restriction instructions.

The Board issued safety recommendations to Metro-North Railroad.

Recommendations: 2 new  
Brief adopted: October 8, 2019

### ***Other Railroad Efforts and Focus Areas***

The Office of Railroad, Pipeline, and Hazardous Materials Investigations provided rail and hazardous materials investigation support to the Transportation Safety Board of Canada for a mixed freight train derailment that occurred in a tunnel between Port Huron, Michigan, in the United States and Sarnia, Ontario, in Canada, on June 28, 2019. There were no fatalities. The derailed train straddled the border; however, the point of derailment was determined to be in Canada, and the Transportation Safety Board of Canada assumed the lead in the investigation.

## **Ongoing Significant Railroad Accident Investigations**

<b>Location</b>	<b>Date</b>	<b>Description</b>	<b>Fatalities</b>
New York, New York	9/10/2020	Employee fatality	1
Tempe, Arizona	7/20/2020	Derailed and fire	0
Lindenwald, New Jersey	7/26/2020	Employee fatality in yard	1
Northlake, Illinois	4/23/2020	Union Pacific Railroad conductor fatality	1
Draffin, Kentucky	2/13/2020	CSX Transportation freight train derailment with hazardous materials release	0
Sacramento, California	8/22/2019	Collision between Sacramento Regional Transit District light rail vehicles	0
Carey, Ohio	8/12/2019	Side collision between CSX Transportation freight trains	0
Philadelphia, Pennsylvania	7/08/2019	Southeastern Pennsylvania Transit Authority train struck 2 track workers	1
Sarnia, Ontario, Canada	6/28/2019	Canadian National Railway freight train derailment with hazardous materials release	0
Fort Worth, Texas	4/24/2019	Union Pacific Railroad train derailment with hazardous materials release	0

Location	Date	Description	Fatalities
Chattanooga, Tennessee	4/13/2019	CSX Transportation remote-control locomotive struck and killed carman	1
Baltimore, Maryland	2/07/2019	Norfolk Southern Railway conductor fatality	1
Bronx, New York	12/05/2018	New York City Transit passenger killed while moving between cars	1
Estill, South Carolina	11/30/2018	CSX Transportation roadway worker fatality	1
Granite Canyon, Wyoming	10/04/2018	Rear-end collision between Union Pacific Railroad freight trains	2
Kingman, Arizona	6/05/2018	Collision between BNSF intermodal train and rail unloading machine vehicle at the rear of a BNSF work train	1
Bowie, Maryland	4/24/2018	Amtrak train struck and killed roadway worker	1
Upper Darby, Pennsylvania	8/22/2017	Rear-end collision between Southeastern Pennsylvania Transit Authority trains	0
Hyndman, Pennsylvania	8/02/2017	CSX Transportation train derailment with hazardous materials release	0

Note: At the close of FY 2020, we were continuing to devote significant resources to the accident investigations listed and anticipated 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 products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 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 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 describes three of the four briefs completed in FY 2020.

#### **Magellan Pipeline Anhydrous Ammonia Release Tekamah, Nebraska October 17, 2016**

An 8-inch-diameter underground transmission pipeline ruptured and released 2,587 barrels (108,654 gallons) of liquid anhydrous ammonia on private property adjacent to milepost 263.32 on County Road P in Burt County, near Tekamah, Nebraska. The pipeline was owned and operated by Magellan Midstream Partners LP. Upon release and exposure to the atmosphere, the ammonia vaporized and produced a toxic plume. A local resident who had left his home to investigate the accident scene died of respiratory failure from exposure

to the ammonia vapor; two others sustained minor injuries. A total of 29 households, including 49 people, were evacuated. US Highway 75, a main roadway in the area, was closed for several days.

The NTSB determined that the probable cause of the pipeline rupture was corrosion fatigue cracks that grew and coalesced under disbonded polyethylene tape coating. Contributing to the location of the cracking was external loading that caused bending stress in the pipe in addition to the cyclic stresses in the pipe from the internal pressure of the ammonia transported.

We identified the following safety issue during our investigation: the need for pipeline operators to have Inline Inspection data additionally screened, using data signatures obtained from previous pipeline failures, to assist in forecasting pipeline deficiencies.

Recommendations: None  
Brief Adopted: January 29, 2020

### **Gasoline Transmission Pipeline Explosion/Fire Helena, Alabama October 31, 2016**

While excavating, a contractor damaged the Colonial Pipeline Company's 36-inch-diameter refined liquid petroleum transmission pipeline, known as Line 1, near Helena, Alabama. The damage resulted in a release of gasoline from the pipeline, which ignited and burned for several days. Two excavation crew workers died, and four other workers were injured.

The NTSB determined that the probable cause of the explosion was the excavation crew's inadequate planning, coordination, and communication during the excavation and failure to adhere to company policy requiring hand excavation if closer than 2 feet from the top or bottom of the pipeline until the pipeline has been exposed, which allowed the track-hoe to damage the pipeline.

We identified the following safety issue during our investigation: the need for additional training for pipeline field crews on excavation and backfill procedures.

Recommendations: None  
Brief Adopted: December 10, 2019

### **Natural Gas Explosion at Educational Facility Minneapolis, Minnesota August 7, 2017**

A building on the north campus of the Minnehaha Academy, a private school in Minneapolis, Minnesota, was destroyed by a natural gas explosion. At the time of the explosion, two workers were installing piping to support the relocation of gas meters from the basement of the building to the outside. Two new meters mounted on an exterior wall were ready for the piping to be connected. While workers were removing the existing piping, a full-flow natural gas line at pressure was opened. When the workers were unable



to control the release of the gas, they evacuated the building and warned others to evacuate. The explosion occurred during the evacuation. Two people were killed, and nine others were injured.

The NTSB determined that the probable cause of the explosion was the disassembling of piping upstream of a gas service meter in the building by a pipefitting crew, resulting in the release of natural gas, which subsequently ignited. Contributing to the accident was the lack of detailed documentation that clearly established the scope of work to be performed.

We identified the following safety issue during our investigation: the need for updated procedures and training on the installation of excess flow valves and manual service line shutoff valves.

Recommendations: None  
Brief Adopted: December 2, 2019

## Ongoing Significant Pipeline Accident Investigations

Location	Date	Description	Fatalities
Hillsboro, Kentucky	5/04/2020	Natural gas pipeline rupture and fire in rural area	0
Danville, Kentucky	8/01/2019	Natural gas pipeline rupture and fire affecting nearby homes	1
San Francisco, California	2/06/2019	Excavator damage to natural gas main initiates Fire	0
Dallas, Texas	2/23/2018	Single-family residence explosion after two previous houses had fire/explosions	1

Note: At the close of FY 2020, we were continuing to devote significant resources to the accident investigations listed and anticipated 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 the issuance of products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2020 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 Accident Reports***

Investigation reports on major accidents are adopted and issued by the Board.

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**CSX Transportation Inc. Tank Car Release of UN1987 Denatured Ethanol  
Fredericksburg, Virginia  
November 2, 2016**

CSX Transportation Inc. reported a 68-gallon release of UN1987 denatured ethanol, a flammable Class 3 hazardous material, from cracks in the bottom of the shell of Archer Daniels Midland Company tank car ADMX 29899 in the CSX Transportation Inc. rail yard in Fredericksburg, Virginia. The release and the resulting emergency rail traffic caused other rail traffic on adjacent main tracks to be significantly slowed, resulting in passenger train delays during peak traffic hours. The incident location was bordered by commercial businesses and residential neighborhoods.

The NTSB determined that the probable cause of the release was undetected cracks that resulted from overspeed high-energy coupling events, which caused tank shell deformation that led to the initiation of two fatigue cracks at the terminations of the cradle pad fillet welds.

We identified the following safety issues during our investigation: the lack of federal regulations limiting the combination of coupling speed and impacting mass to tank car coupler and underframe components, which could mitigate the risk of a hazardous materials release following high-force coupling events and (2) the need for structural integrity inspections to be performed by qualified technicians at certified tank car facilities using specialized nondestructive examination techniques with a sufficient probability of detection to ensure that critical flaws are identified in tank materials. Without a means of detecting and reporting excessive coupling speed events, damaged tank cars such as ADMX 29899 may continue in service and pose an unnecessary risk of hazardous materials releases.

The Board issued recommendations to the Federal Railroad Administration.

Recommendations: 4 new  
Report Adopted: February 14, 2020

**Air Products and Chemicals Inc. Tube Trailer Module Hydrogen Release and  
Subsequent Fire  
Diamond Bar, California  
February 11, 2018**

A release of compressed hydrogen and subsequent fire occurred in Diamond Bar, California, during the transportation of an Air Products and Chemicals Inc. 2014 Mack CXU613 truck-tractor in combination with a 2015 Cheetah Chassis Corporation chassis and 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 240 kilograms of 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 1,400 to 2,000 people were evacuated from the adjacent business district and a nearby residential area. Equipment damages were estimated at \$175,000.

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The NTSB 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, thus allowing a fire to develop inside the module and impinge on adjacent cylinders. Contributing to the incident was a lack of a requirement for requalification inspectors to verify the pressure relief device pressure rating and to inspect for vent line assembly securement.

We identified the following safety issues during this investigation: (1) the need for greater first responder training and awareness about hydrogen tube trailer modules; (2) the lack, in available guidance, of critical hazard recognition and firefighting information specific to fuel cell electric vehicle fueling infrastructure and containers currently used for the bulk transportation of compressed hydrogen; (3) the improper installation of vent line compression fittings that disassembled during venting had not been properly installed at the time the tube trailer module was fabricated, and the failure to notice and repair this issue during the requalification inspection; (4) the lack of a Pipeline and Hazardous Materials Safety Administration special permit and regulatory requirements for (a) verifying that pressure relief devices used on cylinders actuate at the correct pressure and (b) venting equipment have been properly assembled and secured, which increases the risk of uncontrolled fires on flammable gas tube trailers; and (5) the lack of noticeable marking or other visual indicators, unique design features, and unique model numbering to readily identify pressure relief devices intended for different applications, thus making them easy to confuse and enabling the requalification technician to install four incorrect pressure relief devices on the incident tube trailer module.

The Board issued safety recommendations to the Pipeline and Hazardous Materials Safety Administration; the US Department of Energy, Pacific Northwest National Laboratory; and the Compressed Gas Association.

Recommendations: 6 new  
Report Adopted: October 10, 2019

### ***Hazardous Materials Accident Investigation 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 describes the brief completed in FY 2020.

#### **Lithium-Ion Battery Truck Fire Following Aerial Transport Brampton, Ontario (Canada) June 3, 2016**

A FedEx W900 local delivery truck and all of its cargo were destroyed by a fire while the driver was delivering packages to a business in Brampton, Ontario, Canada; no injuries

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were reported. The fire began among a shipment of four large-format lithium-ion batteries, each of which was individually packaged in a fiberboard box. No other dangerous goods were on board. The international shipment of the four lithium-ion batteries originated from Braille Battery Inc., a battery manufacturer located in Sarasota, Florida, and were destined for Brampton, Ontario, Canada. The batteries were initially transported by FedEx on two separate US-registered cargo airplanes before being transferred to the delivery truck. The fire occurred about 10 hours after the batteries were offloaded from the cargo airplane at the Toronto, Canada, international airport. The FAA notified the NTSB of the accident because of concerns that the fire could also occur during air transport.

The NTSB determined that the probable cause of the fire was an electrical short circuit between the battery terminal bolt and the upper cells of the lithium-ion battery module, causing a thermal runaway within the battery, igniting the battery and its packaging. Contributing to the electrical short circuit was Braille Battery Inc.'s design, which did not protect against short circuiting. Also contributing to the consequences of the accident was Braille Battery Inc.'s use of combustible packing materials.

