National Transportation Safety Board

Fiscal Year 2021
Budget Request

National Transportation Safety Board
Washington, DC 20594

Office of the Chairman

February 10, 2020

The Honorable Michael R. Pence
President
United States Senate
Washington, DC 20510

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

Dear Mr. President and Madam Speaker:

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters. We also conduct safety studies focused on broader safety questions and topic areas. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The enclosed budget submission reflects the President's request of $116.4 million for fiscal year (FY) 2021. This funding level is an increase of $6.0 million from the FY 2020 enacted appropriation level of $110.4 million and funds 412 full-time equivalent positions (FTEs).

We are proud of the products and initiatives highlighted in this submission. They reflect not only accomplishments in the past year, but outline initiatives that will propel us to continue to improve processes and products into the future. These efforts are made possible by the expertise, experience and diligence of our highly skilled employees. Personnel compensation and benefits account for over 70 percent of our expenses. Pay raises and increases in agency contributions to benefits such as retirement have driven up these expenses, and we appreciate the recognition given to our needs through the $6.0 million increase in the President's budget request. This funding increase will help stabilize staffing and will provide for modest progress toward full staffing levels.

It will also support our continued success in improving the quality and quantity of investigation-related data, refining processes around safety recommendations, and allowing administrative functions to fully support mission requirements, in addition to a host of other critical activities.

As an agency, we are excited to invest our resources in people and processes that help make transportation safer for the public. Full funding at the requested level of $116.4 million provides sustained support of this mission.

Sincerely,

Robert L. Sumwalt, III
Chairman

Enclosure

cc: The Honorable David Price
Chairman
Subcommittee on Transportation, HUD, and Related Agencies
Committee on Appropriations
US House of Representatives

The Honorable Mario Diaz-Balaart
Ranking Member
Subcommittee on Transportation, HUD, and Related Agencies
Committee on Appropriations
US House of Representatives

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

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

CONTENTS

ACRONYMS AND ABBREVIATIONS

ADAS	advanced driver assistance systems
ADS-B	Automatic Dependent Surveillance-Broadcast
AS	NTSB Office of Aviation Safety
ARTP	Aviation Report Timeliness Project
ASI	aviation safety investigator
CFR	*Code of Federal Regulations*
CFV	commercial fishing vessel
CHP	California Highway Patrol
CPAP	continuous positive airway pressure
CSD	NTSB Computer Services Division
CSX	CSX Transportation
CVR	cockpit voice recorder
dba	doing business as
DEF	diesel exhaust fluid
DGAC	(Mexican) Directorate General of Civil Aviation
DHS	US Department of Homeland Security
DOT	US Department of Transportation
DS	NTSB Digital Services Division
DVR	digital video recorder
EAD	NTSB Enterprise Architect Division
EEO	Equal Employment Opportunity
EEODI	NTSB Office of Equal Employment Opportunity, Diversity, and Inclusion
FAA	Federal Aviation Administration

FDR	flight data recorder
FERS	Federal Employees Retirement System
FISMA	Federal Information Security Management Act
FOIA	Freedom of Information Act
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTE	full-time equivalent
FV	fishing vessel
FY	fiscal year
GA	NTSB Government and Industry Affairs Division
GEU	Glendale, Arizona Municipal Airport
GIS	geographic information system (GIS)
GPS	global positioning system
GSA	General Services Administration
HOV	high-occupancy vehicle
HR	NTSB Human Resources Division
HS	NTSB Office of Highway Safety
HSPD-12	Homeland Security Presidential Directive 12
ICAO	International Civil Aviation Organization
IIC	investigator-in-charge
IMO	International Maritime Organization
IT	information technology
LAS	Las Vegas, Nevada International Airport
MCAS	Maneuvering Characteristics Augmentation System

MAIIF	Marine Accident Investigators' International Forum
MR	NTSB Media Relations Division
mph	miles per hour
MV	motor vessel
MS	NTSB Office of Marine Safety
MWL	Most Wanted List
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
NYCT	New York City Transit
OCFO	NTSB Office of the Chief Financial Officer
OCIO	NTSB Office of the Chief Information Officer
OEM	Original Equipment Manufacturer
OES	Original Equipment Supplier
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Administration
OSHP	Occupational Safety and Health Program
PHMSA	Pipeline and Hazardous Materials Safety Administration
PIC	pilot-in-command
PIV	personal identity verification
PTC	positive train control
PV	passenger vessel
RE	NTSB Office of Research and Engineering
RMD	NTSB Records Management Division
RPH	NTSB Office of Railroad, Pipeline and Hazardous Materials Investigations

SA	NTSB Safety Advocacy Division
SAFTI	System for Analysis of Federal Transportation Investigations
SEPTA	Southeastern Pennsylvania Transportation Authority
SES	Senior Executive Service
SIC	second-in-command
SIS	substantially interested state
SL	senior level
SOP	standard operating procedures
SR	NTSB Safety Recommendations Division
SRC	NTSB Office of Safety Recommendations and Communications
SUV	sport utility vehicle
SSA	Safe Skies for Africa
SSD	NTSB Systems Support Division
sUAS	small unmanned aircraft system
TDA	NTSB Transportation Disaster Assistance Division
TSB	Transportation Safety Board
UAS	unmanned aircraft system
UBM	United Bikers of Maine
UP	Union Pacific
U.S.C.	*United States Code*
USS	United States Ship (US Navy–commissioned vessel)

EXECUTIVE SUMMARY

The NTSB is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. We determine the probable cause of the accidents we investigate and issue safety recommendations aimed at preventing future accidents. In addition, we coordinate the resources of the federal government and other organizations to assist victims and their family members who have been impacted by major transportation disasters. We also conduct safety studies focused on broader safety questions and topic areas. Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The enclosed budget submission reflects the President's request of $116.4 million for fiscal year (FY) 2021. This funding level is an increase of $6.0 million from the FY 2020 enacted appropriation level of $110.4 million and funds 412 FTEs. This is an increase of eight FTEs from the staffing level supported by the FY 2020 enacted appropriation level.

People are our primary resource, and personnel and payroll costs consume most of our funding. The increase in funding is beneficial to the agency as we strive to achieve and maintain staffing levels that fully support our strategic goals. Pay raises and increases in retirement contributions have a substantial impact on us, as do additional workload requirements contained in the FY 2018 NTSB Reauthorization bill. Among these are requirements for additional support and discussion of our recommendations that impact the modal offices as well as our Safety Recommendations, Safety Advocacy and Transportation Disaster Assistance divisions. This funding increase will help stabilize staffing and provide for modest progress toward full staffing levels.

The agency has made strong progress in the area of improving the quality and quantity of investigation-related data. Formerly known as the Multi-Modal Accident Data Management System, the System for Analysis of Federal Transportation Investigations (SAFTI) became functional across all modes in the fall of FY 2019. This system, along with other supporting analysis tools, will be critical in meeting our strategic objectives of improving the timeliness of investigations through data analysis and improving the effectiveness of agency products. Resources continue to be required to fully optimize this initiative, as well as to update and upgrade such systems as the docket management system and the agency website, which facilitate information needs of the public and stakeholders.

This budget request submission highlights some of our many accomplishments achieved in FY 2019. It includes information on a variety of our safety related products—Accident Reports, Accident Briefs, Safety Recommendation Reports, Safety Alerts, Safety Seminars, and our participation in international investigations, which proved to be substantial during the fiscal year. It notes our efforts advocating for adoption of our recommendations and discusses our continued emphasis on emerging transportation technologies, including unmanned aircraft (drones), automated vehicles, and alternatively fueled vehicles.

As an agency, we are excited to invest our provided resources in the employees and systems that allow the NTSB to work constantly to improve transportation safety for the American people.

MISSION AND ORGANIZATION OVERVIEW

Since its creation in 1967 as an accident investigation agency within the newly created US Department of Transportation (DOT), the NTSB's mission has been to determine the probable cause of transportation accidents and incidents and to formulate safety recommendations to improve transportation safety. Our authority currently extends to these types of accidents:

- All US civil aviation accidents and certain public aircraft accidents.
- Select highway accidents.
- Railroad accidents involving passenger trains or select freight train accidents that result in fatalities or significant property damage.
- Major marine accidents and any marine accident involving both a public and a nonpublic vessel.
- Pipeline accidents involving fatalities, substantial property damage, or significant environmental damage.
- Select accidents resulting in the release of hazardous materials in any mode of transportation.
- Select transportation accidents that involve problems of a recurring nature or that are catastrophic.

In 1974, Congress passed the Independent Safety Board Act, which severed the NTSB's ties to the DOT and authorized the agency to take these additional actions:

- Evaluate the effectiveness of government agencies involved in transportation safety.
- Evaluate the safeguards used in the transportation of hazardous materials.
- Evaluate the effectiveness of emergency responses to hazardous material accidents.
- Conduct special studies on safety problems.
- Maintain an official US census of aviation accidents and incidents.
- Review appeals from individuals and entities who have been assessed civil penalties by the Federal Aviation Administration (FAA).
- Review appeals from airmen and merchant seamen whose certificates have been revoked or suspended by the FAA and the US Coast Guard (Coast Guard), respectively.

The NTSB also leads US teams assisting in foreign airline accident investigations conducted by foreign authorities under the provisions of International Civil Aviation Organization (ICAO) agreements. In 1996, the Aviation Disaster Family Assistance Act

further assigned the NTSB the responsibility of coordinating federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to address the concerns of accident survivors and family members following air carrier accidents that have occurred in the United States or its territories resulting in a loss of life (Title 49 *United States Code* [*U.S.C.*] § 1136). The rail passenger disaster family assistance provisions of the Rail Safety Improvement Act of 2008 assigned the NTSB similar responsibilities for rail passenger disasters resulting in a loss of life (49 *U.S.C.* § 1139). In 2018, the agency's family assistance responsibilities expanded as a result of our reauthorization, which includes a new section that obligates the agency, to the maximum extent practicable, to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accidents we investigate in advance of the media (49 *U.S.C.* § 1140). Currently, the primary focus of agency efforts is to ensure compliance for accidents involving fatalities.

To date, the NTSB has investigated more than 146,000 aviation accidents and thousands of surface transportation accidents. On call 24 hours a day, 365 days a year, our investigators have traveled throughout the United States and to every corner of the world to perform investigations. Because of this dedication, we are recognized as the world's leading accident investigation agency.

We have issued close to 15,000 safety recommendations resulting from NTSB investigations to more than 2,400 recipients in all transportation modes. Since 1990, we have published the Most Wanted List (MWL) of Transportation Safety Improvements, which highlights safety-critical actions that the DOT modal administrations, the Coast Guard, the states, and other entities should take to help prevent accidents and save lives. Further information concerning the MWL appears in Appendix A.

We are not authorized to regulate transportation equipment, personnel, or operations or to initiate enforcement action. However, because of our reputation for objectivity and thoroughness, many safety features currently incorporated into airplanes, helicopters, automobiles, commercial motor vehicles, trains, pipelines, and marine vessels had their genesis in NTSB safety recommendations. Further information concerning the status of our safety recommendations appears in Appendix B.

Our five-member Board is composed of appointees nominated by the President and confirmed by the Senate. A Chairman (one of the five members, also nominated by the President and confirmed by the Senate) serves as the chief executive officer of the NTSB. The President designates one of the Members as Vice Chairman.

The NTSB is headquartered in Washington, DC. We also have investigators located in offices in Ashburn, Virginia; Denver, Colorado; Anchorage, Alaska; and Federal Way, Washington; as well as investigators located throughout the country who telework. The NTSB's training center is in Ashburn, Virginia.