We identified the following safety issue during the investigation: the failure of the Pipeline and Hazardous Materials Safety Administration special permit process for low-production or prototype batteries to require sufficient testing and evaluation for thermal hazards and, accordingly, an “equivalent level of safety” to that provided under United Nations *Manual of Tests and Criteria, Part III, Sub-section 38.3* testing, which simulates transportation conditions.

The Board issued recommendations to the Pipeline and Hazardous Materials Safety Administration.

Recommendations: 2 new  
Brief Adopted: May 28, 2020

### ***Hazardous Materials Investigations Other Efforts and Focus Areas***

The Office of Railroad, Pipeline, and Hazardous Materials Investigations provided hazardous materials investigative support to the Transportation Safety Board of Canada for two crude oil train derailments through September 2020, including one derailment that had occurred in Lazare, Manitoba, on February 16, 2019, and another that occurred in Guernsey, Saskatchewan, on February 6, 2020. Neither involved fatalities.

### **Ongoing Significant Hazardous Materials Investigations**

One significant hazardous materials investigation was ongoing as of September 30, 2020: the anhydrous ammonia release from a nurse tank trailer that occurred in Beach Park, Illinois, on April 25, 2019. At the close of FY 2020, we were continuing to devote significant resources to this accident investigation and anticipated producing an accident report or brief for adoption upon completion.

## RESEARCH AND ENGINEERING

	<b>(\$000s)</b>	<b>FTEs</b>
FY 2021 Estimate	\$14,045	47
FY 2022 Request	\$14,630	47
Increase/Decrease	\$585	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of Research and Engineering 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 (FDR) and cockpit voice recorders (CVR), 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 Investigations***

The medical officers evaluate 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.

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## Accomplishments and Ongoing Efforts

### ***Safety Research Division***

In FY 2020, the Safety Research Division staff responded to 220 requests for data analysis and statistical information from other NTSB offices, Board Members, Congress, and the public. In addition to responding to these requests, staff completed a major research study, a data update of a 2001 study, two annual statistical review publications, a rulemaking response, and provided safety data, statistical analysis, and geospatial visualizations for NTSB accident investigations. These are some examples of the division's efforts:

#### **Sinking of Amphibious Passenger Vessel *Stretch Duck 7* Branson, Missouri July 19, 2018**

About 7:08 p.m. local time on July 19, 2018, the *Stretch Duck 7*, a 33-foot-long, modified World War II-era DUKW amphibious passenger vessel that was operated by Ripley/Ride The Ducks sank during a storm with heavy winds that moved rapidly on Table Rock Lake near Branson, Missouri. Of the 31 persons aboard, 17 fatalities resulted. Division staff provided a data report on accidents involving WWII-era DUKW vessels over a 20-year period.

Report Adopted: April 28, 2020

#### **Survivability of Accidents Involving Part 121 US Air Carrier Operations Safety Report Data Update 2001-2017**

The division completed an update to the 2001 NTSB safety report *Survivability of Accidents Involving Part 121 US Air Carrier Operations, 1983 Through 2000*. Staff examined the overall proportion of occupants who survived if they were in an accident involving an aircraft operated under Title 14 Code CFR Part 121 (generally defined as large aircraft operated by airlines and cargo carriers), and whether this had changed significantly since the NTSB's 2001 report. Staff also assessed the prevalence of serious injuries in Part 121 aircraft accidents and cause-of-death information for the most serious of these accidents.

Report Adopted: April 13, 2020

#### **Centers for Disease Control and Prevention (CDC) Proposed Data Collection Submitted for Public Comment and Recommendations, National Institute for Occupational Safety and Health (NIOSH) Evaluation of North American Fatigue Management Program Effectiveness**

The division completed a proposed rulemaking response focused on CDC/NIOSH's evaluation of the effectiveness of the North American Fatigue Management Program's training and education modules. The NTSB Board Members approved and issued the final

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response to support CDC/NIOSH’s efforts in evaluating this important transportation safety program.

Report Adopted: December 18, 2019

### **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 unprotected 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. Division staff completed an in-depth research study on bicyclist crash risks and select countermeasures designed to improve bicyclist safety. The study’s 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.

As a result of the study, the NTSB made safety recommendations to the National Highway Traffic Safety Administration, the Federal Highway Administration, the Intelligent Transportation Systems Joint Program Office, the US Consumer Product Safety Commissions, the American Association of State Highway and Transportation Officials, the 50 states and commonwealths, the District of Columbia, and the Commonwealth of Puerto Rico. We also reiterated 10 previously issued recommendations.

Recommendations: 12 new, 10 reiterated  
Report Adopted: November 5, 2019

### **Pedestrian Bridge Collapse Over SW 8th Street Miami, Florida March 15, 2018**

On March 15, 2018, about 1:46 p.m. local time, a partially constructed pedestrian bridge experienced a catastrophic structural failure and collapsed. The bridge crossed SW 8th Street, an eight-lane roadway separating Florida International University from the City of Sweetwater. Eight vehicles below the bridge were fully or partially crushed. One bridge worker and five vehicle occupants died. Five bridge workers and five other people were injured. Division staff provided geographic information and developed geospatial



map products for the investigation.

Report Adopted: October 22, 2019

**2017 US Civil Aviation Accident Summary  
2018 Preliminary Aviation Accident Statistics  
Annual Reports**

The division compiled, organized, and published the NTSB's *Summary of US Civil Aviation Accidents for Calendar Year 2017* and the *2018 Preliminary Aviation Statistics*. Staff wrote structured query language scripts and computer code to extract, clean, and compile these data and their associated graphs and charts. Staff also developed an online interactive geospatial map showing the location and unique characteristics for each accident in the 2017 Summary.

The 2017 Summary was published to the NTSB public website December 20, 2019; the 2018 Preliminary Statistics were published to the NTSB public website November 14, 2019.

**Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles  
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 staff provided a data report on the prevalence of electric vehicle battery fires and assisted with the development of proposed safety recommendations.

Investigation in Process

**Dredge *Waymon L. Boyd* Gas Pipeline Strike  
Corpus Christi, Texas  
August 21, 2020**

On August 21, 2020, about 8:10 a.m. local time, the dredge *Waymon L. Boyd* struck a natural gas pipeline near the Epic Dock near the Inner Harbor of Corpus Christi, Texas. Division staff provided geospatial data visualization support for the investigation.

Investigation in Process

**Fire Aboard Small Passenger Vessel Diving Vessel *Conception* Sank After Fire  
Platts Harbor, Channel Islands National Park, Santa Cruz Island, California  
September 2, 2019**

On September 2, 2019, about 3:14 a.m. local time, US Coast Guard Sector Los Angeles/ Long Beach received a distress call from the 75-foot commercial diving vessel *Conception*, with 39 persons on board. On the last night of the current voyage, the vessel was anchored in Platts Harbor off Santa Cruz Island when it caught fire. Thirty-three passengers and one crewmember died. Division staff provided a data report on small passenger vessel safety

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statistics using the Coast Guard’s Marine Information for Safety and Law Enforcement database.

Investigation in Process

**Collision with Terrain During Takeoff of Parachute Jump Flight, Beech King Air 65-A90 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 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 10 passengers sustained fatal injuries, and the airplane was destroyed. Division staff provided a data report on general aviation for-hire flight operations in the United States.

Investigation in Process

### **National and International Outreach Activities**

The Safety Research Division also participates in and contributes to national and international activities that foster interagency cooperation, technical exchange, and the development of standards and best practices. Here are some examples of these efforts:

- ICAO Occurrence Validation Study Group – Reviews and validates aviation accident data.
- Commercial Aviation Safety Team/ICAO Common Taxonomy Team – Develops common taxonomies and definitions for aviation accident and incident reporting systems.
- Model Minimum Uniform Crash Criteria Work Group – Coordinates updates to the Model Minimum Uniform Crash Criteria, a minimum recommended set of data elements for state motor vehicle crash data systems.
- Transportation Research Board Impairment in Transportation Committee – Provides a forum for identifying, developing, and disseminating research related to impairment in all modes of transportation.
- Federal Fatigue Management and Research Work Group – Exchanges research and best practices concerning human fatigue, its effects on safety and health, and best practices in fatigue management.

### ***Materials Laboratory Division***

Materials Laboratory engineers examine parts and wreckage from more than 150 accidents in a typical year from all transportation modes and document their findings through formal factual reports, study reports, analytical reports, and safety recommendations. Examples of these efforts include the following:

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**Left Engine Failure and Subsequent Depressurization, Southwest Airlines Flight 1380, Boeing 737-7H4, N772SW  
Philadelphia, Pennsylvania  
April 17, 2018**

Southwest Airlines flight 1380, a Boeing 737-700, 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. Fragments from the engine inlet and cowling struck the wing and fuselage, resulting in a rapid depressurization after the loss of one passenger window. The flight crew conducted an emergency descent and diverted into Philadelphia International Airport, Philadelphia, 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. Staff conducted a metallurgical evaluation of the turbine engine components and the cowling, and supported an investigative hearing.

Report Adopted: November 19, 2019

**Pedestrian Bridge Collapse Over SW 8th Street  
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.

Report Adopted: October 22, 2019

**Dredge *Waymon L. Boyd* Gas Pipe Strike  
Corpus Christi, Texas  
August 21, 2020**

The dredge vessel *Waymon L. Boyd* struck a natural gas pipeline near the Epic Dock near the Inner Harbor of Corpus Christi, Texas. Division staff provided metallurgical consulting on retrieval of the evidence and the preparation of test plans for metallurgical evaluation of the rupture.

Investigation in Process

**Union Pacific Railroad Freight Train Derailment, Hazardous Material Release and Fire  
Tempe, Arizona  
July 29, 2020**

In Tempe, Arizona, a westbound Union Pacific Railroad freight train MTUPX-29 with 3 locomotives and 97 mixed-freight cars derailed 12 cars near milepost 914.1. The derailment occurred as the train traveled over a wooden trestle leading up to a steel

superstructure bridge over Tempe Town Lake. Of the 12 derailed cars, 3 tank cars were loaded with the cyclohexanone. Two of these tank cars fell from the trestle and one released 2,201 gallons of cyclohexanone. There was a subsequent fire. Staff provided a metallurgical failure analysis of fractured track.

Investigation in Process

**Natural Gas Pipeline Rupture and Fire  
Hillsboro, Kentucky  
June 22, 2020**

A 30-inch-diameter natural gas transmission pipeline owned and operated by Enbridge Inc. ruptured near Hillsboro, Kentucky. The resulting fire burned vegetation over 5 acres of heavily forested land. About 148 million cubic feet of natural gas was released during the rupture and resulting emergency response blowdown. The rupture occurred at a girth weld and resulted in a crater that was about 20-feet wide. Staff provided oversight of the metallurgical failure analysis.

Investigation in Process

**Diving vessel *Conception* Sank 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. Staff also prepared multi-physics computational fire models using a fire dynamics simulator and Pyrosym® to aid investigators in understanding the nature of the fire.

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 then 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 also 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

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**Natural Gas-Fueled Explosion of Residence  
Dallas, Texas  
February 23, 2018**

In close succession, a natural gas-fueled explosion occurred at a single-story residence at 3534 Espanola Drive in Dallas, Texas; an explosion and subsequent fire occurred at 3527 Durango Drive (less than 415 feet from the Espanola Drive house explosion); and a structural fire occurred at 3515 Durango Drive (less than 310 feet from the Espanola Drive house explosion). Staff conducted a metallurgical evaluation of a leak in a natural gas service main that runs along a common alley servicing the properties. Staff also supported the fire and explosion investigations.

Investigation in Process

***Vehicle Recorder Division***

In a typical year, the Vehicle Recorder 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:

**Atlas Air B-767-300 Rapid Descent into Trinity Bay  
Baytown, Texas  
February 23, 2019**

On February 23, 2019, about 12:30 p.m. local time, Atlas Air flight 3591, a Boeing 767-300, entered a rapid descent from 6,000 feet and impacted a marshy bay area about 30 miles from Houston George Bush Intercontinental Airport, Houston, Texas. Two pilots and one non-revenue jumpseat pilot were fatally injured. The airplane was destroyed and highly fragmented. Flight 3591 had entered clouds and was flying in instrument meteorological conditions shortly before the final descent. Staff extracted data from the FDR and CVR, and created plots of flight data parameters and a transcript of the cockpit audio. Staff also performed a sound spectrum study, coordinating with Boeing, the aircraft manufacturer, to help identify specific sounds heard in the CVR.

Report Adopted: July 14, 2020

**Helicopter Air Ambulance Collision with Terrain  
Zaleski, Ohio  
January 29, 2019**

On January 29, 2019, about 6:50 a.m. local time, a single-engine, turbine-powered Bell 407 helicopter being operated as a helicopter air ambulance flight, collided with forested terrain about 4 miles northeast of Zaleski, Ohio. The certificated commercial pilot, flight nurse, and flight paramedic died, and the helicopter was destroyed. The helicopter was registered to and operated by Viking Aviation LLC dba Survival Flight Inc. under Title 14 *CFR* Part 135. Company flight-following procedures were in effect for the visual flight rules flight, which had departed Mount Carmel Hospital, Grove City, Ohio, about 6:28 a.m., destined for Holzer Meigs Emergency Department in Pomeroy, Ohio, about

69 nautical miles southeast, to pick up a patient. Night visual meteorological conditions existed at the departure location, but available weather information indicated that snow showers and areas of instrument meteorological conditions existed along the route of flight. Staff recovered data from an onboard flight data monitoring device that was damaged by the accident. Staff plotted parametric data, transcribed audio, and performed a sound-spectrum analysis of the audio to help identify sounds.

Report Adopted: May 19, 2020

**Sinking of Amphibious Passenger Vessel Stretch Duck 7  
Branson, Missouri  
July 19, 2018**

About 7:08 p.m. local time on July 19, 2018, the Stretch Duck 7, a 33-foot-long, modified World War II-era DUKW amphibious passenger vessel that was operated by Ripley/Ride The Ducks sank during a storm with heavy winds that moved rapidly on Table Rock Lake near Branson, Missouri. Of the 31 persons aboard, 17 fatalities resulted. Several hours prior to the accident, the National Weather Service had issued a severe thunderstorm watch for the area, followed by a severe thunderstorm warning a minute before the vessel departed the shoreside boarding facility. About 5 minutes after the Stretch Duck 7 entered the water, the leading edge of a storm front, later determined to be a derecho, resulting in waves flooding through a non-weathertight air intake hatch on the bow and causing the vessel to sink. Staff provided information to divers during the on-scene recovery process to help in locating data recording devices in the submerged wreckage, then used lab resources to dry the devices and recover the data. Staff also created transcriptions of the recovered audio and video.

Report Adopted: April 28, 2020

**Inadvertent Activation of the Fuel Shutoff Lever and Subsequent Ditching  
New York, New York  
March 11, 2018**

On March 11, 2018, about 7:08 p.m. local time, an Airbus Helicopters AS350 B2 lost engine power during cruise flight, and the pilot performed an autorotative descent and ditching on the East River in New York, New York. The pilot sustained minor injuries, the five passengers drowned, and the helicopter was substantially damaged. The FlyNYON branded flight was operated by Liberty Helicopters Inc. per a contractual agreement with NYONair; both companies considered the flight to be an aerial photography flight operated under the provisions of Title 14 *CFR* Part 91. The intended 30-minute local flight had departed from Helo Kearny Heliport, Kearny, New Jersey, about 6:50 p.m. Staff recovered multiple recording devices that sank with the helicopter wreckage, dried them, and recovered audio and video recordings showing portions of the passenger compartment and the cockpit of the helicopter. The video was important in aiding investigators in determining the probable cause of the accident.

Report Adopted: December 10, 2019

**Air India Express Boeing 737-800 Runway Overrun  
Kozhikode, India  
August 7, 2020**

On August 7, 2020 Air India Express Flight 1344 was scheduled to fly from Dubai, United Arab Emirates, to Kozhikode, India, landing at Calicut International Airport. The flight crew aborted two landing attempts because of heavy rain and tailwind. On the third landing attempt, the aircraft touched down on runway 10, but skidded off the end of the tabletop runway and fell into a 30–35 ft slope, killing 19 passengers and both pilots. The four cabin crew members and 165 passengers survived, of whom over 100 were injured. The NTSB is participating under the provisions of ICAO Annex 13. Staff analyzed data from both the FDR and CVR, and created plots of flight data parameters and a transcript of the cockpit audio.

Investigation in Process

**Pakistan International Airlines Airbus A32-214 Crash into Residential Area  
Karachi, Pakistan  
May 22, 2020**

On May 22, 2020, at about 2:45 p.m. local time, Pakistan International Airlines 8303 Airbus A320-214, AP-BLD, crashed into a residential area during a go-around at Karachi-Jinnah International Airport, Karachi, Pakistan with 99 passengers and 8 crew on board. Of those, 97 were killed, and two passengers survived with injuries. Eight people on the ground were also injured in the accident, and one of them later died from their injuries. The NTSB is participating under the provisions of ICAO Annex 13. Staff analyzed data from the FDR and created plots of flight data parameters.

Investigation in Process

**Saab 2000 Runway Overrun, PenAir flight 3296  
Unalaska, Alaska  
October 17, 2019**

On October 17, 2019, about 5:40 p.m. local time, PenAir flight 3296, a Saab 2000, overran the runway while landing at the Thomas Madsen Airport, Unalaska, Alaska. The airplane passed through the airport perimeter fence, crossed a road, and came to rest on shoreline rocks. Of the 42 passengers and crewmembers on board, 1 passenger was fatally injured, and several other passengers sustained serious or minor injuries. The airplane received substantial damage. The regularly scheduled domestic passenger flight was operating under the provisions of 14 *CFR* Part 121 from Ted Stevens International Airport, Anchorage, Alaska. Staff extracted data from both the FDR and CVR, and created plots of flight data parameters and a transcript of the cockpit audio.

Investigation in Process

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## **National and International Outreach Activities**

The Vehicle Recorder Division also participates in and contributes to multiple national and international bodies to foster interagency cooperation, technical exchange, and improve recorder standards. Here are some examples of these efforts:

- International Recorder Investigator Group – Exchange of technical information and best practices amongst flight recorder laboratories.
- ICAO Flight Recorder Specific Working Group – Developing international standards and recommended practices pertaining to flight recorders.
- ARINC Timely Recovery of Flight Data Working Group – Developing an industry report on the requirements, potential solutions, and recommendations for the standardization of flight data recovery.
- RTCA SC-229/WG-98 – Updating minimum operational performance specifications for emergency locator transmitters.
- European Organisation for Civil Aviation Equipment Working Group 118 – Updating performance standards for flight recorders used as the basis for FAA technical standard orders.
- ICAO Common Taxonomy Team – Developing common definitions to be used for the comparison of Flight Operations Quality Assurance events between various flight data monitoring systems operated around the world.
- Scientific Working Group on Digital Evidence – Federal Bureau of Investigation/US Department of Homeland Security–sponsored group developing and sharing tools, techniques, and best practices for the collection and interpretation of digital evidence.
- INTERPOL Digital Forensics Expert Group – Technical exchange between international agencies on emerging technologies in digital forensics.

## ***Vehicle Performance Division***

In a typical year, Vehicle Performance staff members produce more than 50 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:

### **Stretch Limousine Run-Off-Road Crash Schoharie, New York October 6, 2018**

About 1:55 p.m. local time on October 6, 2018, a 2001 Ford Excursion, modified postmanufacture 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 had been made to the original braking system to accommodate the additional weight resulting from the modifications. A total of 20 fatalities, including 2 pedestrians, resulted from the accident. Staff is leading a study to understand the overall adequacy of the original equipment manufacturer/original



equipment supplier braking system on the vehicle for the weight of the modified vehicle. Staff also planned and contracted for full-scale vehicle testing, including dynamometer tests, to evaluate how this additional weight would have affected the performance of the braking system, with concentration on the increased risk for brake fade resulting from increased temperatures. Advanced vehicle dynamics simulations are being used to evaluate the performance of the braking system as the limousine navigated the route of travel and made its final descent down the steep grade before the crash.

Report Adopted: September 29, 2020

**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, entered a rapid descent from 6,000 feet and impacted a marshy bay area about 30 miles from Houston George Bush Intercontinental Airport, Houston, Texas. Two pilots and one non-revenue jumpseat pilot were fatally injured. The airplane was destroyed and highly fragmented. Staff used recorded data to evaluate aircraft performance and investigate the possibility that the motion of the aircraft could have contributed to spatial disorientation. The division is also developing an animation depicting the sequence of events in the accident.

Report Adopted: July 14, 2020

**Helicopter Air Ambulance Collision with Terrain  
Zaleski, Ohio  
January 29, 2019**

On January 29, 2019, about 6:50 a.m. local time, a single-engine, turbine-powered Bell 407 helicopter being operated as a helicopter air ambulance flight collided with forested terrain about 4 miles northeast of Zaleski, Ohio. The certificated commercial pilot, flight nurse, and flight paramedic died, and the helicopter was destroyed. The helicopter was registered to and operated by Viking Aviation, LLC, dba Survival Flight Inc., under Title 14 *CFR* Part 135. Company flight-following procedures were in effect for the visual flight rules flight, which departed Mount Carmel Hospital, Grove City, Ohio, about 6:28 a.m. and was destined for Holzer Meigs Emergency Department, Pomeroy, Ohio, about 69 nautical miles southeast, to pick up a patient. Night visual meteorological conditions existed at the departure location, but available weather information indicated that snow showers and areas of instrument meteorological conditions existed along the route of flight. Staff used recorded data from onboard the helicopter to evaluate aircraft performance, estimate the flightpath and attitude near the crash site, and rule out ice accretion on the rotor blades as a factor in the accident.

Report Adopted: May 19, 2020

**Sinking of Amphibious Passenger Vessel Stretch Duck 7  
Branson, Missouri  
July 19, 2018**

About 7:08 p.m. local time on July 19, 2018, the Stretch Duck 7, a 33-foot-long, modified World War II-era DUKW amphibious passenger vessel that was operated by Ripley/Ride The Ducks, sank during a storm with heavy winds that moved rapidly on Table Rock Lake near Branson, Missouri. Of the 31 persons aboard, 17 fatalities resulted. Several hours prior to the accident, the National Weather Service had issued a severe thunderstorm watch for the area, followed by a severe thunderstorm warning a minute before the vessel departed the shoreside boarding facility. About 5 minutes after the Stretch Duck 7 entered the water, the leading edge of a storm front, later determined to be a derecho, resulting in waves flooding through a non-weather-tight air intake hatch on the bow and causing the vessel to sink. Staff analyzed onboard video recorded on Stretch Duck 7 and sister vessels on the lake in conjunction with an eyewitness smartphone video to determine the path of the vessel on the lake and the height of the waves encountered during the storm.

Report Adopted: April 28, 2020

**Inadvertent Activation of the Fuel Shutoff Lever and Subsequent Ditching  
New York, New York  
March 11, 2018**

On March 11, 2018, about 7:08 p.m. local time, an Airbus Helicopters AS350 B2 lost engine power during cruise flight, and the pilot performed an autorotative descent and ditching on the East River in New York, New York. The pilot sustained minor injuries, the five passengers drowned, and the helicopter was substantially damaged. The FlyNYON-branded flight was operated by Liberty Helicopters Inc. per a contractual agreement with NYONair; both companies considered the flight to be an aerial photography flight operated under the provisions of Title 14 *CFR* Part 91. Visual flight rules weather conditions prevailed, and no flight plan was filed for the intended 30-minute local flight, which had departed from Helo Kearny Heliport, Kearny, New Jersey, about 6:50 p.m. Staff analyzed eyewitness smartphone videos to calculate the final rate of descent and the location of the impact with the river, and evaluated the aircraft performance and possible alternate areas where the helicopter could have put down, using data along with onboard and eyewitness videos. The division also created an animation illustrating the sequence of events in the accident, which was used at the Board meeting for the investigation.