Organization and Program Structure

RESOURCE REQUIREMENTS

Appropriations Language

Salaries and Expenses – 950310

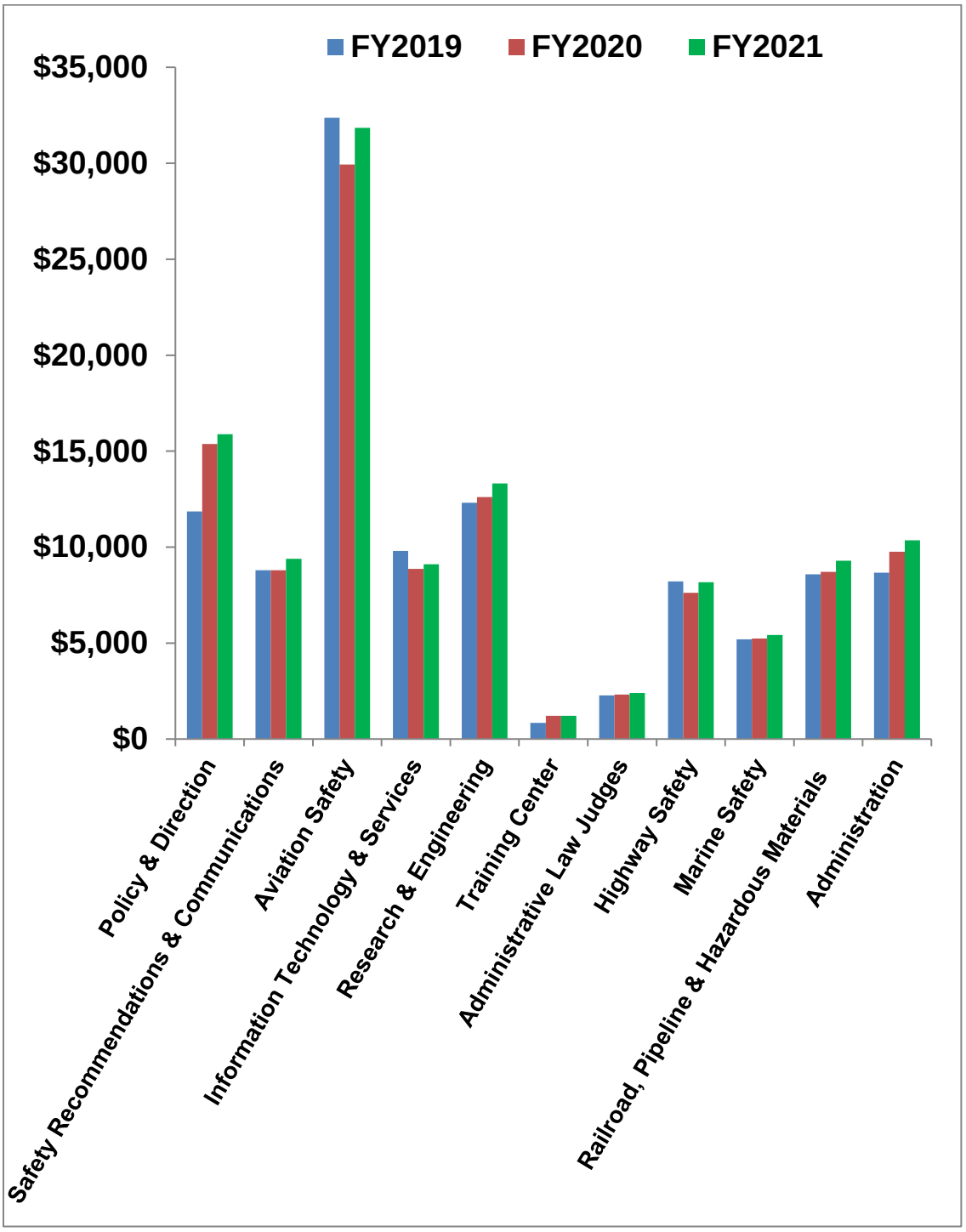
"For necessary expenses of the National Transportation Safety Board, including hire of passenger motor vehicles and aircraft*;* services as authorized by 5 *U.S.C.* 3109, but at rates for individuals not to exceed the per diem rate equivalent to the rate for a GS-15; uniforms or allowances therefor, as authorized by law (5 *U.S.C.* 5901-5902), *$116,400,000* of which not to exceed $2,000 may be used for official reception and representation expenses. The amounts made available to the National Transportation Safety Board in this Act include amounts necessary to make lease payments on an obligation incurred in FY 2001 for a capital lease."

Emergency Fund – 950311

No new funding is being requested for the Emergency Fund in FY 2021.

NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Obligations by Program Activity ($000s)



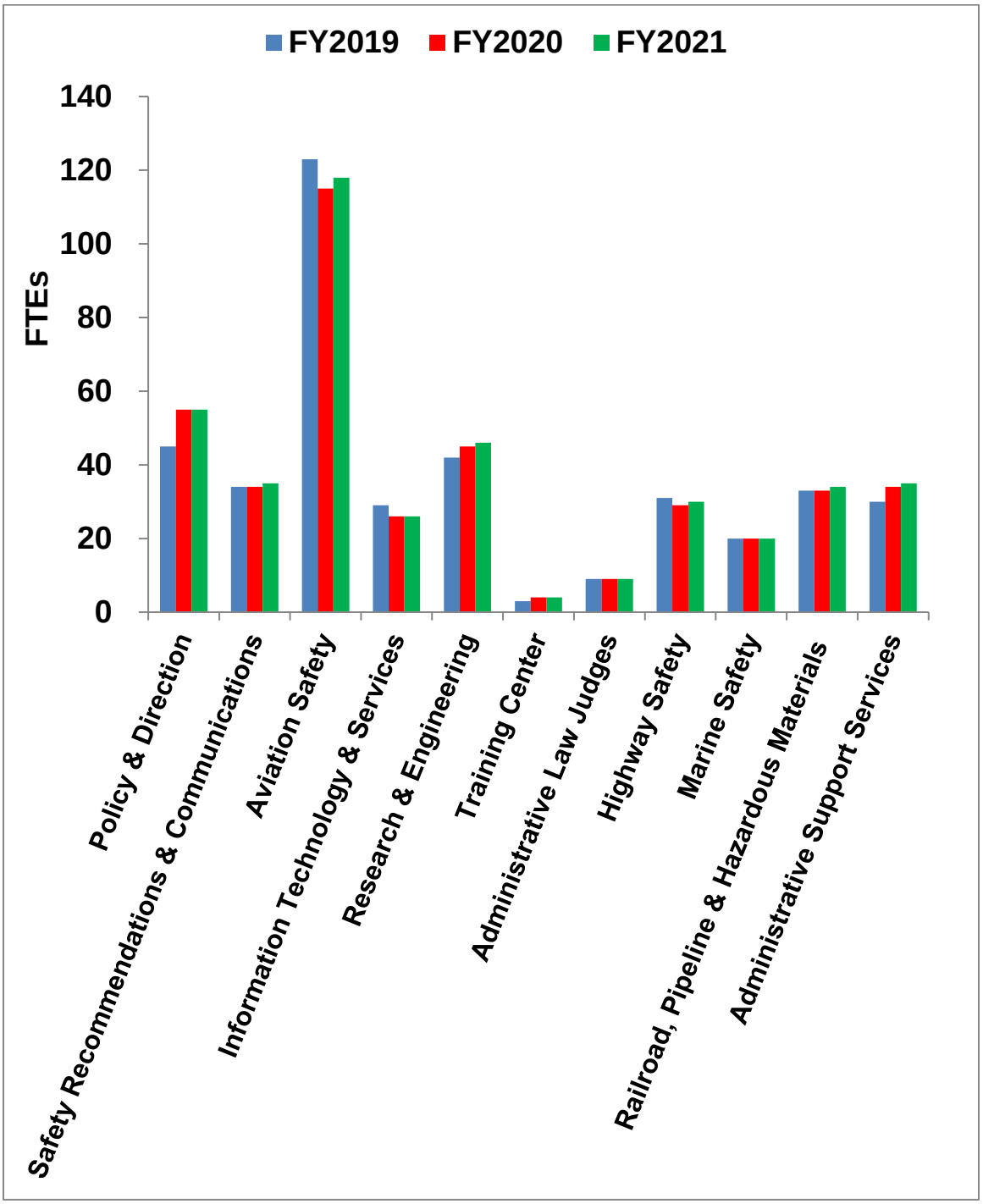
NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Obligations by Program Activity ($000s)

Identification Code: 95-0310-0-1-407	FY 2019	FY 2020	FY 2021
Policy and Direction	11,851	15,367	15,880
Safety Recommendations and Communications	8,797	8,790	9,389
Aviation Safety	32,372	29,930	31,850
Information Technology and Services	9,801	8,863	9,105
Research and Engineering	12,316	12,606	13,310
Training Center	846	1,207	1,216
Administrative Law Judges	2,278	2,313	2,397
Highway Safety	8,208	7,619	8,172
Marine Safety	5,188	5,240	5,426
Railroad, Pipeline and Hazardous Materials Investigations	8,579	8,706	9,296
Administration	8,663	9,759	10,359
Total	108,899	110,400	116,400

NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Staffing by Program Activity



NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

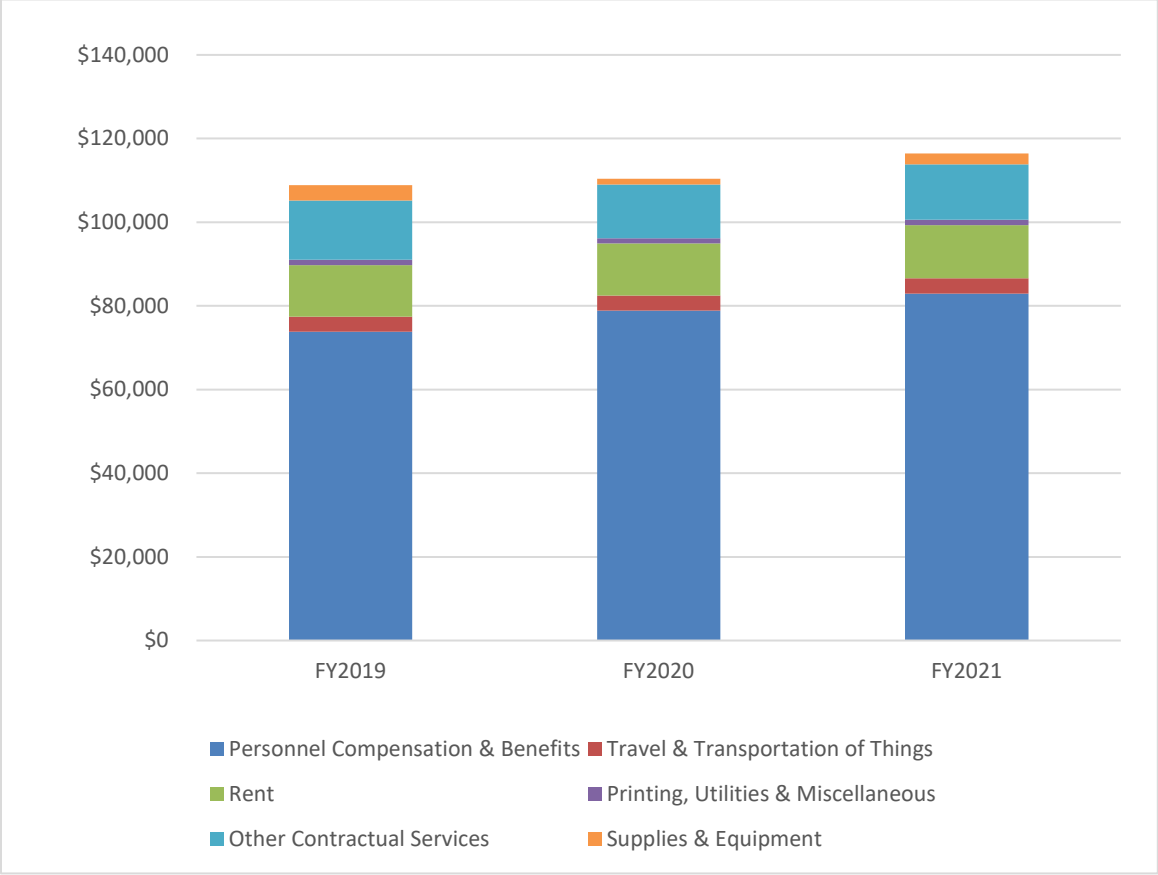
Staffing by Program Activity

Identification Code: 95-0310-0-1-407	FY 2019	FY 2020	FY 2021
Policy and Direction	**45**	**55**	**55**
Chairman, Vice Chairman, Board Members*	11	15	15
Office of the Managing Director	14	14	14
Office of the General Counsel	6	9	9
Office of the Chief Financial Officer	12	14	14
EEO, Diversity & Inclusion Office	2	3	3
Safety Recommendations and Communications	**34**	**34**	**35**
Aviation Safety	**123**	**115**	**118**
Information Technology and Services	**29**	**26**	**26**
Research and Engineering	**42**	**45**	**46**
Training Center	**3**	**4**	**4**
Administrative Law Judges	**9**	**9**	**9**
Highway Safety	**31**	**29**	**30**
Marine Safety	**20**	**20**	**20**
Railroad, Pipeline and Hazardous Materials Investigations	**33**	**33**	**34**
Administration	**30**	**34**	**35**
Total	**399**	**404**	**412**

* FY 2020 and FY 2021 assume full Board staffing.

NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Obligations by Object Classification ($000s)



NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Obligations by Object Classification ($000s)

Identification Code: 95-0310-0-1-407		FY 2019	FY 2020	FY 2021
	Personnel Compensation and Benefits:			
11.1	Permanent Positions	51,538	53,397	55,544
11.3	Positions Other Than Permanent	2,192	3,180	3,238
11.5	Other Personnel Compensation	2,339	2,441	2,942
	Total Personnel Compensation	56,069	59,018	61,724
12.1	Personnel Benefits	17,718	19,858	21,182
	Subtotal, Personnel Compensation and Benefits	73,787	78,876	82,906
	Other Than Personnel Compensation and Benefits:			
21.0	Travel and Transportation of Persons	3,574	3,497	3,637
22.0	Transportation of Things	65	66	69
23.1	Rental Payments to GSA	9,581	9,670	9,848
23.2	Rental Payments to Others	2,744	2,815	2,871
23.3	Communications, Utilities, and Miscellaneous Charges	1,153	1,130	1,176
24.0	Printing and Reproduction	105	108	112
25.0	Other Contractual Services	14,154	12,855	13,248
26.0	Supplies and Materials	587	578	601
31.0	Equipment	3,149	805	1,932
99.9	Total Obligations	108,899	110,400	116,400
	Personnel Summary:			
	Full Time Equivalent Employment (FTE)	399	404	412

NATIONAL TRANSPORTATION SAFETY BOARD
SALARIES AND EXPENSES

Analysis of Changes – FY 2020 to FY 2021

$ 2,185 Staffing Changes

The requested funding level provides for an FTE level of 412, an increase of 8 FTEs from the count of 404 supported by the FY 2020 enacted appropriation.

$ 1,753 Pay and Benefits

Funds cover the pro-rated impact of the FY 2020 3.1 percent pay raise effective January 1, 2020, as well as increases in the FERS contribution rate.

$ 468 Awards

Funds cover the 1.0 percent increase in the non-SES, non-SL awards program from FY 2020.

$ 381 Non-Pay Inflation

Inflation of 2.0 percent is used for non-pay inflation based on economic assumptions for discretionary programs.

$ 1,213 Program Investments

Continued investment in systems and equipment supporting the investigative mission of the agency.

$ 6,000 Total

Summary of Changes

$ 110,400 FY 2020 level (supports 404 FTEs)

$ 6,000 Total Increase/Decrease

$ 116,400 FY 2021 Discretionary Level (supports 412 FTEs)

POLICY AND DIRECTION

	($000s)	FTEs
FY 2020 Estimate	$15,367	55
FY 2021 Request	$15,880	55
Increase/Decrease	$513	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

Policy and Direction program resources fund the offices of the Chairman, Vice Chairman, and Members of the Board, as well as the offices of the Managing Director; General Counsel; Chief Financial Officer; and Equal Employment Opportunity, Diversity, and Inclusion. Collectively, these offices provide overall leadership, management, and direction for the NTSB.

Chairman, Vice Chairman, and Board Members

The Chairman serves as the chief executive officer for the agency. The Chairman, Vice Chairman, and Board Members preside at NTSB Board meetings; review and approve NTSB reports, safety studies, and safety recommendations; provide appellate review of FAA certificate and certain civil penalty actions, as well as Coast Guard license actions; and act as spokespersons at accident scenes. They also advocate for specific safety recommendations with the transportation community, other federal agencies, state and local governments, and the public.

Office of the Managing Director

The Office of the Managing Director assists the Chairman in the discharge of executive and administrative functions. The office coordinates activities of the entire staff, manages the day-to-day operation of the agency, and develops and recommends plans to achieve program objectives. The Managing Director is responsible for the overall leadership, direction, and performance of the agency, as well as its communications and organizational efficiency, including oversight of the NTSB Response Operations Center. The center provides support 24 hours a day, 365 days a year, for agency-wide operational requirements, including accident launches and the collection and dissemination of information related to transportation accidents and incidents.

Additionally, two organizational units reside within the Office of the Managing Director. The Training Center manages workforce development and external training functions. The Executive Secretariat is responsible for managing the voting process for Board Members and for the processing and archiving of external correspondence.

Office of the General Counsel

The Office of the General Counsel provides advice and assistance on legal aspects of policy matters, legislation, testimony, NTSB rules, and ethics. The office also provides objective review of airman appeals of certificate actions and certain civil penalties and seaman license actions, acting on behalf of the agency on particular procedural aspects of enforcement cases; makes decisions as to the release of official information pursuant to the requests or demands of private litigants, courts, or other authorities for use in litigation not involving the United States; ensures compliance with statutes concerning public access to information through publication of NTSB decisions and releases under the Freedom of Information Act (FOIA); drafts all rulemaking and interpretive guidance; provides counsel and staff assistance to the US Department of Justice when the NTSB is a party to judicial proceedings; and provides internal legal assistance and guidance regarding accident and incident investigations, hearings, appearances as witnesses, the acquisition of evidence by subpoena and other means, and the taking of depositions.

Office of the Chief Financial Officer

The Office of the Chief Financial Officer (OCFO) manages NTSB financial resources, develops the agency's budget requests for submission to the OMB and Congress, and executes the budget for resources appropriated to the NTSB by Congress. The OCFO also prepares the agency's financial statements as required by the Accountability of Tax Dollars Act, oversees property and inventory control programs, and analyzes the fee structure for services that the agency provides on a reimbursable basis. Additionally, the OCFO is responsible for ensuring compliance with the Federal Managers' Financial Integrity Act.

Office of Equal Employment Opportunity, Diversity, and Inclusion

The Office of Equal Employment Opportunity, Diversity, and Inclusion (EEODI) advises and assists the Chairman and NTSB office directors in carrying out their responsibilities related to Title VII of the Civil Rights Act of 1964, as amended, and other laws, executive orders, and regulatory guidelines affecting diversity development, and the processing of Equal Employment Opportunity (EEO) complaints. These services are provided to managers, employees, and job applicants through a combination of full-time staff, collateral-duty employees, and volunteer managers of our special emphasis programs. To maintain the integrity and impartiality of the agency's EEO complaints resolution program, external EEO counselors and investigators are contracted to help employees and job applicants who file formal or informal complaints of alleged discrimination. In addition, the office manages an alternative dispute resolution program. EEODI services also include providing required educational training to NTSB staff, raising diversity awareness at the

agency, engaging in targeted outreach, helping with internal recruitment initiatives, and providing career enhancement advisory services.

SAFETY RECOMMENDATIONS AND COMMUNICATIONS

	($000s)	FTEs
FY 2020 Estimate	$8,790	34
FY 2021 Request	$9,389	35
Increase/Decrease	599	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Safety Recommendations and Communications (SRC) comprises six divisions: Media Relations (MR), Government and Industry Affairs (GA), Safety Advocacy (SA), Transportation Disaster Assistance (TDA), Safety Recommendations (SR), and Digital Services (DS). SRC ensures that information regarding NTSB investigations, activities, advocacy, and safety recommendations is accurately and effectively communicated to a range of stakeholders, including elected officials and their staff at the federal, state, and local levels; industry representatives; media; victims of transportation accidents and their families; and the public. SRC's mission begins at the scene of an accident, continues through the NTSB accident investigation and the resulting issuance of one or more safety recommendations, and is maintained through advocacy efforts to secure favorable action on safety recommendations. In addition to traditional communication methods, the office uses digital and social media to facilitate robust public and stakeholder engagement.

Media Relations Division

This division is responsible for the following:

- Serving as national spokespersons for the NTSB.
- Serving as the primary point of contact for all MR activities and disseminating information about NTSB activities to the public via mass media. This includes collaborating with other SRC divisions to ensure the integrated, coordinated, and synchronized release of information, including imagery, MR products (such as news releases and feature releases), and social media content, with the goal of building public understanding of and support for the agency's mission.

- Providing MR support for Board members and investigators, including developing key messages and supporting talking points, facilitating interviews, preparing personnel for media briefings, coordinating media briefings, and providing MR training.
- Identifying opportunities to engage the media to communicate key messages to identified audiences.
- Providing counsel to senior leadership regarding public and media perceptions of NTSB actions and policies.
- Creating and maintaining a library of public affairs guidance for issues of media interest to align messaging and promote unity of effort within the agency.
- Responding to media inquiries, including facilitating interviews with NTSB subject matter experts, developing responses to queries, and crafting key messages.
- Providing strategic and tactical MR support for forums, meetings, roundtables, and other special investigative events.
- Providing MR guidance and training to the transportation industry to align their communications with the NTSB party agreement for NTSB investigations.

Government and Industry Affairs Division

This division is responsible for the following:

- Informing Congress, other federal agencies, and state and local governments about NTSB activities and advising the Chairman, Vice Chairman, Board members, and staff on congressional and legislative matters.
- Coordinating responses to requests for information and assistance from Congress, the White House, the Government Accountability Office, other federal agencies, and state and local governments through correspondence and briefings.
- Supporting the Chairman, Vice Chairman, Board members, and staff with legislative testimony.
- Providing launch support to the Chairman, Vice Chairman, Board members, and accident investigators.
- Monitoring federal and state legislative activity related to NTSB safety recommendations.
- Coordinating the development of NTSB legislative proposals and providing technical assistance to Congress and states in drafting legislation.
- Supporting modal offices in planning and executing forums and roundtables.
- Helping staff identify appropriate resources in state and local government to support investigations and other projects.

- Collaborating with the SA division in support of its advocacy programs.

Safety Advocacy Division

This division is responsible for the following:

- Developing and administering the NTSB's (MWL) of transportation safety improvements, based, in part, on open safety recommendations. The MWL is the agency's preeminent advocacy tool and highlights issues whose resolution would significantly impact transportation safety at the national and state levels. A new list is announced biennially at a press conference. Although the NTSB actively advocates for all its safety recommendations to be implemented, follow-up efforts are generally more aggressive for the recommendations supporting MWL issues.
- Developing the MWL advocacy strategy and working with Board members and NTSB staff to promote MWL issues.
- Developing and implementing the agency's advocacy program to highlight state-related safety recommendations.
- Collaborating with the GA division to obtain support for programs and legislation at state and local levels consistent with agency recommendations.
- Disseminating safety information and increasing public awareness of NTSB activities in transportation safety through the "Safety Compass" blog, other social media venues, and conference presentations.
- Developing and maintaining contact with SA organizations and providing information on NTSB activities and safety recommendations.

Transportation Disaster Assistance Division

This division is responsible for the following:

- Ensuring the NTSB meets its statutory obligations under the Aviation Disaster Family Assistance Act (49 *USC* section 1136) and the rail passenger disaster family assistance provisions of the Rail Safety Improvement Act of 2008 (49 *USC* section 1139). This involves responding to all major aviation accidents and rail accidents investigated by the NTSB to coordinate federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to address the concerns of survivors, families, and friends.
- Ensuring that the agency meets its obligation to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accident investigated by the agency to the maximum extent practicable in advance of the media (Title 49 *U.S.C.* section 1140).