Report Adopted: December 10, 2019

**Pedestrian Bridge Collapse Over SW 8th Street  
Miami, Florida  
March 15, 2018**

On March 15, 2018, about 1:46 p.m. local time, a partially constructed pedestrian bridge experienced a catastrophic structural failure and collapsed. The bridge crossed SW 8th Street, an eight-lane roadway separating Florida International University from the City of

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Sweetwater. Eight vehicles below the bridge were fully or partially crushed. One bridge worker and five vehicle occupants died. Five bridge workers and five other people were injured. Staff created a detailed three-dimensional computer model and overlaid laser scan and photogrammetric point clouds on the model to assist with documenting the materials used to construct the bridge; assisted with calculations to quantify surface roughness from measurements taken using a three-dimensional laser scanner; and created a combined animation and video visualization used at the Board meeting for the investigation.

Report Adopted: October 22, 2019

**Collision with Terrain, Sikorsky S76B  
Calabasas, California  
January 26, 2020**

On January 26, 2020, at 9:45 a.m. local time, a Sikorsky S-76B helicopter collided with hilly terrain near the city of Calabasas, California. The pilot and eight passengers were fatally injured, and the helicopter was destroyed by impact forces and fire. The helicopter was operated by Island Express Helicopters Inc. under Title 14 *CFR* Part 135 as an on-demand passenger flight from John Wayne–Orange County Airport, Santa Ana, California, to Camarillo Airport, Camarillo, California. Staff are using surveillance video to determine the visibility conditions near the location of the accident and automatic dependent surveillance – broadcast (ADS-B) position data to evaluate (1) the motion of the aircraft and (2) whether a terrain awareness warning system could have provided a timely alert to the pilot about the proximity to the ground before impact.

Investigation in Process

**Saab 2000 Runway Overrun, PenAir flight 3296  
Unalaska, Alaska  
October 17, 2019**

On October 17, 2019, about 5:40 p.m. local time, PenAir flight 3296, a Saab 2000, overran the runway while landing at the Thomas Madsen Airport, Unalaska, Alaska. The airplane passed through the airport perimeter fence, crossed a road, and came to rest on shoreline rocks. Of the 42 passengers and crewmembers on board, 1 passenger was fatally injured, and several other passengers sustained serious or minor injuries. The airplane received substantial damage. The regularly scheduled domestic passenger flight was operating under the provisions of 14 *CFR* Part 121 from Ted Stevens International Airport, Anchorage, Alaska. Staff are using data from the flight recorders and physical evidence to evaluate the aircraft and braking performance during the runway overrun.

Investigation in Process

**Boeing B-17 crash at Bradley International Airport  
Windsor Locks, Connecticut  
October 2, 2019**

On October 2, 2019, at 9:53 a.m. local time, a Boeing B-17G, owned and operated by the

Collings Foundation, was destroyed during a precautionary landing and subsequent runway excursion at Bradley International Airport, Windsor Locks, Connecticut. The commercial pilot, airline transport pilot, and five passengers were fatally injured. The flight mechanic/loadmaster and four passengers were seriously injured; one passenger and one person on the ground incurred minor injuries. Shortly after takeoff from Bradley International Airport, at 9:50 a.m., one of the pilots reported that he wanted to return to the airport because of a problem with the No. 4 engine. While on approach to land, the airplane struck approach lights about 1,000 feet before the runway, then contacted the ground about 500 feet before the runway. The airplane veered off the runway, colliding with vehicles and a deicing fluid tank. Most of the cabin, cockpit, and right wing were consumed by postimpact fire. Staff are evaluating the aircraft performance and assessing the power available, assuming one or more engines were not operating.

Investigation in Process

**Midair Collision Between a De Havilland DHC-2 and a DeHavilland 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 airplane, and a float-equipped De Havilland DHC-3 airplane, 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. The division used ADS-B data, recorded data recovered from one accident aircraft, and onboard photos and videos recorded by passengers to determine a time history for the relative position of aircraft and the collision geometry. Staff performed detailed three-dimensional laser scans of two exemplar aircraft and then used simulation software to determine the visibility of each aircraft to the pilot of the other aircraft. The division also reconstructed the appearance of the electronic displays in each aircraft, illustrating the traffic information available to the pilot of each aircraft, and is developing an animation of the accident sequence, highlighting the potential for improving the traffic information available to pilots.

Investigation in Process

***Medical Investigations***

NTSB medical officers participate in numerous 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 agency and to external audiences. Our medical officers participate in

more than 150 accident investigations annually and complete more than 250 reports for these cases. Here are some examples of these efforts:

**Stretch Limousine Run-Off-Road Crash**  
**Schoharie, New York**  
**October 6, 2018**

About 1:55 p.m. local time on October 6, 2018, 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 had been made to the original braking system to accommodate the additional weight resulting from the modifications. A total of 20 fatalities, including 2 pedestrians, resulted from the accident. A medical officer evaluated the driver's toxicology and medical records, produced a factual report, and collaborated with human performance for a joint analytical report to assist in the investigation.

Report Adopted September 29, 2020

**CSX, Train Side Collision**  
**Carey, Ohio**  
**August 12, 2019**

A westbound CSX freight train, while in positive train control (PTC) restricted mode, collided with an eastbound CSX train resulting in derailment of the westbound locomotive and 25 railcars and minor injuries to the engineers; the westbound engineer tested positive for alcohol and marijuana. A medical officer participated in the interviews with the westbound crew, evaluated their toxicology and occupational medical records, and produced factual and analytical reports.

Report Adopted September 15, 2020

**Collision with a Hangar on Takeoff**  
**Addison, Texas**  
**June 30, 2019**

On June 30, 2019, about 9:11 a.m. local time, a Beech BE-300 collided with a hangar and terrain after takeoff from Addison Airport, Addison, Texas. The airline transport pilot, the commercial co-pilot, and eight passengers sustained fatal injuries.

A medical officer is evaluating the flight crew for evidence of medical conditions or use of medications or other substances.

Investigation in Process

**Collision While Landing  
Compton, California  
March 13, 2019**

A North American T-28 collided with a Cessna 152 while landing on the runway, resulting in an explosion in the recently landed Cessna that killed its student pilot and seriously injured the flight instructor; the T-28 pilot reported that bright sun had obscured his forward vision. A medical officer is evaluating the T-28 pilot's certification files and personal medical records to assist in the investigation.

Investigation in Process

**CommutAir flight 4933 landed between Runway 1 and Taxiway  
Presque Isle, Maine  
March 4, 2019**

On March 4, 2019, at 11:43 a.m. local time, CommutAir flight 4933, an Embraer EMB-145XR, dba United Express, landed between runway 1 and taxiway A in light to moderate snow at Northern Maine Regional Airport at Presque Isle, Maine. This was the second approach to runway 1, after the pilot's having conducted a missed approach during the first approach. Radar track data show that the airplane was aligned right of runway 1 during both approaches. Of the 31 passengers and crew onboard, 2 passengers and 1 crewmember received minor injuries. The airplane was substantially damaged. A medical officer is performing an evaluation of medical conditions of the flight crew to assist in the investigation.

Investigation in Process

**Outreach Presentation - Annual Meeting of the Association for the Advancement of  
Automotive Medicine  
Madrid, Spain  
October 18, 2019**

In collaboration with the Office of Highway Safety, medical staff presented *Impaired Driving: A Case Report* addressing the March 29, 2017, *Pickup Truck Centerline Crossover Collision with Medium-Size Bus on US Highway 83, Concan, Texas, USA*. The presentation, which was later published in the journal *Traffic Injury Prevention*, described the events, findings, and probable cause to a diverse audience of international traffic safety experts.<sup>2</sup>

**Chief Data Scientist**

The chief data scientist has continued to lead agency-wide efforts to better utilize data for strategic decision-making and develop advanced data science capabilities. As part of the

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<sup>2</sup> McKay MP, Poland K, Karol D, Marshall R, Kaminski R. "Impaired driving: A case report. *Pickup truck centerline crossover collision with medium-size bus on U.S. Highway 83, Concan, Texas, United States.*" *Traffic Inj Prev.* 2019;20(sup2):S165-S168. doi: 10.1080/15389588.2019.1661668. Epub 2019 Oct 30.

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SAFTI team, the chief data scientist developed new capabilities for analyzing safety issues, recommendations, and safety actions across all NTSB investigations and created data analysis and visualization tools to improve agency processes. As the agency’s designated chief data officer, the chief data scientist formed the NTSB Data Governance Body as required by the Evidence-Based Policymaking Act of 2018 and Office of Management and Budget guidance, and he represents the NTSB on the Federal Chief Data Officer Council. The chief data scientist also developed a charter that has been approved by the Data Governance Body and published on the agency website. The Data Governance Body is now meeting on a quarterly schedule and progressing on the agency’s implementation of the Federal Data Strategy.

### **National and International Outreach Activities**

The chief data scientist also contributes to multiple national and international bodies to foster data sharing, technical exchange, and data standards. Here are some examples of these efforts:

- OMB, Chief Data Office Council – The council was created by the Foundations for Policymaking Act, responsible for supporting agency chief data officers in implementing the Federal Data Strategy.
- ICAO Common Taxonomy Team Main Body – The chief data scientist develops and manages common taxonomies and definitions for sharing safety data.
- ICAO Accident Investigation Panel – The chief data scientist serves as advisor to the United States representative on the Panel responsible for making recommendations regarding ICAO Annex 13 investigation Standards and Recommended Practices.
- ICAO Occurrence Validation Study Group – The chief data scientist represents the United States and currently leads, as rapporteur, an international study group of analysts charged with reviewing and validating State aviation accident and incident reports used to support ICAO safety programs.
- General Aviation Joint Steering Committee, Safety Analysis Team – The chief data scientist performs analyses and monitors trends in general aviation safety to support the committee, a joint initiative of industry, government, and academia to develop general aviation safety enhancements.
- Federal Aviation Administration Machine Learning Working group – The chief data scientist serves on this multi-agency working group led by the FAA to develop and share machine learning applications and best practices.