- Serving as the primary resource for survivors of transportation accidents, as well as families and friends of those involved in accidents, regarding NTSB investigations. TDA specialists provide information regarding the NTSB investigative process, and, to the maximum extent practicable, updates on the status of existing investigations. TDA specialists also help transportation accident survivors and families and friends of those involved in accidents access available resources through the appropriate organizations.
- Supporting NTSB investigative staff by facilitating data collection through direct interaction with accident survivors and the families and friends of those involved in transportation accidents.
- Serving as a resource for local, state, and federal agencies; nongovernmental and private organizations; and transportation carriers during the preparedness phase of the disaster management cycle to assist with planning an effective family assistance response following transportation accidents. TDA specialists collaborate with the family assistance response community to ensure that key concepts and operational aspects of a family assistance operation are understood and implemented during a response.

Safety Recommendations Division

This division is responsible for the following:

- Evaluating responses from safety recommendation recipients and drafting classification response letters for Board member review and approval.
- Working with modal offices to develop new safety recommendations that are actionable, effective, and measurable, based on the findings of accident investigations.
- Supporting and tracking safety recommendation implementation.
- Maintaining the safety recommendation database, which includes information on recommendation recipients, status, adoption, and implementation.
- Analyzing safety recommendation status and implementation and generating summary reports.

Digital Services Division

This division is responsible for the following:

- Engaging the public and stakeholders via digital media.
- Implementing digital strategies to highlight the NTSB's investigative and safety advocacy messages.

- Managing digital communications programs and platforms (website, social media, and visual media) to ensure consistent messaging across various digital channels and agency compliance with digital government policies and orders.
- Providing leadership and guidance regarding digital technology adoption for agency communications programs.
- Producing videos and animations, providing photography support, producing original graphics, and editing images in support of agency activities such as accident launches, investigative product development, and advocacy, among others.

Accomplishments and Ongoing Efforts

Media Relations Division

In FY 2019, MR staff efforts generated more than 164,500 print, online, and broadcast media mentions. Significant launches during the period included the Schoharie, New York, limo crash; the Jacksonville, Florida, runway excursion; the San Francisco, California, natural gas explosion and fire; the Merrimack Valley, Massachusetts, natural gas explosion and fire; the Yorba Linda, California, Cessna crash; the New York City rooftop helicopter crash; and the Ketchikan, Alaska, midair collision.

A total of 421 unique hyperlinks were created and used in 50 news releases, 21 media advisories, and 705 tweets to drive web traffic to NTSB online products. Those links received more than 132,700 clicks.

MR published 103 images to the NTSB Flickr account, which earned a total of 453,049 views, demonstrating the value of the division's inclusion of compelling imagery in its products.

MR news releases and media advisories continue to earn an above-average open rate, with a 24 percent rate for the year, slightly above the 21 percent accepted industry standard for government communications. MR staff processed more than 3,250 media inquiries and supported 9 documentary/infotainment projects focused on NTSB investigations and the agency's investigative process.

MR continues to provide high-quality and highly effective MR training to NTSB staff and transportation industry communicators. In 2019, we trained 1,175 people in 23 training sessions held domestically and internationally.

Government and Industry Affairs Division

GA initiated outreach to congressional, federal, state, and local officials who expressed an interest in improving transportation safety, arranging numerous briefings and responding to requests for information regarding NTSB investigations and safety issue areas.

In FY 2019, staff prepared Board members to testify at 10 congressional hearings regarding the agency's investigation into the Merrimack Valley natural gas explosions, the foreign investigations of aviation accidents involving the Boeing 737 MAX (two hearings), pipeline safety (two hearings), aviation safety, rail safety, highway safety (two hearings), and confirmation hearings for Board members. The division also supported Board member testimonies and legislative advocacy efforts before state legislatures, including testimony regarding highway safety issues in Massachusetts and Connecticut.

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

Safety Advocacy Division

In FY 2019, SA funded and supported 61 advocacy and outreach activities on issues related to the MWL and other critical recommendations. The division also supported 26 Board member trips and presentations. Staff developed legislative testimony related to MWL issue areas and delivered presentations to state representatives regarding occupant protection, impairment, and distraction.

In the first quarter, division staff directed most of their efforts into researching, planning, and announcing the 2019–2020 MWL, which was issued on February 4, 2019.

In the second quarter, the SA team began to implement advocacy strategies to address the new MWL issues. These efforts included engaging with internal and external stakeholders, with a focus on achieving measurable outcomes. For example, the SA team participated in several conferences and other similar meetings leading up to and following the MWL release, including events hosted by the following groups: Lifesavers' Highway Safety Priorities, Flight Safety Foundation, National Black Caucus of State Legislators, the American Trucking Associations, Network of Employees for Transportation Safety, International Road Federation, and the American Academy of Forensic Sciences. Staff also collaborated with Jetco Delivery, StopDistraction.org, Impact Teen Drivers, and the California Highway Patrol to host distracted driving roundtables in Texas and California.

To broaden the reach and impact of the issues on the MWL, the SA team coordinated with the National Safety Council, Mothers Against Drunk Driving, Students Against Destructive Decisions, and various state legislators to encourage states to implement a .05-percent blood alcohol concentration (BAC) limit. The SA team coordinated several highway coalition meetings and, in April, hosted a webinar with the heavy-duty trucking industry and associations to discuss the benefits of collision avoidance technologies, another issue on the 2019–2020 MWL.

In the third quarter, SA conducted outreach and social media activities in support of Motorcycle Safety Awareness Month, supported presentations at helicopter conferences, participated in the AAA Western and Central New York Impaired Driving Summit, briefed

transportation officials about NTSB school bus safety recommendations, and participated in a variety of youth and teen driving events and activities.

In the fourth quarter, SA published and promoted an updated list of the safety recommendations associated with the 2019–2020 MWL; exhibited at the Experimental Aircraft Association's AirVenture event, helping investigators prepare and deliver more than 15 presentations to general aviation pilots and enthusiasts; presented at the final symposium of the US DOT's Safe Skies for Africa Program; worked with agency leadership to host a roundtable in Alaska focused on improving Part 135 flight operations safety; addressed the National Council of Examiners for Engineering and Surveying Annual Conference about hazmat recommendations; developed various social media summer and back-to-school highway-related campaigns; and participated in impairment and distraction-related events.

Division staff produced two *Advocacy Spotlight* e-newsletters that shared NTSB advocacy information and activities and highlighted progress on MWL items.

SA staff continued to significantly expand the agency's use of social and digital media platforms to highlight investigative findings, share MWL safety messages and lessons learned, and promote the implementation of NTSB recommendations. Division staff posted hundreds of social media messages via the NTSB blog, Twitter, Facebook, LinkedIn, Instagram, YouTube, and Flickr. The division also became more fully engaged with the agency's corporate LinkedIn page, developing and posting a biweekly safety message from the Chairman, highlighting the work of agency staff, publishing job announcements, and promoting key advocacy events.

SA staff produced several episodes of the "Behind the Scene @ NTSB" podcast, which highlights agency activities, staff, and programs. Since the podcast's inception in 2018, 28 episodes have been released, and the number of podcast followers has grown monthly. Additionally, in FY 2019, SA staff produced four webinars on MWL topics specific to unique audiences and recommendation recipients. In all, SA webcasts have reached more than 1,000 industry and government stakeholders.

Using the division's e-mail distribution platform, staff sent 157 notifications related to events, reports, investigative findings, and MWL-related information that resulted in an above-average "open" rate. The number of stakeholders receiving such notifications has increased by about 23 percent since FY 2018.

Transportation Disaster Assistance Division

In FY 2019, TDA launched to eight aviation accidents (three of which met the criteria established in 49 *U.S.C* section 1136), four highway accidents, and one marine accident. Staff provided support for an additional 454 domestic aviation accidents, 12 international aviation accidents, 15 rail accidents, 21 highway accidents, 4 pipeline accidents, 1 hazmat accident, and 10 marine accidents, managing an average of 55 cases per week. Staff provided information and offered disaster assistance services to approximately 2,198

accident survivors, family members, and other family contacts associated with these investigations.

TDA staff collaborated with NTSB senior leadership and modal offices to develop an implementation strategy for the new family assistance requirements included with the 2018 NTSB reauthorization (Title 49 *U.S.C* section 1140). This effort culminated in a guidance document for investigative and TDA staff to facilitate compliance with the section 1140 requirements. Staff continue to seek opportunities to refine processes, including applying Lean Six Sigma principles to case management. The NTSB's expanded responsibilities per Title 49 *U.S.C* section 1140 have increased TDA's caseload by 76 percent compared to FY 2018.

TDA participated in 60 outreach events, resulting in direct contact with approximately 3,580 participants. Staff responded to inquiries from 16 international agencies; 45 federal agencies and departments; 64 state and local agencies; 139 industry organizations; and 79 professional organizations, educational institutions, and other aid organizations. Staff engaged in an average of 25 outreach activities per week requiring either travel or remote interaction.

In collaboration with the NTSB Training Center, TDA organized a 2 1/2-day course to provide an overview of family assistance operations following transportation disasters. This course was offered twice in FY 2019 and was attended by 94 representatives from the transportation industry; local, state, and federal agencies; and other organizations. TDA staff also served as instructors during six other training courses held at the NTSB Training Center, engaging with 274 participants.

TDA staff developed a training program for aviation accident investigators focused on enhancing communications with accident survivors and the family members and friends of those involved in transportation accidents. This course was offered twice in FY 2019, with 43 accident investigators participating. Staff developed a similar training program for NTSB Board members.

Staff engaged internationally in several initiatives to develop and enhance family assistance operations. Staff represented the United States as the appointed representative during the ICAO's 13th Air Navigation Conference Special Session on family assistance, and served as part of the US delegation during ICAO's 40th Assembly Meeting, participating in training events in Austria, Brazil, Hong Kong, Italy, Nigeria, and the United Arab Emirates designed to build international family assistance response capabilities. For international agency representatives interested in developing or enhancing their country's family assistance programs, the NTSB offered complimentary registration to the 2 1/2–day family assistance course.

TDA engaged in an initiative to revise guidance to meet the criteria established in 49 *U.S.C.* section 1136 for the distribution and control of passenger lists and manifests following an aviation accident. Staff hosted a workshop that assembled 40 key stakeholders from domestic and foreign air carriers, passenger rail carriers, airport authorities, emergency management offices, public safety agencies, federal agencies, and nongovernmental

organizations. The workshop was intended to facilitate discussion and ensure that various perspectives were considered in the draft document. Final guidance was distributed to the broader family assistance response community in July 2019.

Safety Recommendations Division

In FY 2019, SR staff reviewed and analyzed 132 responses from recommendation recipients and developed recommendation classification responses to those letters for Board review and approval. The division also assisted the modal offices in developing and issuing 157 new safety recommendations.

SR developed numerous reports and data summaries on specific recommendation topics to support NTSB Board members, agency staff, the media, and the public during the same period. Staff provided input on recommendations during the report-planning phase of 26 NTSB accident investigations conducted by the modal offices.

SR outreach activities included 34 meetings with government and industry organizations, including the FAA, the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), the Federal Transit Administration (FTA), the Coast Guard, and NiSource to discuss previously issued recommendations.

In FY 2019, the division initiated a program to collect information on actions taken by states in response to NTSB safety recommendations. The information collected includes legislation that has been either enacted, or introduced but not yet enacted, and such administrative actions as design specification and maintenance inspection programs for roads, bridges, and tunnels.

Digital Services Division

In FY 2019, DS staff supported 20 major accident launches, 9 Board meetings, and 8 other NTSB-led safety-focused events. The division completed over 400 graphics and illustrations for use in reports and other materials; managed more than 30 print publication requests; produced more than 50 videos, podcasts, and live video streams; and fulfilled more than 1,500 website update requests.