## Summary of Research and Engineering Systems

The Office of Research and Engineering is dedicated to developing innovative systems that make our work more efficient and accurate. Due to rapidly changing technology, these systems require updating and maintenance every year. These systems include the following:

<b>System:</b>	<b>Description:</b>	<b>RE Division</b>
<b>BigRED</b>	BigRED is an internal workflow tool used by recorder specialists to track devices sent in by field investigators. Specialists use the database to record the entire lifecycle of a device in the lab, from when it arrives from the field to when it is eventually returned to its owner. Intermediate steps of download, recovery, audition (when applicable), and product development are also tracked.	Vehicle Recorders Laboratory
<b>CIDER</b>	The Crash Investigation Data Extraction and Readout (CIDER) system is a client/server application used for processing parametric recorder data. Recorder Specialists use CIDER to recover data from tape-based flight data recorders, convert data from raw binary formats into engineering units values for analysis, analyze and validate the data, and generate plots, tabular data files, and other products for other investigative teams and reports. CIDER also provides capabilities for managing investigation recorder data and documentation of recorder conversion libraries.	Vehicle Recorders Laboratory
<b>MEDICS</b>	The Medical Information Catalog System (MEDICS) is a web-based application used to store medical records from NTSB investigations. NTSB medical officers use MEDICS as a case management tool for their reviews across all modal offices. The MEDICS software automatically enforces the security, storage, transmission, and access control requirements for medical records. MEDICS also connects to the SAFTI database used to manage investigation data, which allows investigators to access records, receive autopsy and toxicology reports, request subpoenas for medical records, and request medical officer reviews. Only those employees with a need to access this health information may use MEDICS.	Medical Consult Service and Chief Data Scientist



<b>System:</b>	<b>Description:</b>	<b>RE Division</b>
<b>PREVIEW</b>	The Protected Recording Viewer (PREVIEW) system is a web-based application to allow access to protected content products (such as audio and video transcripts) and recordings normally stored on non-networked secure servers within the laboratory at NTSB Headquarters for authorized NTSB employees working remotely. The application automatically enforces the security requirements for storage, transmission, and access control to prevent inadvertent public release of the products and recordings in accordance with statutory requirements and NTSB policy for protecting the content.	Vehicle Recorders Laboratory
<b>RAPTR</b>	RAPTR is a software tool developed by the Air Force Research Laboratory that enables multitrack audio playback, video playback, and transcription. It is the Board's primary tool for analyzing CVR content.	Vehicle Recorders Laboratory
<b>REVEAL</b>	REVEAL is a digital data recovery and analysis tool for visualizing, exploring, and extracting binary data files. It allows users to mine unstructured binary data for useful data parameters either through manual inspection or by using scripted routines.	Vehicle Recorders Laboratory

## TRAINING CENTER

	<b>(\$000s)</b>	<b>FTEs</b>
FY 2021 Estimate	\$1,074	4
FY 2022 Request	\$1,108	4
Increase/Decrease	\$34	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The NTSB Training Center is an organizational component of the Office of the Managing Director. The Training Center is responsible for training NTSB staff and our partners in investigations, developing training plans, and overseeing the development and implementation of workforce development programs.

### Accomplishments and Ongoing Efforts

The Training Center continues to evaluate its courses, further refine the offerings, and improve instruction in all areas of technical, investigative, supervisory, and leadership development, and other aspects of mission support. The Training Center offers course content in investigative skills that target processes, procedures, and technical issues critical to the agency's mission of accident investigation and 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 2020, the Training Center continued to implement upgrades to FedTalent, its 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 provides a valuable tool for tracking staff competencies and skills. The Training Center also initiated efforts to begin replacing the registration system used for enrolling external participants, as the existing system is antiquated and no longer supportable by the developer.

Full-time training officers and advisers coordinate the development of group training by regularly conducting needs analyses and assessments 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

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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 key initiatives of the Training Center:

- ***Adapting and embracing a virtual training model.*** The pandemic brought both challenges and opportunities to the NTSB Training Center. Initially, courses were postponed and rescheduled, but as restrictions on in-person activities persisted and telework became the norm, the Training Center adapted, moving over 90 percent of its courses to a virtual platform. Although not all courses or course content are compatible with virtual delivery, full-time telework agency-wide has provided center staff an opportunity to evaluate innovative approaches toward conducting our core curriculum and has allowed us to expand our experience. Going forward, our adaptability to virtual learning will enable us to better meet the training needs of the over 25 percent of NTSB employees who live outside the Washington, DC, metropolitan area and whose training opportunities have often been impacted by the availability of funds for travel.
- ***Expanding workforce development for all NTSB Staff:*** We continue to expand the course offerings for NTSB career professionals through an innovative curation strategy that maximizes the number and variety of courses available to them. We continued our participation in the Federal Small Agency Council’s training cooperative, sharing excess course capacity among member agencies, and extended our interagency agreements with the US Department of Interior University and the Treasury Executive Institute to provide essential training in acquisitions; federal supervision; project management; and leadership and managerial development topics for staff, supervisors, senior executives, and aspiring leaders. Expanded offerings have included new courses through private sector training sources, as well as one-on-one coaching, yielding targeted career development support tailored to individual needs. Our 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 courses as Cognitive Interviewing, Accident Site Photography, and Investigating Human Fatigue Factors. During FY 2020, we also trained all investigators and on-scene personnel in the Incident Command System and Emergency Management protocols to maximize our ability to work effectively with other agencies on-scene.
- ***Offering investigation courses for federal agencies and external stakeholders:*** The Training Center is often contacted to develop and present classes for other agencies in accident investigation in aviation as well as other modes of transportation. During FY 2020, we conducted training on managing communications during a major transportation accident on site at the John F. Kennedy International Airport and another accident at Federal Express. We continue to present a 2-week Aircraft Accident Investigation class (now in its 11th year), courses in Advanced Aircraft Mishap Analysis and Reporting, and Advanced Marine Mishap Analysis and Reporting for the Coast Guard (a separate course, tailored specifically to that agency). This year, 29 employees from the DOT and its modal administrations attended NTSB courses, as

did 96 employees from the Department of Homeland Security (including the Coast Guard), and 45 employees from the Departments of Defense, Commerce, and other federal agencies. We also provided accident investigation training for 44 students representing 24 other nations.

- ***Evaluating and updating current courses and developing courses to produce new revenue streams.*** Our staff evaluates each course that the center offers 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 to incorporate new and upcoming transportation tools.

***FY 2020 Activities***

<b>Courses with External Enrollment</b>	
<b>Courses at the Training Center:</b>	<b>Students</b>
Aircraft Accident Investigation <sup>1</sup>	40
Aircraft Accident Investigation Orientation for Aviation Professionals <sup>2</sup>	65
Accident Investigation Orientation for Railroad Professionals <sup>3</sup>	0
Cognitive Interviewing <sup>4</sup>	61
Family Assistance	48
Helicopter Accident Investigation <sup>5</sup>	0
Highway Crash Investigation (Featuring autonomous vehicle investigations) <sup>4</sup>	25
Investigating Human Fatigue Factors <sup>4</sup>	40
Accident Site Photography	19
Managing Communications Following a Major Aircraft Accident or Incident	72
Marine Accident Investigation <sup>4</sup>	39
<b>Attendance Subtotal– Courses at Training Center</b>	<b>409</b>
<b>Offsite Courses:</b>	<b>Students</b>
Managing Communications During a Major Transportation Accident – FedEx	56
Managing Communications During a Major Transportation Accident – John F. Kennedy International Airport	72
<b>Attendance Subtotal – Off Site Courses</b>	<b>128</b>
<b>Total Attendance – Courses with Public Enrollment</b>	<b>537</b>

<sup>1</sup> Normally offered twice a year; the first scheduled offering was postponed. When a virtual course was offered later, all attendees could be accommodated in a single offering.

<sup>2</sup> Offered twice; first in person, then virtually.

<sup>3</sup> Postponed to FY 2021.

<sup>4</sup> Offered virtually.

<sup>5</sup> Cancelled.

<b>Course Areas Offered Exclusively for NTSB Employees</b>		
<b>Course Category:</b>	<b>Courses</b>	<b>Students</b>
Compliance & Administration	35	2,740
Computer skills	30	222
Diversity & Inclusion	9	235
General Skills	38	163
Leadership & Supervision	29	305
Mission	36	804
Retirement	18	756
Safety & Health	19	259
<b>Total Attendance</b>	<b>214</b>	<b>5,484</b>

## ADMINISTRATIVE LAW JUDGES

	(S000s)	FTEs
FY 2021 Estimate	\$2,438	9
FY 2022 Request	\$2,516	9
Increase/Decrease	\$78	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The NTSB serves as the court of appeals for airmen, aircraft mechanics, air traffic controllers, air carriers, repair facilities, and any other individual or entity 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.

One of the agency’s Administrative Law Judges retired in September, leaving three judges as of September 30, 2020: two stationed in Washington, DC, and another stationed in Dallas–Ft. Worth, Texas. 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 the extent practicable 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

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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 through September 30, 2020:

- Emergency cases filed: 133
- Emergency cases closed: 69
- Emergency hearings held: 8
- Cases in which respondents waived the emergency procedures: 73
- Petitions challenging the FAA’s determination to bring the case as an emergency processed: 33

- New cases filed: 227 (161 of which were enforcement cases; 66 of which were certificate denials, mainly medical certificate denials)
- Cases closed: 216 cases
- Hearings held: 13
- Appeals of decisions made by NTSB administrative law judges to the full Board processed: 15 (5 of which were emergencies, 4 of which were non-emergencies, and 6 of which were procedural dismissals)



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## INFORMATION TECHNOLOGY AND SERVICES

	(\$000s)	FTEs
FY 2021 Estimate	\$9,470	26
FY 2022 Request	\$9,690	26
Increase/Decrease	\$220	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. No other program changes are planned.

### Program Description

The Office of the Chief Information Officer 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 two program areas, described below.

#### ***Computer Services Division***

The Computer Services Division 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 division has the responsibility of securing the network and defending against outside threats. 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 division 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 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. The division also develops office-centric applications for modal and support office business functions.

## ***Records Management Division***

The Records Management Division 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 on 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 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.

## ***Chief Technology Officer Program***

The Chief Technology Officer outlines the office’s technological vision, researching new technologies for potential benefits, implementing technology strategies, and ensuring that the technological resources are aligned with the agency’s mission needs and goals.

## ***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, to identify and resolve current IT security weaknesses and risks, and to protect against future vulnerabilities and threats.

## **Accomplishments and Ongoing Efforts**

### ***Computer Services Division***

The Computer Services Division resolved more than 3,111 service desk requests for the NTSB’s headquarters, regional offices, and teleworkers in FY 2020. The division’s IT specialists continued to support the agency’s mission by launching on major accident investigations early in the fiscal year to 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. When 100 percent of NTSB staff began working from home in March 2020 due to the pandemic, the agency saw an increased

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demand for remote services, especially video teleconferencing services. Improvements in recent years were key to handling this increased demand, enabling us to provide high-quality services as well as deploy an additional collaboration tool (Zoom for government) within a short period of time. The division took the lead in facilitating virtual Board meetings and virtual hearings of the Administrative Law Judges.

The division performed regular monthly maintenance activities for all agency IT systems to protect the agency against known vulnerabilities. We also implemented three items to improve against vulnerability: (1) a Secure Domain Name System for the ntsb.gov domain; (2) an automated process to disable inactive accounts after 60 days of inactivity; and (3) an industry-leading solution for identity management. The third item not only protects vulnerable systems with multi-factor authentication but also provides single sign-on capabilities for many third-party systems in use across the agency.

Most notably, the division deployed a fully meshed Wi-Fi solution to the entire agency. This included three wireless networks, one for internal users, one for internal mobile devices, and one for guests. The Wi-Fi system was deployed such that a user can go to almost any NTSB office location<sup>3</sup> and connect securely without intervention.

### ***Systems Support Division***

Since the beginning of FY 2020, the Systems Support Division made several enhancements to its suite of in-house applications that support various agency program offices and activities, including the product management application, the Case Appeals Filing System, and the Project Status Board. Division members worked closely with other offices and teams to help successfully launch their projects, such as site development for the Office of Safety Recommendations and Communication's new portal, InsideNTSB, and the syncing/migration of data for the SAFTI team. The division also collaborated on, tested, and launched a new approach to dynamically capture laptop metrics to help eliminate inventory and compliance issues, and helped design and implement a new publication tool for the MyDMS docket management system.

This division implemented an upgrade to the agency's public-facing website to the latest SharePoint platform that facilitated the launch of the highly anticipated CAROL Query tool, thus paving the way for the site refresh project (to incorporate an overall look-and-feel upgrade) currently underway. Other ongoing activities include the upgrade to the HEAT (Service Desk) software and the migration of most in-house applications and databases to later operating system and SQL server versions.

As an essential part of the service and support team, the division addressed 117 service requests (for example, postings, add sites, edit sites) and 205 incident (application or database-related) requests, as well as participated in many other tasks not assigned exclusively to the division, including tasks of the Network Operations Center/Security Operations Center and networking activities.

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<sup>3</sup> Deployment to our Anchorage, Alaska, location has been delayed by the pandemic.

## ***Records Management Division***

The Records Management Division posted 1,410 accident dockets in FY 2020, and the FOIA Office received 573 new FOIA requests and processed 850 FOIA requests, which included both new and prior year requests. The revamped FOIA practices resulted in a 72 percent reduction in the backlog. In addition, the division continued assisting the public with record searches.

The division 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 Architect Division***

The Enterprise Architect Division continues to work on various efforts to standardize business processes, to analyze/visualize NTSB's data to more effectively comprehend and identify trends and patterns, and to enable all the agency's data users to make better-informed decisions based on that data. This division continues to lead the post-implementation enhancement requests and data integration for SAFTI for all modal offices, enabling these offices to standardize the accident investigation process, resulting in structured data.

The division has launched a tool that allows the creation of data queries involving the full spectrum of private and public data contained in databases, facilitating holistic research across the agency's data elements. This new query tool, available to any user, significantly improves searches across multiple NTSB databases, such as Accident and Safety Recommendation, which it consolidates into one comprehensive response.

The division explored various initiatives, including the integration of investigative studies with SAFTI, which will streamline the investigative process and will improve data analytics and metrics; this improvement will be used to gauge performance and enable decision makers to measure, monitor, and manage the key activities and processes needed to achieve the agency's strategic goals. The division expects to begin implementing this project in the next fiscal year.

The division 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.

## ***Chief Technology Officer Program***

Key office activities revolve around two major initiatives: digital transformation and meeting the goals identified in Executive Order 13800, Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure. These two initiatives focus on the need to deliver services and products efficiently and effectively on a more secure and reliable

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technical platform while reevaluating agency processes, procedures, technologies, and data analytics in meeting mission objectives in delivery of services and products to the public.

Having completed a new network infrastructure and remote work platform in FY 2019, the office has begun to deliver such capabilities as single sign-on, which is the core of the enterprise federated Identity Management strategy, an enterprise wireless infrastructure. In FY 2020, the office expanded the NTSB cloud in Microsoft Azure to host such enterprise applications as SAFTI, Case Analysis and Reporting Online (CAROL) Query, the public facing website (ntsb.gov), PREVIEW, and future applications. The office also deployed an enterprise proxy service, NGINX, that enhances security of all the agency's public-facing web applications and provided a high-availability capability that all future enterprise applications can leverage. In FY 2021, the Office of the Chief Information Officer will continue to develop data analytics capabilities to enable the agency to make data-driven decisions.

Priorities for FY 2021 and the following years include enhancing collaboration tools for remote work, completing the development of the enterprise case management tool for accident investigation, developing enterprise data analytic capabilities, continuing to migrate enterprise applications and service to the cloud, and enhancing the cybersecurity program.

### ***IT Security Program***

The security program continued to advise the Chief Information Officer regarding the agency's FISMA compliance requirements and advocated the expanded use of such external cybersecurity enhancement services as re-instituting required third party assessments, 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 2020 FISMA report. The agency is working towards remediating known vulnerabilities and closing out open auditor findings to further improve IT security.

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## ADMINISTRATION

	(\$000s)	FTEs
FY 2021 Estimate	\$9,472	31
FY 2022 Request	\$9,252	31
Increase/Decrease	(\$220)	0

### Overview of the Request

The funding level for this program reflects the pro-rated impact of a pay raise of 2.7 percent projected for January 1, 2022, and increases in FERS and FEHB contribution rates. The slight reduction in the funding level from FY 2021 to FY 2022 is attributed to one-time costs associated with the relocation of the Denver field office in FY 2021. 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 carried out the office's work in FY 2020: Administrative Operations and Security, Acquisition and Lease Management, Human Resources, and Safety. In July 2020, the Safety Division was transferred to the Office of the Managing Director.

#### ***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 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 Human Resources 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.

## **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 for Personal Identity Verification 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 program requirements. The installation of the physical access control system upgrades for the NTSB's headquarters facility began in FY 2020; its completion was delayed by the pandemic. The division also completed audio-visual upgrades at the NTSB Training Center Facility, improving the functionality of the training space in the building.

During the first quarter of the fiscal year, we provided the agency's annual property disposition report to GSA, in accordance with federal management regulations; we also completed our annual accountable asset inventory and validation for the agency, although there was a delay in reporting those results internally.

The division completed the Continuity of Operations Business Process Analysis and Business Impact Analysis and worked with the Acquisition and Lease Management Division to award the contract for the next phase, which includes revisions to the Continuity of Operations program based on the information gained from the analyses.

### ***Acquisition and Lease Management Division***

The Acquisition and Lease Management Division executed 253 contract actions to support the mission of the agency. The division continued to provide support for and training in the acquisition process and in roles and responsibilities for purchase cardholders, ensuring that investigators are better prepared to request and receive the mission-critical goods and services they need to complete accident investigations.

The division awarded a new 5-year contract for wireless services, providing essential communication services and mobile devices for NTSB employees, to include those working at NTSB offices, teleworkers, and investigators performing on-scene accident investigations at various locations across the continental United States. The division also

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executed a contract to refresh the agency’s inventory of laptop computers, replacing its aging fleet and ensuring that users have devices that suit their work responsibilities.

### ***Human Resources Division***

The Human Resources Division continued to work with the Office of Personnel Management to administer the Federal Employee Viewpoint Survey. Employee participation in the 2019 survey had a 70 percent response rate, nearly matching the record response rates of 2017 and 2018. The unadjusted participation rate for the 2020 survey was above that, and as of the fiscal year’s end, we looked forward to getting those results. The survey continues to provide valuable information that senior leadership uses to improve the work environment and, ultimately, productivity and mission accomplishments. For example, in 2019, 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.

The Office of Administration took steps this year to increase the effectiveness of the human resources program. A reorganization created the Staffing and Employee Services Branch and the Policy and Strategic Planning Branch, providing the division the opportunity to increase the focus on two major groups of responsibilities, operations, and policy development, as well as ensuring that division staff receive the appropriate training to perform assigned responsibilities more effectively.

Following the guidance provided by the Office of Personnel Management during last year’s audit, we standardized our operational procedures and increased our quality reviews. The division worked with the agency’s OMB Circular A-123 program to strengthen internal controls in the areas of telework and the processing and tracking of official passports; in addition, we completed an evaluation of the duties and responsibilities for accurate position sensitivity designations for managerial, supervisory, and staff positions throughout the agency.

The division continued to implement position management principles to identify staffing priorities in accordance with the administration’s requirements. We also considered the impact of emerging transportation technologies on the current skill levels of agency staff and identified recruitment and training options for closing skills gaps. Division staff collaborated with program offices throughout the agency to recruit and hire 37 new employees for mission-critical and support positions and to provide 13 current employees with internal career promotions. Additionally, through details and temporary promotions, four employees were selected for temporary assignments to share resources and provide an avenue for skill enhancement.

The NTSB has continued to pursue various avenues to market technical positions. The Human Resources Division used LinkedIn to showcase open jobs, encouraged NTSB employees to use their networks to market vacant positions, and regularly posted to Facebook, occasionally including features about the exciting work available to engineers in our state-of-the-art electronics laboratory. Our Careers page on the agency website listed



current openings, provided information about the agency, and gave prospective applicants information about applying for federal jobs.

The division also expanded our use of technology. In the spring, we implemented virtual onboarding to continue our ability to bring new hires into the agency and conducted our first virtual Annual Awards Ceremony, involving the entire staff in recognizing significant achievements. We found that our recently updated telework policy and training for supervisors and employees enabled the NTSB to transition seamlessly to full-time telework when it became necessary. Revised policies specifying flexibilities to manage work–life balance, including childcare, amid a public health crisis clarified new ways the agency’s workforce could continue to plan and carry out their duties. Working with leaders throughout the agency, we contributed to plans for continuing mission-critical work in a maximum telework environment while preparing for a measured and safe return to the office when public health conditions permit.

The division plans to seek ongoing full certification of the performance management system for senior-level employees, a bi-annual request to the Office of Personnel Management, in the next fiscal year. Achieving full certification will allow the agency to facilitate the recruitment and retention of the most talented of these employees by offering more competitive compensation.

### ***Occupational Health and Safety Division***

The division has educated employees on the benefits of an active workstation and provided them the opportunity to use a sit-to-stand desk in their offices. Additionally, the division has implemented a wellness room equipped with a treadmill standing desk and stationary exercise bicycle desk, allowing employees to perform work periodically on these active workstations.

A Risk Management Worksheet subcommittee, established by members of the Safety Committee in 2019 to provide recommendations for improving the functionality and use of the worksheet by the investigative offices, met four times during the fiscal year. The subcommittee developed a new Risk Management Worksheet for use during the pandemic.

The division also led agency efforts to research, procure, and distribute personal protective equipment and supplies to ensure that employees were adequately protected from illness while launching to and returning from accident sites. Additionally, the division participated on the NTSB’s COVID-19 team, advising agency leadership during the drafting of a plan for the agency’s eventual return to office to ensure that necessary safety measures are taken.

In July 2020, the functions of the Occupational Health and Safety Division were transferred to the Office of the Managing Director.

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## APPENDIX A: MOST WANTED LIST

The NTSB issued its first 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 issue area, has been 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. Below are the 10 issue areas included on the 2019–2020 MWL.

### **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.

### **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, like 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

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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. After more than 50 years of investigating train collisions and derailments, issuing safety recommendations, and conducting countless advocacy activities, we were pleased to see that all railroads required to do so had implemented PTC by the December 31, 2020, deadline mandated by Congress.

### **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 more than 9,378 people in 2018 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 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 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 railways, causing too many preventable accidents. We want to see mandatory screening

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and treatment for obstructive sleep apnea for rail and highway personnel in safety-sensitive positions.

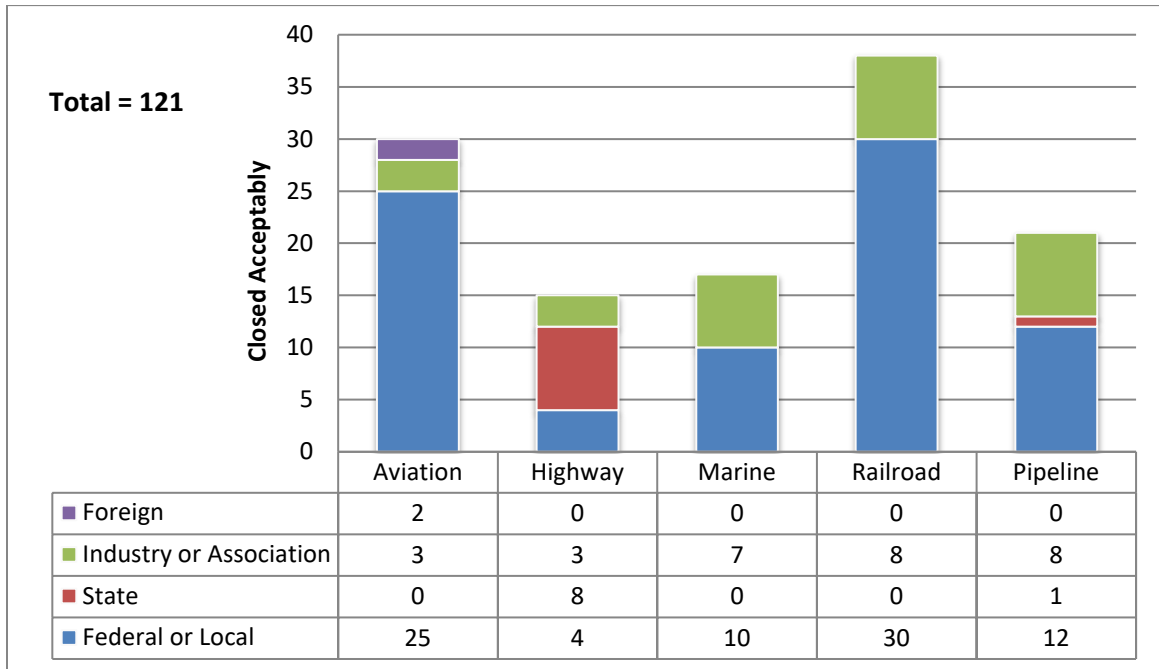
### **STRENGTHEN OCCUPANT PROTECTION**

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.