DS staff worked with the Office of the Chief Information Officer (OCIO) to implement a digital signage system at headquarters, providing up-to-date and timely topical information to NTSB staff. DS staff is also leading the creation of a new internal employee engagement intranet site, with the objectives of increasing the agency's internal communications effectiveness, highlighting staff stories, and fostering more robust two-way communications between staff and senior leadership.

AVIATION SAFETY

	($000s)	FTEs
FY 2020 Estimate	$29,930	115
FY 2021 Request	$31,850	118
Increase/Decrease	$1,920	3

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 3 FTEs is supported by this funding level. No other program changes are planned.

Program Description

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

- Investigate all air carrier, commuter, and air taxi accidents and certain serious incidents; fatal and nonfatal general aviation accidents and serious incidents; unmanned aircraft systems (UAS) and public aircraft accidents and serious incidents; and commercial space launch/reentry accidents.
- Participate in the investigation of aircraft accidents that occur in foreign countries involving US carriers, US-manufactured or -designed equipment, or US-registered aircraft to fulfill US obligations under ICAO agreements.
- Investigate safety issues that extend beyond a single accident to examine specific aviation safety problems from a broader perspective.

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

Major Investigations Division

The Major Investigations Division of AS performs these functions:

- Provides an investigator-in-charge (IIC) for air carrier domestic aircraft accident and incident investigations, certain public aircraft accidents and incidents, commercial space launch/reentry accidents, and UAS accident and incident investigations.

- Coordinates the preparation of comprehensive aviation accident and incident reports and manages aviation investigative hearings, forums, and conferences related to air carrier operations.
- Coordinates and supervises the efforts of NTSB group chairmen and external investigation participants provided by industry, other government agencies, and foreign authorities (for US investigations involving foreign-operated, -registered, -manufactured, or -designed aircraft).
- Provides accredited representatives to assist in the investigation of civil aviation accidents that occur in other countries. (The accredited representative informs domestic aviation interests of the progress of an investigation, while providing needed technical expertise, as requested, to foreign accident investigation counterparts, and informs FAA and US industry representatives of issues that may affect US aviation safety, or the safety of aircraft or aircraft components manufactured in the United States.)
- Develops NTSB investigative capabilities and agency strategy in new and innovative transportation industries to improve safety. Current areas of development include increasing NTSB comprehensive and technical proficiency in UAS accident and incident investigation, use of small unmanned aircraft system (sUAS) technology for accident scene documentation, commercial space launch/reentry accident investigation, and urban air mobility vehicle operations in the US National Airspace System.

As applicable for domestic accident and incident investigations, a specialist in operational factors, aviation engineering, human performance, survival factors, or other organizational element may act as a group chairman on a major investigation to examine issues in his or her specialty area. Group chairmen lead their respective groups in the technical investigation of an accident under the direction of the IIC and produce a factual report that is placed in the agency's public docket. They also produce analytical reports that are used in developing the draft accident report and proposed safety recommendations. NTSB technical specialists may also provide specialized assistance through the US-accredited representative in foreign accident and incident investigations.

Operational Factors Division

The Operational Factors Division examines issues related to air traffic control, flight operations, and meteorology, such as—

- Air traffic control facilities, procedures, and flight handling, including developing flight histories and animations from air route traffic control centers and terminal facility radar records.
- Operations of the air carrier or the UAS operator; training, experience, and operational performance of flight crews or UAS pilots; and FAA surveillance of flight operations.

- Meteorological/environmental conditions that may have caused or contributed to an accident, and pertinent meteorological products, procedures, and services provided by government and industry.
- Commercial space crewmember training, experience, and operational performance.

Aviation Engineering Division

The Aviation Engineering Division examines all issues related to powerplants, structures, systems, system safety, and maintenance, such as—

- Powerplant components, including the airworthiness of aircraft engines and propellers.
- Integrity of aircraft structures and flight controls, including the adequacy of design and certification.
- Airworthiness of aircraft flight controls and electrical, pneumatic, hydraulic, and avionics systems.
- Hazards and associated safety risks introduced by aircraft equipment failures, including the adequacy of design and certification.
- Service history and maintenance of aircraft systems, structures, and powerplants.
- Airworthiness of helicopters, including powerplants, structures, and control systems.
- Commercial spacecraft engines, structure, and systems.

Human Performance/Survival Factors Division

AS human performance specialists assess the knowledge, experience, training, and physical abilities of those whose actions may have caused or contributed to an accident or incident. They review the adequacy of established procedures, examine work habit patterns and interrelationships among crewmembers and managers to assess organizational factors and safety culture, and investigate the ergonomics of equipment design and the potential effects of that design on operator performance. A human performance investigation may also include an assessment of sleep and rest cycles and drug or alcohol use.

Survival factors specialists examine factors that affect the survival of those involved in accidents, including the causes of injuries sustained by occupants of the aircraft or by others. They also examine safety procedures, search-and-rescue operations, crashworthiness, equipment design, emergency response and escape, crewmember emergency procedures training, and airport operations and certification.

Writing and Editing Division

The Writing and Editing Division manages the development of, and writes, major aviation reports; staff also writes, analyzes, and edits accident briefs, safety recommendation reports, special investigation reports, safety alerts, responses to notices of proposed rulemaking, and general correspondence related to aviation. In addition, the division manages the NTSB's aviation accident database.

Regional Offices

Although regional accident/incident investigations may be much smaller in scope than those led by IICs at the Washington, DC, headquarters, they are conducted in a similar manner. Often, a single aviation safety investigator (ASI) conducts the investigation, gathering detailed information and working with party representatives. During each investigation, ASIs consider ways to prevent similar accidents from occurring in the future through a more immediate and informal solution (known as a safety accomplishment) or through the formal safety recommendation process. In addition, ASIs often provide support to major accident investigations and may identify accidents that have broader safety issues to be addressed in a forum, at a Board meeting, or through a special investigation report. In these cases, additional staff from headquarters are often assigned to assist ASIs in gathering the facts, developing the analysis, and drafting the final report.

See Appendix C for AS regional office coverage.

General Aviation Accident Investigations Division

The General Aviation Accident Investigations Division staff comprises recent college graduates selected from the Federal Pathways Program. They are responsible for investigating and documenting minor accidents (data collection investigations) and conducting some nonfatal limited investigations and engine teardowns. This division has reduced the workload of more senior journeymen and senior accident investigators so that they can better focus on investigating more complex accidents, developing safety recommendations, conducting external industry safety outreach, and advocating safety initiatives.

Administrative Support Division

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

Accomplishments and Ongoing Efforts

This office's accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Departure From Controlled Flight Trans-Pacific Air Charter, LLC Learjet 35A
Teterboro, New Jersey
May 15, 2017

On May 15, 2017, about 3:29 p.m. local time, a Learjet 35A, N452DA, departed controlled flight while on a circling approach to runway 1 at Teterboro Airport, Teterboro, New Jersey, and impacted a commercial building and parking lot. The pilot-in-command (PIC) and the second-in-command (SIC) died; no one on the ground was injured. The airplane was destroyed by impact forces and a postcrash fire. The airplane was registered to A&C Big Sky Aviation, LLC, and was operated by Trans-Pacific Air Charter, LLC, under the provisions of Title 14 *Code of Federal Regulations* (*CFR*) Part 91 as a positioning flight. The flight had departed from Philadelphia International Airport, Philadelphia, Pennsylvania, about 3:04 p.m. local time destined for Teterboro.

The NTSB determined that the probable cause of this accident was the PIC's attempt to salvage an unstabilized visual approach, which resulted in an aerodynamic stall at low altitude. Contributing to the accident was the PIC's decision to allow an unapproved SIC to act as pilot flying, the PIC's inadequate and incomplete preflight planning, and the flight crew's lack of an approach briefing. Also contributing to the accident were Trans-Pacific Jets' lack of a safety program that would have enabled the company to identify and correct patterns of poor performance and procedural noncompliance and the FAA's ineffective Safety Assurance System procedures, which failed to identify these company oversight deficiencies.

Safety issues identified and evaluated as part of the investigation and report included the need for flight data monitoring programs (and supporting recording devices) for 14 *CFR* Part 135 operators, the need for safety management systems for Part 135 operators, the need for the FAA to develop and implement procedures to identify Part 135 operators whose pilots do not comply with standard operating procedures (SOPs), the need for Part 135 operators to monitor pilots with performance deficiencies, inadequate FAA guidance for Part 135 crew resource management training, the need for leadership training for Part 135 PICs, and the lack of approach speed wind additive guidance in Trans-Pacific SOPs.

Safety recommendations were issued to the FAA.

Recommendations: 3 new, 6 reiterated
Report Adopted: March 12, 2019

Runway Overrun During Rejected Takeoff Ameristar Air Cargo, Inc., [doing business as] dba Ameristar Charters, flight 9363 Boeing MD-83
Ypsilanti, Michigan
March 8, 2017

On March 8, 2017, about 2:52 p.m., Ameristar Air Cargo, Inc., dba Ameristar Charters, flight 9363, a Boeing MD-83 airplane, N786TW, overran the departure end of runway 23L at Willow Run Airport, Ypsilanti, Michigan, after the captain executed a rejected takeoff. The 110 passengers and 6 flight crewmembers evacuated the airplane via emergency escape slides; however, one slide failed to inflate and could not be used. One passenger received a minor injury, and the airplane sustained substantial damage. The airplane was operated under the provisions of 14 *CFR* Part 121 as an on-demand charter flight and was destined for Washington Dulles International Airport, Dulles, Virginia.

The NTSB determined that the probable cause of this accident was the jammed condition of the airplane's right elevator, which resulted from exposure to localized, dynamic wind while the airplane was parked and rendered the airplane unable to rotate during takeoff. Contributing to the accident were (1) the effect of a large structure on the gusting surface wind at the airplane's parked location, which led to turbulent gust loads on the right elevator sufficient to jam it, even though the horizontal surface wind speed was below the certification design limit and maintenance inspection criteria for the airplane, and (2) the lack of a means to enable the flight crew to detect a jammed elevator during preflight checks for the Boeing MD-83 airplane. Contributing to the survivability of the accident was the captain's timely and appropriate decision to reject the takeoff, the check airman's disciplined adherence to standard operating procedures after the captain called for the rejected takeoff, and the dimensionally compliant runway safety area where the overrun occurred.

Safety issues identified and evaluated as part of the investigation and report included the lack of a means to enable flight crews of Boeing DC-9/MD-80 series and 717 model airplanes to verify before takeoff that the elevators are not jammed, the need for lower ground gust criteria for elevator physical inspections and operational checks by maintenance personnel for these airplanes, the lack of procedures for operators of these airplanes to monitor the wind that affects parked airplanes, the potential inadequacy of ground gust limit loads for the certification of all transport category airplanes, the lack of certain procedures for weather observers during a facility evacuation, and evacuation slide malfunction.

Safety recommendations were issued to the FAA and The Boeing Company.

Recommendations: 6 new
Report Adopted: February 14, 2019

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause.

Some of the briefs result in safety action (without the need for recommendations) by the FAA, the manufacturer, or an operator based on the information that we gather during the course of the investigation. Our investigations provide the parties with timely access to evidence essential to identifying an actionable problem and needed safety action. These briefs may be adopted by the Office Director under delegated authority or, in certain cases, may be adopted by the Board. In FY 2019, AS completed a total of 1037 delegated briefs. The below accident and incident briefs highlight some of the accidents and incidents that resulted in critical safety changes as a result of our investigation.

Engine Fire During Takeoff
September 6, 2017
Las Vegas, Nevada

On September 6, 2017, about 12:19 a.m. local time, a Delta Air Lines Boeing 757-232, registration N686DA, equipped with two Pratt & Whitney PW2037 turbofan engines, experienced a No. 1 (left) engine undercowl fire during takeoff from McCarran International Airport (LAS), Las Vegas, Nevada. The flight crew reported a left engine fire indication and associated aural fire alert at rotation/initial climb. The crew completed the quick reference handbook procedures, declared an emergency, shut down the left engine and discharged one of the fire bottles; the fire warning momentarily was cleared. They then initiated engine-out procedures to return to LAS airport. During the downwind leg of the airplane's flight pattern, the fire warning indication re-illuminated, and the second fire bottle was discharged, which cleared the fire warning a second time. The airplane made an uneventful overweight landing at LAS and was met by aircraft rescue and firefighting (ARFF) on the runway. ARFF sprayed fire retardant into the engine and confirmed that the fire was extinguished. The airplane was cleared to taxi to the gate under its own power. There were no passengers or crew injuries reported. The flight was being operated in accordance with 14 *CFR* Part 121 and was a regularly scheduled flight from LAS to John F. Kennedy International Airport, Queens, New York.

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

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

Recommendations: None
Brief Approved: September 30, 2019

Inflight Wing Separation on Piper PA-28R Airplane
Daytona Beach, Florida
April 4, 2018

On April 4, 2018, about 9:53 a.m. local time, a Piper PA-28R-201, N106ER, collided with

terrain following an in-flight separation of the left wing near the wing root during climb after a touch-and-go maneuver at Daytona Beach International Airport, Daytona Beach, Florida. The airline transport pilot and private pilot were fatally injured, and the airplane was destroyed. The airplane was registered to and operated by Embry-Riddle Aeronautical University under the provisions of 14 *CFR* Part 91 as an instructional flight. Day visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the local flight.

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

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

Recommendations: None
Brief Approved: September 3, 2019

Runway Excursion During Takeoff
May 31, 2018
Parkin, Arkansas

On May 31, 2018, about 11:15 a.m. local time, a Thrush Aircraft S2R-H80, N6215P, received substantial damage during a runway excursion during takeoff on runway 18 from a private airstrip near Parkin, Arkansas. The pilot was not injured. The aircraft was registered to Mid Continent Aircraft Corp and operated by Air Aids, Inc., under the provisions of 14 *CFR* Part 137 as an aerial application flight. Visual meteorological conditions prevailed for the flight, which was operated without a flight plan. The local flight was originating at the time of the accident.

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

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

Recommendations: None
Brief Approved: May 1, 2019

Engine Fire After Touchdown
August 22, 2017
Glendale, Arizona

On August 22, 2017, about 9:04 a.m. local time, an Enstrom F-28F helicopter, N52PD, experienced smoke coming from the engine cowling area after touchdown at the Glendale Municipal Airport (GEU) Glendale, Arizona. The certified flight instructor and student pilot were not injured, and the helicopter was not damaged. The helicopter was registered to and operated by Airwest Aviation Academy LLC under the provisions of 14 *CFR* Part 91, as an instructional flight. Visual meteorological conditions prevailed, and no flight plan had been filed. The local flight departed GEU about 8:20 a.m. local time.

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

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

Recommendations: None
Brief Approved: March 18, 2019

Loss of Engine Power During Cruise Flight
August 11, 2017
Adrian, Michigan

On August 11, 2017, about 12:00 p.m. local time, a Navion G airplane, N249KC, impacted trees after a loss of engine power near Adrian, Michigan. The flight instructor and private pilot were seriously injured and the airplane sustained substantial damage. The airplane was registered to Kalea Co. LLC and operated by Sky Walker Flying under the provisions of Title 14 *CFR* Part 91 as an instructional flight. Visual meteorological conditions prevailed at the time of the accident and a flight plan had not been filed. The local flight departed Lenawee County Airport, Adrian, Michigan, about 10:00 a.m.

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

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

Recommendations: None
Brief Approved: March 18, 2019

Landing Gear Collapse After Touchdown
December 4, 2016
San Antonio, Texas

On December 04, 2016, about 2:53 p.m. local time, an Embraer ERJ170 200L, operated by SkyWest Airlines, experienced an uncommanded retraction of the nose landing gear during rollout after landing on runway 4 at the San Antonio International Airport, San Antonio, Texas (SAT). After departure from the George Bush Intercontinental Airport, Houston, Texas, the crew heard a loud "thud/pop" just aft of the flight deck. On approach to SAT, the crew declared an emergency and performed a flyby of the control tower to verify landing gear position. The tower confirmed that the gear appeared to be in the down position. After touchdown on runway 4, during the landing rollout the nose gear retracted, without command, as the aircraft slowed to a stop. The crew and passengers evacuated the aircraft from the aft cabin doors via the evacuation slides; no one was injured. The airplane sustained minor damage. The flight was conducted under the provisions of 14 *CFR* Part 121. Visual meteorological conditions prevailed and a FAA flight plan had been filed for the flight.

The NTSB determined that the probable cause of this incident was a failure of the nose landing gear down lock spring which precluded normal downlock operation of the nose landing gear. The spring failure was due to the presence of too much retained austenite which led to the formation of progressive cracking and subsequent failure of the spring.

As a result of this investigation, Embraer released a retrofit letter, in conjunction with service bulletins for the E170/175 and E190/195 fleets addressing an inspection and possible replacement of the nose landing gear downlock springs manufactured from certain material batches. An additional service bulletin addressed the main landing gear downlock springs.

Recommendations: None
Brief Approved: November 15, 2018

Domestic Investigative Workload Summarized by State

The following table summarizes statistical information on domestic accident and incident investigations initiated from October 1, 2018, through September 30, 2019. Information is provided by state or territory and by investigation type. Investigation types are defined after the table.

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
ALABAMA	0	2	8	2	2	0	14
ALASKA	1	10	22	5	53	0	91
ARIZONA	0	3	11	3	28	0	45
ARKANSAS	0	4	4	0	6	0	14
CALIFORNIA	0	24	40	3	50	2	119
COLORADO	0	2	13	3	21	0	39

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
CONNECTICUT	0	0	3	0	4	0	7
DELAWARE	0	1	0	1	0	0	2
DISTRICT OF COLUMBIA	0	0	0	0	0		0
FLORIDA	1	17	45	12	41	1	117
GEORGIA	0	9	13	3	16	1	42
HAWAII	1	1	8	0	5	0	15
IDAHO	0	3	7	1	17	0	28
ILLINOIS	0	1	8	0	13	0	22
INDIANA	0	7	8	1	8	0	24
IOWA	0	2	2	0	6	0	10
KANSAS	0	3	4	0	13	0	20
KENTUCKY	0	1	4	2	2	0	9
LOUISIANA	0	5	5	2	4	0	16
MAINE	0	1	2	0	7	0	10
MARYLAND	0	1	9	1	4	0	15
MASSACHUSETTS	0	1	1	1	2	0	5
MICHIGAN	0	4	12	1	6	0	23
MINNESOTA	0	3	4	0	6	0	13
MISSISSIPPI	0	5	6	1	0	0	12
MISSOURI	0	3	6	1	12	0	22
MONTANA	0	2	5	0	6	0	13
NEBRASKA	0	1	6	0	5	0	12
NEVADA	0	2	8	3	13	0	26
NEW HAMPSHIRE	0	0	0	0	2	0	2
NEW JERSEY	0	2	4	2	10	0	18
NEW MEXICO	0	6	6	1	9	0	22
NEW YORK	0	6	7	0	10	0	23
NORTH CAROLINA	0	6	7	2	11	0	26
NORTH DAKOTA	0	1	4	0	2	0	7
NORTHERN MARIANAS	0	0	0	0	2	0	2
OHIO	1	8	7	0	9	0	25
OKLAHOMA	0	1	7	2	6	0	16
OREGON	0	9	18	2	17	0	46
PENNSYLVANIA	0	4	10	1	13	0	28
RHODE ISLAND	0	0	1	0	0	0	1
SOUTH CAROLINA	0	0	6	2	13	0	21
SOUTH DAKOTA	0	2	5	0	4	0	11
TENNESSEE	0	2	9	2	7	0	20
TEXAS	2	21	46	3	41	0	113
US VIRGIN ISLANDS	0	0	1	0	0	0	1
UTAH	0	5	6	0	12	0	23
VERMONT	0	0	0	0	1	0	1
VIRGINIA	0	5	7	4	13	0	29

State	Major	Field	Limited	Truncated Limited	Data Collection	Incident	Total
WASHINGTON	0	5	15	0	19	0	39
WEST VIRGINIA	0	0	2	1	2	0	5
WISCONSIN	0	2	7	0	12	1	22
WYOMING	0	1	2	0	8	0	11
Total	**6**	**204**	**441**	**68**	**573**	**5**	**1,297**

***Major Investigation*:** A major investigation is a significant event, involving the launch of a team consisting of an IIC and one or more NTSB investigators or the use of significant NTSB investigative resources. These accidents typically involve loss of life, multiple injuries, considerable property damage, a new aircraft design, or significant public interest.

***Field Investigation*:** A field investigation requires at least one NTSB investigator to travel to the accident site and conduct a follow-up investigation. Field accidents typically involve at least one fatality in an airplane that is FAA certified in the "normal" category.

***Limited Investigation*:** This category represents NTSB investigations in which investigators do not travel to the scene. An FAA inspector documents the accident site, and an NTSB investigator conducts the remainder of the investigation from the office or during a follow-up examination. These accidents typically do not involve fatalities.

***Truncated Limited Investigation*:** This category represents limited investigations in which the investigator receives a statement describing the circumstances of the accident, there is low public visibility and interest, there is limited potential for a safety improvement, and no need for engine or component teardowns. Because the circumstances of the accident are generally known and little follow-up investigation is required, these investigations can be completed quicker than field or limited investigations.

***Data Collection Investigation*:** This category of investigation does not involve investigator travel and does not require significant investigative efforts. A brief report is completed for these investigations. These accidents must meet the following criteria:

- No fatalities or "critical" serious injuries.
- Statement from the pilot documenting that no mechanical malfunctions or safety issues were known.
- Lack of any obvious safety issues.
- Minimal public or industry visibility.

***Incident Investigation*:** This category defines occurrences involving one or more aircraft in which there is a hazard or potential hazard to safety, but the event is not classified as an accident because of the degree of injury or the extent of damage, or because the circumstances of the injury or damage fall outside the definition of *aircraft accident*

contained in 49 *CFR* 830.2. Incident investigations cover a broad range of events and may include the following:

- Damage to an aircraft that does not occur while passengers are on board.
- Runway incursion.
- Pilot deviation.
- Near midair collision.
- Aircraft malfunction.

When the NTSB conducts a full investigation of an incident, we determine probable cause. We focus on those incidents that involve safety issues of high potential consequence or those of a systemic, recurring nature. An incident investigation may involve investigator travel.

International Investigations

The United States is a signatory to the Chicago Convention on International Civil Aviation, which is administered by ICAO. The NTSB is charged with fulfilling the US obligation for accident and incident investigations in accordance with Annex 13 of this agreement in full coordination with the US Department of State.

The international investigative process is critical to maintaining aviation safety in the United States and throughout the world. When an aircraft operated by—or designed, manufactured, or registered to—a US company has been involved in an accident in a foreign state, NTSB participation in that investigation enables the United States to ensure the airworthiness and operation of its aircraft operated in this country as well as overseas. ICAO Annex 13 protocols also define the agency's engagement with international authorities whose products or operations are involved in accidents within the United States. This international process of collaboration plays an important role in enabling us to identify safety concerns and issue appropriate recommendations. We have issued numerous safety recommendations that have resulted in safety improvements worldwide directly because of our participation in these foreign investigations.

In FY 2019, AS was notified of and assisted on 324 international investigations. Of these, investigators launched or traveled in support of 12 investigations. Several accidents, including these, required significant US involvement:

- On March 10, 2019, Ethiopian Airlines flight 302, a Boeing 737MAX, crashed shortly after takeoff from Addis Ababa Bole International Airport, Addis Ababa, Ethiopia. All 157 passengers and flight crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Ethiopian Civil Aviation Authority. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.

- On December 24, 2018, an Agusta 109S helicopter crashed about 8 minutes after takeoff from a private residence in Puebla, Mexico. The 2 pilots and 3 passengers onboard were fatally injured and the helicopter was destroyed. The accident is being investigated by the Mexican Directorate General of Civil Aviation (DGAC). At the request of the Mexican DGAC and the US State Department, the NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 to support the investigation.