## APPENDIX B: STATUS OF SAFETY RECOMMENDATIONS

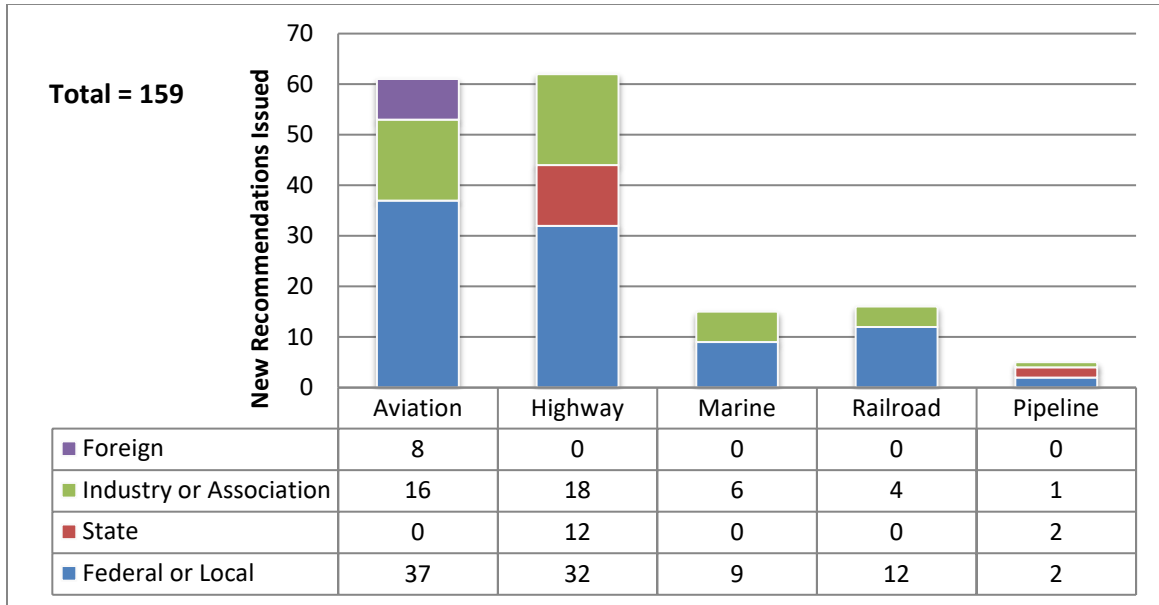
### Recommendations Closed

The chart below shows the distribution by mode of the 121 NTSB safety recommendations closed in an acceptable status from October 1, 2019, through September 30, 2020.



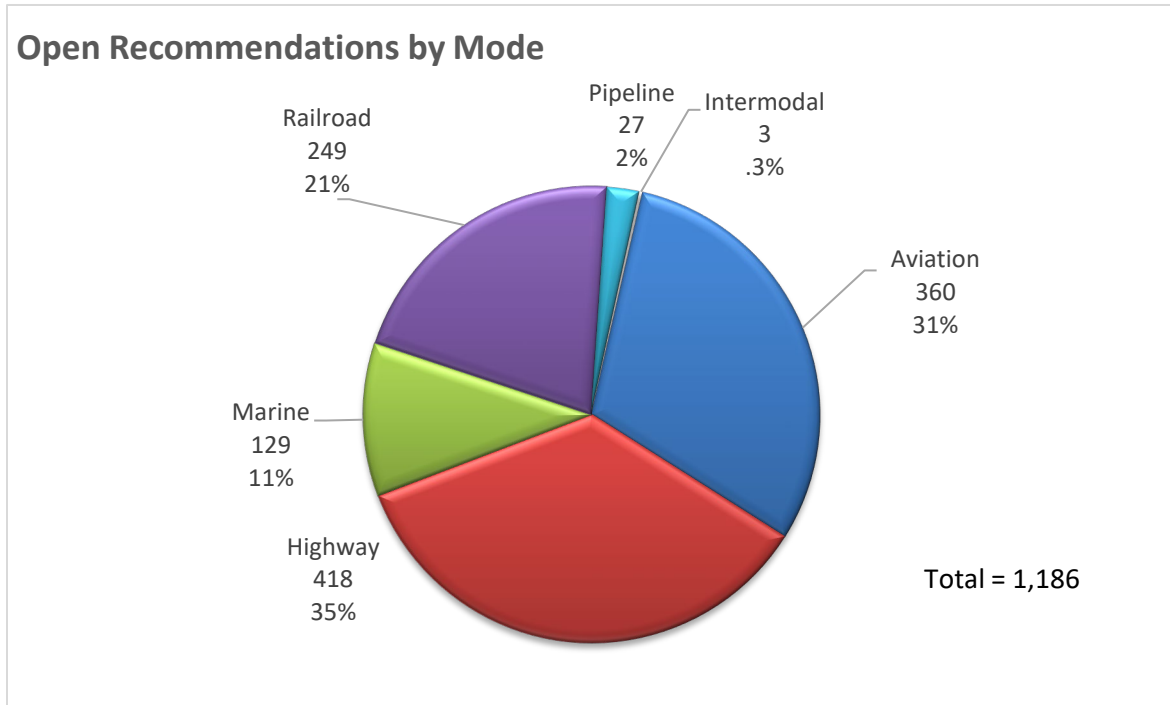
## New Recommendations Issued

The chart below shows the distribution by transportation mode of the 159 safety recommendations issued by the NTSB from October 1, 2019, through September 30, 2020.



## Open Recommendations

The chart below displays the distribution by transportation mode of the 1,186 safety recommendations open as of September 30, 2020.



## APPENDIX C: TRANSPORTATION DISASTER ASSISTANCE

### Significant Activities in FY 2020

**TDA Investigation Support** – Offering information and disaster assistance services to approximately 2,600 accident survivors, family member and family contacts associated with NTSB investigations:

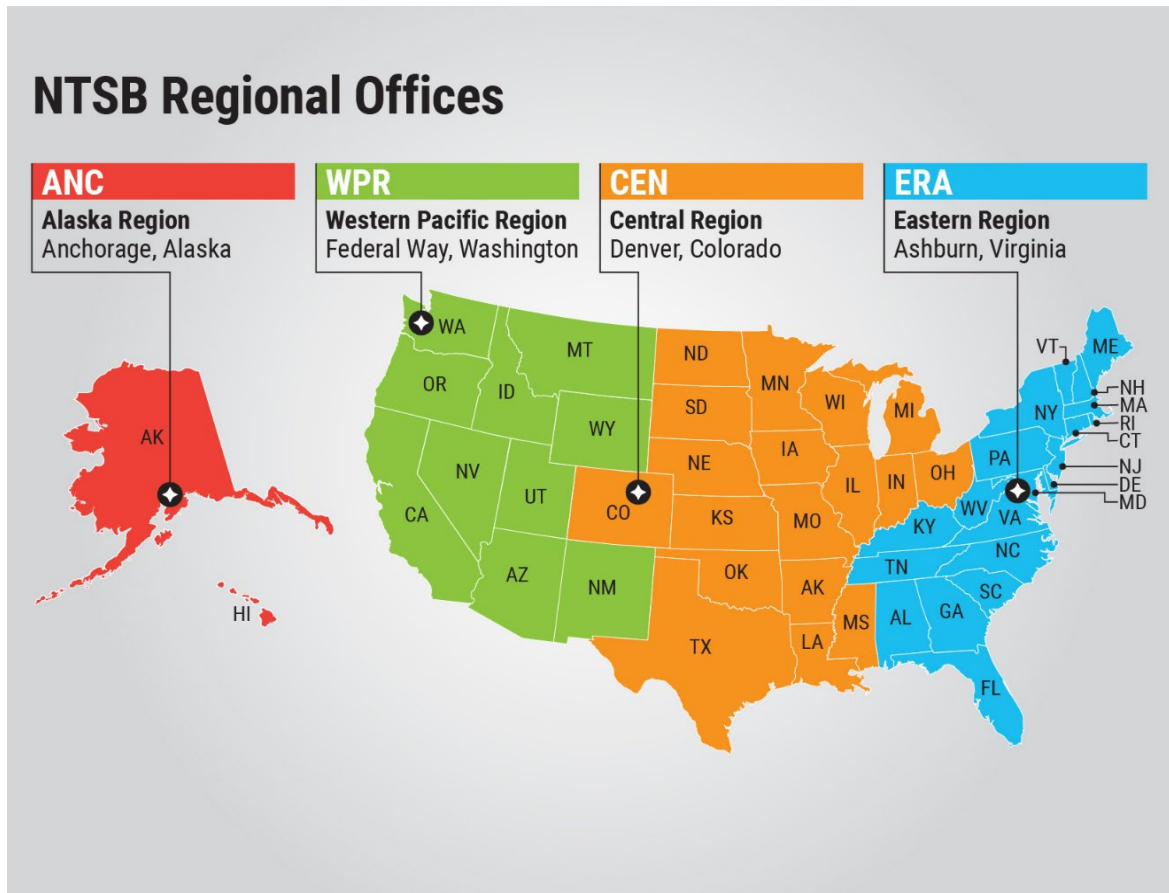
<b>Launches</b>	
Aviation Safety	7
Highway Safety	1
<b>Total Launches</b>	<b>8</b>
<b>Other Investigations Supported</b>	
Domestic aviation accidents	608
International aviation accidents	9
Rail accidents	12
Highway accidents	20
Pipeline accidents	7
Marine accidents	14
<b>Total Other Investigations Supported</b>	<b>670</b>

#### TDA Outreach and Training Activities

- Division staff participated in 46 outreach events, resulting in direct contact with 3,428 participants and responded to inquiries from 302 agencies and organizations. Twenty-three additional outreach events were canceled in FY 2020 because of the pandemic.
- TDA staff developed and delivered several training programs for NTSB Board Members, accident investigators, and other staff focused on enhancing communications with accident survivors and the family members and friends of those involved in transportation accidents; approximately 250 NTSB staff members attended.
- The division engaged in a collaborative effort to enhance the Employee Assistance, Critical Incident Stress Awareness, and Peer Support Programs, compiling stress awareness and mental health resources that they made available to agency staff and developing a webinar series focused on stress awareness and mental health in the workplace.



## APPENDIX D: 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

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## APPENDIX E: HISTORICAL INFORMATION

### NTSB Salaries and Expenses Funding History (in millions)

<b>FY</b>	<b>Amount</b>
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
2020	\$110.4

\* Includes across-the-board rescissions

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## Current Board Members

Name	Board Title	Appointment	Term Expiration
Robert L. Sumwalt	Chairman	August 5, 2019	August 7, 2022 <sup>1</sup>
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 31, 2023

<sup>1</sup> Chairman Sumwalt's term as a Board Member ends December 31, 2021

Under 49 *U.S.C.* section 1111(d), when the term of office of a Board Member ends, the Member may continue to serve until a successor begins service as a Board Member.