- On November 9, 2018, Fly Jamaica Airways flight 256, a Boeing 757, overran the runway during landing at Georgetown-Cheddi Jagan International Airport, Georgetown, Guyana. Of the 128 passengers and crew onboard, 1 passenger was fatally injured and 5 others received minor injuries; the airplane was substantially damaged. The accident is being investigated by the government of Guyana. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.

- On October 29, 2018, Lion Air flight 610, a Boeing 737MAX, crashed into the sea shortly after takeoff from Jakarta-Soekarno-Hatta International Airport, Jakarta, Indonesia. All 189 passengers and crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Indonesia Komite Nasional Keselamatan Transportasi. The NTSB appointed a US-accredited representative in accordance with ICAO Annex 13 because the United States is the state of manufacture and design of the airplane.

US Comments/Foreign Accident Reports

The NTSB completed comments on behalf of the United States on several international investigations in which the United States had significant involvement under Annex 13, in FY 2019. As a result, the Major Investigations Division provided comments on 21 foreign-led late-draft reports in FY 2019, including these:

Boeing 737MAX
Jakarta, Indonesia
October 29, 2018

On October 29, 2018, Lion Air flight 610, a Boeing 737MAX, crashed into the sea shortly after takeoff from Jakarta-Soekarno-Hatta International Airport, Jakarta, Indonesia. All 189 passengers and crew onboard were fatally injured and the airplane was destroyed. The accident is being investigated by the Indonesia Komite Nasional Keselamatan Transportasi. The NTSB US-accredited representative and technical advisors provided comments on a draft of the report in September 2019; the report was published in October 2019.

Boeing 737, Russia
Rostov-on-Don Airport, Rostov-on-Don, Russia
March 19, 2016

On March 19, 2016, Fly Dubai flight FZ981, a Boeing 737-800, crashed on the runway during a go around. The airplane was destroyed, and all 62 passengers and crew members onboard were fatally injured. The accident was investigated by the Korean Aviation and Railway Accident Investigation Board. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in February 2019. The report was published in November 2019.

Boeing MD-11, South Korea
Incheon International Airport, Incheon, South Korea
June 6, 2016

On June 6, 2016, UPS flight 61, a Boeing MD-11, N77UP, crashed during a high-speed rejected takeoff. The airplane was substantially damaged, and none of the 4 crew members onboard were injured. The accident was investigated by the Korean Aviation and Railway Accident Investigation Board. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in May 2019. The report was published in July 2019.

Boeing 737, Peru
Jauja Airport, Jauja, Peru
March 28, 2017

On March 28, 2017, Peruvian Air Line flight 112, a B737-300, crashed during landing. The airplane was substantially damaged, and none of the 150 passengers and crew members onboard were injured. The accident was investigated by the Peru Comisión de Investigación de Accidentes de Aviación. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in February 2019.

Boeing 737, Cuba
Havana-José Martí International Airport, Havana, Cuba
May 18, 2018

On May 18, 2018, Cubana de Aviación flight 972, a Boeing 737-200, crashed shortly after takeoff. The airplane was destroyed, and 112 of the 113 crew and passengers onboard were fatally injured. The accident was investigated by the Cuba Instituto de Aeronáutica Civil. The NTSB US-accredited representative and technical advisors provided comments on a late draft of the report in March 2019. The report was published in May 2019.

Investigative Hearings

Investigative hearings are public hearings related to investigations in which the agency is authorized to obtain testimony under oath.

CFM International Engine Failure on Southwest Airlines flight 1380, April 17, 2018
Investigative Hearing

November 14, 2018

The one-day hearing focused on CFM International CFM56-7 series engine fan blade design, development, and inspection methods and procedures, as well as engine containment design and certification criteria.

Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations outside of a final report or brief. Safety recommendation reports, which may be issued at any time during an accident investigation, are used to make safety recommendations on such issues. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation is designated "Urgent."

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

These recommendations were derived from our participation in the ongoing investigations of two fatal accidents under the provisions of Annex 13 of the International Civil Aviation Organization. As the accident investigation authority for the state of design and manufacture of the airplane in these accidents, the NTSB has been examining the US design certification process used to approve the original design of the Maneuvering Characteristics Augmentation System (MCAS) on the Boeing Company (Boeing) 737MAX. We note that, since the PT Lion Mentari Airlines (Lion Air) accident on October 29, 2018, Boeing has developed a MCAS software update to provide additional layers of protection and is working on updated procedures and training. However, we are concerned that the process used to evaluate the original design needs improvement because that process is still in use to certify current and future aircraft and system designs.

Recommendations: 7 new
Report Adopted: September 19, 2019

Extended Duration Cockpit Voice Recorders

The NTSB has longstanding concerns about the availability of cockpit voice recorder (CVR) information following events that meet the reporting criteria of 49 *CFR* 830.5 and believes that 25-hour CVRs would be valuable to our investigations. Our ongoing experience with overwritten CVR recordings demonstrates the limitations of the current 2-hour recording requirement, particularly in cases in which relevant data were overwritten because of (1) a delay in reporting a safety event that was not immediately recognized to be of a serious nature until further data review; (2) a failure to immediately deactivate the CVR following arrival after a safety event; or (3) the time remaining in the flight after a

safety event, which exceeded the CVR's 2-hour recording duration. Safety recommendations were issued to the FAA.

Recommendations: 2 new
Report Adopted: October 2, 2018

Safety Alerts

Safety alerts are brief information sheets that pinpoint a specific safety issue. They are primarily used to alert the general aviation community, which may not otherwise be reached through safety recommendations, of safety issues identified during multiple investigations. Safety alerts provide information on the problem, examples of accidents, what pilots can do to avoid making the same mistakes, and references for pilots to find additional information. These alerts are posted on the NTSB website, and brochures are distributed at outreach events that staff attends throughout the year. This fiscal year, AS developed two safety alerts:

Fuel Providers: Prevent DEF Jet Fuel Contamination Diesel exhaust fluid (DEF) is a urea-based chemical that is added to ground vehicle emissions systems to reduce nitrogen oxide emissions. DEF is not designed, nor approved, for use in jet fuel. If it is inadvertently added to jet fuel, as has happened in several incidents over the last two years, DEF will react with certain chemical components to form crystalline deposits in the fuel system. The crystalline deposits can then accumulate on filters, engine fuel nozzles, and fuel metering components and result in a loss of engine power. (Adopted: July 2019)

Stabilized Approaches Lead to Safe Landings Failing to establish and maintain a stabilized approach, or continuing an unstabilized approach, could lead to landing too fast or too far down the runway, potentially resulting in a runway excursion, loss of control, or collision with terrain. Regardless of the type of aircraft, the level of pilot experience, or whether the flight is being conducted under instrument flight rules or visual flight rules, a stabilized approach is key to maintaining control of the aircraft and ensuring a safe landing. (Adopted: March 2019)

Other Efforts and Focus Areas

NTSB Most Wanted List Roundtable: Alaska Part 135 Operations – Charting a Safer Course
September 6, 2019

The NTSB continues to investigate multiple accidents involving Part 135 flight operations in Alaska each year. Since 2008, we have investigated 182 accidents involving fixed-wing scheduled/non-scheduled Part 135 operations in Alaska, resulting in 74 fatalities. Unique terrain conditions, challenging weather, and congested airspace are factors, but the NTSB believes many of these accidents could have been avoided if operators had implemented safety management systems, installed flight data monitoring devices, and ensured that pilots received comprehensive controlled-flight into terrain avoidance training—all the subject of recommendations we have issued in the last few decades. The FAA does not

require Part 135 flight operators to meet the same safety requirements as airlines. If the FAA and industry do not address these safety gaps, we will undoubtedly see more accidents involving the traveling public in Alaska.

Forum Presentation Series: Raise the Bar of Your Safety Culture
NTSB at Experimental Aircraft Association Airventure
July 22-28, 2019

A contingent of NTSB aviation investigators, researchers, recorder specialists, and safety advocates presented and exhibited at one of the general aviation industry's largest aviation air shows in the world. As part of the NTSB Forum Presentation Series, we discussed all the ways general aviation pilots can "Raise the Bar of Your Safety Culture." We teamed up with plane crash survivors who told their stories of survival and lessons learned. Presenters also discussed the latest items on our Most Wanted List that address general aviation safety.

Aviation Report Timeliness Project

AS has initiated the Aviation Report Timeliness Project (ARTP) to improve the efficiency of our regional investigations using structured, data-driven management techniques and the implementation of incremental process changes. The ARTP objective is to streamline existing procedures to improve timeliness while maintaining or improving quality. The team is evaluating our current investigation process using data to identify barriers to timeliness as well as to establish standards and guidance needed for quality reports. Areas of evaluations include case distribution and complexity, scope of investigations, report review, project management, remote workforce management and opportunities, and human capital. By the end of calendar year 2019, the team will develop actionable items that will be implemented in all the regions in FY 2020 and we will monitor the implementation and evaluate the success of these changes.

Unmanned Aircraft Program

AS has continued to expand the two-pronged unmanned aircraft (drones) program. One prong is investigations, which has expanded the knowledge base and investigator training to effectively and comprehensively investigate accidents and incidents involving unmanned aircraft. The other prong is operations, which uses sUAS and advanced photogrammetry and geographic information system (GIS) image processing to document accident sites in support of all modes.

Under investigations, we have issued guidance to investigators on conducting examinations of unmanned aircraft spanning the spectrum of capability, from small quadcopter commercial operations to the latest technology, which includes drone delivery services. For example, AS investigators have been coordinating with Amazon and were aware of their drone delivery operations in advance of Amazon's announcement of their related plans. AS is well prepared to investigate any event involving modern unmanned technology, such as our June 2019 response to the crash of an urban air mobility prototype aircraft in Virginia.

Under operations, we have been supporting accident investigations for over 3 years and reached full operational capability in the fall of 2018 after receiving the authority for aircraft acquisition. The drone flight operations and the associated image processing have provided numerous investigations with greatly improved data that is quick to obtain, more accurate, and easier to visualize. In addition to highly detailed and accurate accident site diagram maps created on-scene, drone-based imagery can improve site safety by allowing investigators to examine hazardous areas from afar, or to aid in the search for missing wreckage without engaging in potentially dangerous foot searches. For example, drone data was used to document the wreckage layout of the Atlas Air B767 crash in Baytown, Texas; to provide a GIS road slope analysis for the Schoharie, New York, limousine accident; and to conduct a full three-dimensional examination of proximity and sightlines on an accident involving a powerline patrol helicopter.

The AS unmanned aircraft program will continue to keep up with this extremely dynamic and explosively growing segment of aviation by investigating significant accidents and incidents and growing in our knowledge of the industry. We will also maintain our leadership position in flight operations by conducting multimodal accident site documentation using drones, and we will continue to train and demonstrate proficiency well beyond FAA requirements by using the training standards established by the leading unmanned aircraft association. The NTSB unmanned aircraft program is a gold standard for government and industry, with staff members serving on numerous safety groups.

Safety Seminar: Inspection Authorization Renewal
March 2, 2019

This seminar provided mechanics the opportunity to renew their inspection authorization and encouraged attendees to analyze and evaluate the information to become more informed mechanics and inspectors. Current NTSB investigators and other staff presented accident case studies involving maintenance issues to provide attendees the opportunity to learn from these often-tragic events. Presentations also addressed current technology and best practices and procedures for mechanics and inspectors.

Safety Seminar: Night Flying
December 15, 2018

This seminar explored the benefits and risks of night flying, some of the causes of night flying accidents, and resources available to the pilot community. NTSB investigators shared how they investigate accidents and the lessons learned from these accident investigations. A guest speaker discussed the operational hazards, physical limitations, and regulations that govern night flying.