## Emergency Fund Activity

<b>Fiscal Year</b>	<b>Appropriations (Rescissions)</b>	<b>Obligation Activity</b>	<b>Balance</b>	<b>Purpose/Source</b>
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, New York
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
2020			\$1,997,884	No activity

## FTE Staffing at Year End by Headquarters and Field Offices

<b>FY</b>	<b>Headquarters</b>	<b>Regional</b>	<b>Total</b>
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	403
2020	292	108	400

## FTE Staffing by State and Region FY 2020

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			4									4
Colorado		1	12	1								14
Illinois			7		1			1				9
Indiana								1				1
Louisiana								1				1
Minnesota			2									2
Missouri			1									1
Texas		1	6	7				1				15
Wisconsin			1									1
Tennessee				1								1
Utah			1									1
Connecticut			1									1
Florida			5							1		6
Georgia			3				1					4
New Hampshire			1									1
New Jersey			1					1				2
New York			1									1
North Carolina			3									3
South Carolina				1								1
Virginia			9					2			3	14
Washington, DC	29	7	42	19	25	20	53	22	46	29		292
Arizona			3									3
California			6	1				2				9
Montana			1									1
Oregon			2	1								3
Washington			8	1								9
<b>Grand Total</b>	<b>29</b>	<b>9</b>	<b>120</b>	<b>32</b>	<b>26</b>	<b>20</b>	<b>54</b>	<b>31</b>	<b>46</b>	<b>30</b>	<b>3</b>	<b>400</b>

\*Regions:

Alaska

Central

Eastern

Western

## Training Center Costs and Revenues

	FY 2018	FY 2019	FY 2020
Earned revenue	\$1,164,133	\$1,133,921	\$681,560
Subleases	\$0	\$0	\$0
Total revenue	\$1,164,133	\$1,133,921	\$681,560
Costs:			
Pay	\$593,021	\$654,678	\$640,512
Travel	\$93,287	\$75,593	\$8,184
Contracts	\$228,087	\$392,599	\$116,360
Supplies	\$4,534	\$2,468	\$11,004
Costs before space rental	\$918,929	\$1,125,338	\$776,060
Space rental	\$2,626,073	\$2,626,073	\$2,653,865
Total operating costs	\$3,545,002	\$3,751,411	\$3,429,925
Deficit	\$2,380,869	\$2,617,490	\$2,748,365

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## International Investigations

### ***Total International Accident Investigation Costs by Fiscal Year 2012 - 2020\****

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
2020	\$960,482

\* Since the beginning of FY 2012, the agency has been able to 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 the DOT under the Safe Skies for Africa (SSA) Program.
- (b) Includes \$42,727 billed to the DOT under the SSA Program.
- (c) Includes \$64,897 billed to the DOT under the SSA Program.
- (d) Includes \$120,026 billed to the DOT under the SSA Program.
- (e) Includes \$138,115 billed to the DOT under the SSA Program.
- (f) Includes \$35,146 billed to the DOT under the SSA Program.
- (g) Includes \$88,300 billed to the DOT under the SSA Program.
- (h) Includes \$22,785 billed to the DOT under the SSA Program.



### ***FY 2020 Investigation Costs by Accident\****

<b>Description</b>	<b>Location</b>	<b>Amount</b>
An Agusta AW139 crashed shortly after departure into the Atlantic Ocean.	Big Grand Cay, Bahamas	\$ 128,305
A Boeing 737-86J overran the end of runway after landing.	Istanbul, Turkey	\$ 113,841
An Ethiopian Airline Boeing 737MAX crashed shortly after takeoff.	Addis Ababa, Ethiopia	\$ 102,123
A Sikorsky S61 impacted the ground after losing rotational control due to blade failure.	Camp Dwyer, Afghanistan	\$ 82,657
A Canadian Pacific Railway train derailed carrying crude oil.	Guernsey, Canada	\$ 52,171
A Lion Air Boeing 737 crashed into the Java Sea.	Jakarta, Indonesia	\$ 51,331
An Airbus A321 experienced high pressure turbine disk rupture and subsequent uncontained engine failure during takeoff.	Tan Son Nhat, Vietnam	\$ 40,573
A Thai Airways Boeing 777 aborted takeoff after experiencing a No. 1 engine failure.	Bangkok, Thailand	\$ 35,907
A Swiss International Air Lines Airbus A220-300 had an in-flight shutdown of the No. 1 engine.	Côte-d'Or, France	\$ 35,241
A Boeing 737-800 crashed about 8 minutes after takeoff.	Tehran, Iran	\$ 34,847
A Swiss International Air Lines Airbus A220 had an in-flight shutdown of the No. 1 engine.	Paris, France	\$ 26,473
A Boeing 747 lost power in an engine.	Tokyo, Japan	\$ 20,798
An Agusta A109S helicopter impacted terrain shortly after takeoff.	Santa Maria Coronango, Mexico	\$ 20,296
A Boeing 737 overran the runway and impacted a wall.	Kozhikode, India	\$ 20,063
An Air France A380 had a No. 4 engine fan and inlet cowling separation.	Goose Bay, Canada	\$ 18,552
A Fly Jamaica Boeing 757 had a hydraulic failure and runway overrun during landing.	Georgetown, Guyana	\$ 17,436
An Air China Airbus A330-300 encountered smoke from under part of the aircraft door.	Beijing, China	\$ 16,542
An Airbus BD-500 experienced an engine failure.	Paris, France	\$ 15,797

<b>Description</b>	<b>Location</b>	<b>Amount</b>
An Airbus A220-300 experienced an engine failure during cruise.	Bordeaux, France	\$ 11,287
A Cessna 560 hit an electrical cable and caught on fire.	Azligarh, India	\$ 10,454
A Boeing 737 experienced a gear collapse, resulting in a postcrash fire.	Jauja, Peru	\$ 10,278
An Icelandair Boeing 757 had the right main landing gear collapse on landing.	Keflavik, Iceland	\$ 9,685
A Bell 222U helicopter crashed after both engines lost power.	Addis Ababa, Ethiopia	\$ 9,159
A Sikorsky S92 experienced an over torque condition and a low main rotor speed condition, and the generators came offline.	Sable Island, Canada	\$ 8,896
A Boeing B737-400, had a right landing gear torsion link fracture during the landing roll.	Singapore	\$ 7,471
A Boeing 737 had a burned static inverter that resulted in the strong smell of fumes.	Tessaloniki, Greece	\$ 7,168
An Indigo Airbus A320 experienced an engine failure.	Lucknow, India	\$ 6,674
A Boeing 787 had an inoperative air conditioning system and descended.	Japan	\$ 6,589
A Boeing 737's gear collapsed during landing.	La Paz, Bolivia	\$ 6,406
A Tiger Moth crashed and was destroyed.	Hythe-Kent, United Kingdom	\$ 6,121
A Regional Express Airlines Saab 340B encountered a No.2 engine master fire warning indication during cruise.	Merimbula, Australia	\$ 5,843
An Ethiopian Airlines Boeing 777 caught fire and burned while parked.	Shanghai, China	\$ 5,689
An Embraer ERJ190 lost the left nose landing gear wheel during landing.	Rosario, Argentina	\$ 5,349
A Mango Airlines Boeing 737-800 encountered a "STAB OUT OF TRIM" indication light.	South Africa	\$ 5,255
A Reims F152 crashed in a forest after loss of control during flight.	Buttwil, Switzerland	\$ 5,201
<b>Grand Total</b>		<b>\$ 960,482</b>

\* Report includes accident investigations with more than \$5,000 in FY 2020 expenses through September 30, 2020. Costs include payroll as well as travel and other direct costs.

## Status of Action by State and the District of Columbia 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	Yes	
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	Yes	
Illinois	Yes	Yes	Yes	Partial	Yes	
Indiana	Yes	Yes	Yes	Partial		
Iowa	Partial	Partial		Partial	Partial	
Kansas	Yes	Yes	Partial	Partial	Yes	
Kentucky	Yes	Yes	Yes	Partial	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	Yes
Michigan	Yes	Partial	Yes	Partial		
Minnesota	Yes	Yes	Yes	Partial		
Mississippi	Yes	Yes		Partial	Yes	Partial
Missouri	Yes		Partial	Partial	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	Yes	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	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 = 40 + DC Partial = 9	Yes = 25 + DC Partial = 9	Yes = 31 + DC Partial = 14	Yes = 0 Partial = 49 + DC	Yes = 31 + DC	Yes = 12 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 or for at least 6 months.

## US Transportation Fatalities 2019

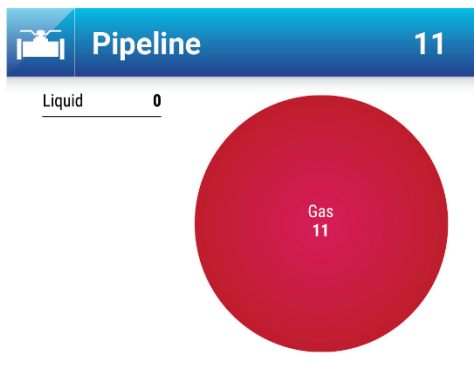
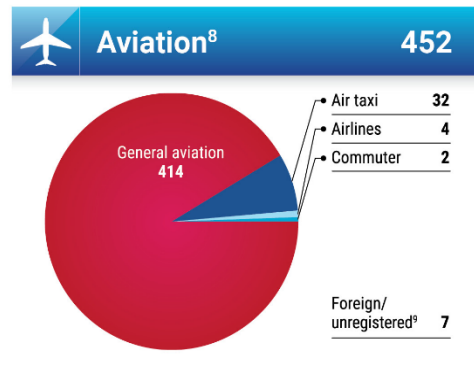
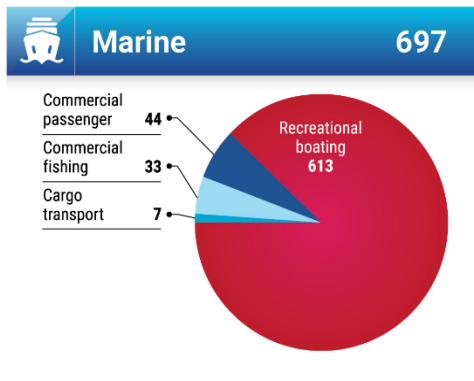
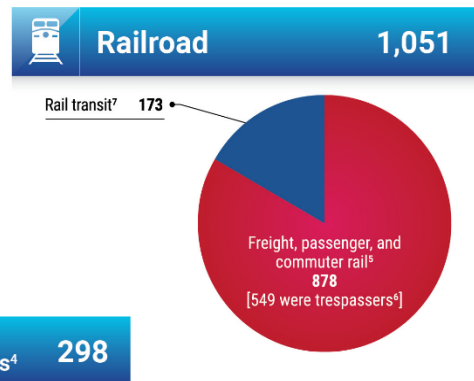
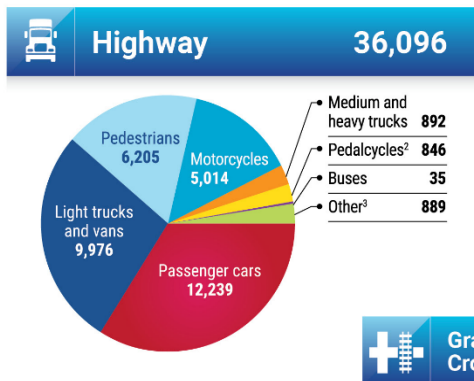


National Transportation Safety Board

### US Transportation Fatalities in 2019 – by Mode

**Total: 38,178<sup>1</sup>**

Aviation data is taken from the NTSB's 2000–2019 Preliminary Aviation Statistics. For other transportation modes, the NTSB used data from the Bureau of Transportation Statistics (BTS), Transportation Fatalities by Mode.



**Footnotes**

- <sup>1</sup> 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.
- <sup>2</sup> Pedalcycles include bicycles and other cycles.
- <sup>3</sup> Other refers to occupants of other vehicle types, other non-motorists, and unknown.
- <sup>4</sup> 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.
- <sup>5</sup> Freight, passenger, and commuter rail data are reported by the Federal Railroad Administration. The FRA does not include suicides.
- <sup>6</sup> 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.
- <sup>7</sup> 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.
- <sup>8</sup> Total fatalities may not equal the sum of each category because accidents may involve multiple categories.
- <sup>9</sup> Foreign/unregistered includes non-US registered aircraft involved in accidents in the United States.