Ongoing Significant Aviation Accident and Incident Investigations

Location	Date	Description	Fatalities
Big Grand Cay, Bahamas	7/4/2019	Crash after takeoff	7
Mokuleia, HI	6/21/2019	Crash after takeoff	11
Addison, TX	6/10/2019	Crash after takeoff	10
Ketchikan, AK	5/13/2019	Mid-air collision between air tour planes	6
Jacksonville, FL	5/3/2019	Runway overrun during thunderstorm	0
Trinity Bay, TX	2/23/2019	Cargo airplane loss of control	3
Zaleski, OH	1/29/2019	Helicopter EMS weather encounter	3
Philadelphia, PA	4/17/2018	B737 uncontained engine failure	1
New York, NY	3/11/2018	Helicopter impact with water and rollover	5

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief upon the completion of each investigation.

HIGHWAY SAFETY

	($000s)	FTEs
FY 2020 Estimate	$7,619	29
FY 2021 Request	$8,172	30
Increase/Decrease	$553	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Highway Safety (HS) investigates accidents that have significant safety implications nationwide, highlight national safety issues, involve a large loss of life, or generate high interest because of their circumstances. Such accidents may include collapses of highway/pedestrian bridges or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), and collisions at highway–railroad grade crossings. HS also investigates accidents that involve new safety issues or technologies (such as automated vehicles and alternatively fueled vehicles) and develops special reports based on trends emerging from NTSB investigations and from research and data that identify common risks or underlying causes of crashes, injuries, and fatalities.

The NTSB is the only organization that performs independent, comprehensive, and transparent multidisciplinary investigations to determine the probable causes of highway accidents, with the goal of making recommendations to prevent similar accidents. Our investigations result in recommendations that, if implemented, reduce or eliminate the risks identified in the investigations and provide policymakers with unbiased analysis.

HS comprises the Investigations Division and the Report Development Division.

Investigations Division

The HS Investigations Division manages the multidisciplinary go-teams launched to accident sites to collect the factual, and develop the analytical, information for investigations. Currently, major HS accident investigations are conducted by one of three teams, with six investigators on each team: an IIC and five other investigators with expertise in vehicle, highway, human performance, survival, and motor carrier factors. The teams are supported by a crash reconstructionist and a National Resource specialist, for a

total of 20 investigators. To enhance geographic coverage and reduce response time, team members are located throughout the country, including in California, Colorado, Delaware, Oregon, South Carolina, Tennessee, Texas, Washington, and Washington, DC.

HS staff is augmented by personnel from other NTSB offices who provide expertise in vehicle simulations, medical issues, occupant protection, fire science, metallurgy/materials, hazardous materials, statistical data analysis, video analysis, communications (accident notification), public/government/family affairs, legal issues, and recommendation follow-up.

Report Development Division

The HS Report Development Division manages the development of accident investigation reports. Project managers and technical writer-editors review the contents of the docket provided by the investigators for accuracy and completeness; research, analyze, and develop national highway safety issues based on this investigative information; and write and edit the report. This division is also responsible for managing investigative hearings and forums on national highway safety issues.

Accomplishments and Ongoing Efforts

This office's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

School Bus Run-Off-Road and Fire
Oakland, Iowa
December 12, 2017

On the morning of December 12, 2017, around 6:50 a.m. local time, a school bus operated by the Riverside Community School District backed into a ditch on a rural road outside Oakland, Iowa, after picking up its first passenger, a 16-year-old female student. While the driver tried to drive the bus out of the ditch, a fire began in the engine compartment and spread throughout the bus. The driver and passenger died in the fire.

The NTSB determined that the probable cause of the of the fatal school bus run-off-road and fire in Oakland, Iowa, was (1) the driver's failure to control the bus, backing it into a roadside ditch for reasons that could not be established; and (2) the failure of the Riverside Community School District to provide adequate oversight by allowing a driver to operate a school bus with a known physical impairment that limited his ability to perform emergency duties. The probable cause of the fire was ignition of a fuel source on the exterior of the engine's turbocharger due to turbocharger overload and heat production,

resulting from the blockage of the exhaust pipe by the bus's position in the ditch and the driver's attempts to accelerate out of the ditch. Contributing to the severity of the fire was the spread of flames, heat, and toxic gases from the engine into the passenger compartment through an incomplete firewall.

Safety issues addressed included school bus driver fitness for duty, school bus fire safety, and school bus emergency training.

As a result of the investigation, the NTSB made safety recommendations to the USDOT; the NHTSA; 44 states (including Iowa), the District of Columbia, and the territory of Puerto Rico; the state of Iowa; the Riverside Community School District; the National Association of State Directors of Pupil Transportation Services, the National Association for Pupil Transportation, and the National School Transportation Association; and school bus manufacturers Blue Bird Corporation, Collins Industries, Inc., IC Bus, Starcraft Bus, Thomas Built Buses, Inc., Trans Tech, and Van-Con, Inc. The report also reiterates one recommendation to NHTSA and reclassifies a previously issued recommendation to the three school transportation associations.

Recommendations: 10 new, 1 reiterated
Report Adopted: June 18, 2019

Motorcoach Run-Off-the-Road and Overturn
Laredo, Texas
May 14, 2016

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, and, as it moved through the curve, it drifted from its lane to the left. The driver reacted by steering to the right and applying the brakes, which resulted in a loss of control; the vehicle slid and yawed clockwise, departed the right side of the highway, entered the earthen right-of-way, and overturned onto its left side. Nine passengers died, 36 passengers experienced minor-to-serious injuries, and the motorcoach driver and trip coordinator suffered minor injuries. The injury severity for five passengers could not be determined.

The NTSB determined that the probable cause of the crash was the driver's failure to maintain the motorcoach fully within the northbound travel lane, due to a combination of fatigue from an acute sleep deficit and blurred distance vision due to hyperglycemia resulting from poorly controlled diabetes; then, as the motorcoach drifted left from the travel lane, the driver abruptly steered to the right and braked, causing the vehicle to leave the highway and roll over. Contributing to the driver's inability to regain control of the motorcoach was the low friction value of the wet pavement and the inoperable antilock braking system. Contributing to the severity of the passenger injuries was the failure of the left side passenger windows to keep passengers within the motorcoach.

The crash investigation focused on safety issues addressing inadequate federal oversight and guidance for commercial drivers with diabetes treated without insulin, inaccurate and

incomplete highway maintenance recordkeeping by the Texas DOT , the need for improved training for the department's maintenance workers to ensure that roadway maintenance operations result in acceptable levels of surface friction, and the need for increased motorcoach crashworthiness through improvements to window glazing and retention.

New safety recommendations were issued to the Federal Motor Carrier Safety Administration (FMCSA) and the Texas Department of Transportation. Safety recommendations were reiterated to the Federal Motor Carrier Safety Administration and the NHTSA.

Recommendations: 5 new, 3 reiterated
Report Adopted: November 7, 2018

Pickup Truck Centerline Crossover Collision With Medium-Size Bus on US Highway 83
Concan, Texas
March 29, 2017

On March 29, 2017, about 12:20 p.m. local time, a 2007 Dodge Ram 3500 pickup truck, occupied by a 20-year-old driver, was traveling north on US Highway 83, near Concan, Texas, when it crossed into the southbound lane and collided with a medium-size bus. The crash occurred near milepost 553.4, near the end of a right-hand curve. The 2004 Ford E350 Turtle Top Van Terra medium-size bus was occupied by a 66-year-old driver and 13 passengers and operated by the First Baptist Church of New Braunfels, Texas. As a result of the crash, the bus driver and 12 passengers were fatally injured. The driver of the truck and one bus passenger were seriously injured.

The NTSB determined that the probable cause of the crash was the failure of the pickup truck driver to control his vehicle due to impairment from his use of marijuana in combination with misuse of a prescribed medication, clonazepam. Contributing to the severity of the injuries was the insufficient occupant protection provided by the lap belts worn by passengers seated in the rear of the medium-size bus.

The key safety issues addressed during this investigation included drug-impaired driving and medium-size bus seat belts systems.

The NTSB made new safety recommendations to NHTSA, the state of Texas, the Texas Department of Transportation, several medium-size bus manufacturers, and two seat manufacturers. The NTSB also reiterated one safety recommendation to NHTSA.

Recommendations: 8 new, 1 reiterated
Report Adopted: October 16, 2018

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These

briefs may be adopted by the Office Director under delegated authority or may be adopted by the Board.

Rear-End Collision Between a Car Operating with Advanced Driver Assistance Systems and a Stationary Fire Truck
Culver City, California
January 22, 2018

On January 22, 2018 at about 8:40 a.m. local time, a 2014 Tesla Model S P85 car was traveling in the high-occupancy vehicle (HOV) lane of southbound I-405 in Culver City, California. The Tesla was behind another vehicle. Because of a collision in the northbound freeway lanes that had happened about 25 minutes earlier, a California Highway Patrol (CHP) vehicle was parked on the left shoulder of southbound I-405, and a Culver City Fire Department truck was parked diagonally across the southbound HOV lane. The emergency lights were active on both the CHP vehicle and the fire truck. When the vehicle ahead of the Tesla changed lanes to the right to go around the fire truck, the Tesla remained in the HOV lane, accelerated, and struck the rear of the fire truck at a recorded speed of about 31 miles per hour (mph). At the time of the crash, the fire truck was unoccupied. The Tesla driver did not report any injuries. The car was equipped with advanced driver assistance systems (ADAS), including Autopilot. Based on the driver's statements and on performance data downloaded from the car after the crash, the Autopilot was engaged at the time of the collision.

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

The safety issues addressed during this investigation included overreliance on vehicle automation and collision avoidance.

Recommendations: None
Brief Adopted: August 22, 2019

Low-Speed Collision Between Truck-Tractor and Autonomous Shuttle
Las Vegas, Nevada
November 8, 2017

On November 8, 2017, at about 12:07 p.m. local time, a minor collision occurred on South 6th Street in downtown Las Vegas, Clark County, Nevada, between a truck-tractor combination vehicle, operated by a 48-year-old driver, and a 2017 Navya Arma autonomous shuttle, carrying 7 passengers and a 38-year-old attendant. None of the vehicle occupants were injured in the crash. The shuttle, manufactured by Navya and operated by Keolis North America, was on a 0.6-mile designated loop beginning and ending at a downtown shopping center known as Container Park (the buildings are repurposed shipping containers or modular cubes). The combination vehicle, a 2006 International

truck-tractor pulling a 2010 Utility refrigerated trailer, was backing into an alley west of South 6th Street while on a delivery route for US Foods when it struck the shuttle.

The NTSB determined that the probable cause of the collision between the truck-tractor and the autonomously operated shuttle in Las Vegas, Nevada, was the truck driver's action of backing into an alley, and his expectation that the shuttle would stop at a sufficient distance from his vehicle to allow him to complete his backup maneuver. Contributing to the cause of the collision was the attendant's inability to take manual control of the vehicle in an emergency.

The safety issues addressed during this investigation included truck driver licensing and experience, visibility and driver expectations, and autonomous shuttle operation.

Recommendations: None
Brief Adopted: July 8, 2019

Motorcoach Roadway Departure and Crash into Ravine
Loxley, Alabama
March 12, 2018

About 5:28 a.m. local time on March 13, 2018, a 2018 Prevost 56-passenger motorcoach, occupied by a 65-year-old male driver and 46 passengers, was traveling westbound on Interstate 10 (I-10), a four-lane highway divided by an earthen center median at the crash location in Baldwin County near Loxley, Alabama. The motorcoach was one of a two-coach chartered tour operated by First Class Tours & Charters of Houston, Texas, transporting students from Channelview High School to Houston following a trip to Disney World in Orlando, Florida. The crash event began when the 2018 Prevost motorcoach departed the westbound lanes, crossed the center median, and traveled across the two opposing eastbound travel lanes and onto the shoulder, striking the guardrail adjacent to the south shoulder of the roadway. The guardrail redirected the motorcoach, which then crossed the eastbound travel lanes in the opposite direction, returning to the center median. While traveling in the median the motorcoach fell into a ravine, which was spanned by two separate bridges for the eastbound and westbound I-10 roadways. At the bottom of the ravine, the motorcoach came to rest on its passenger side with its roof wedged against a vertical bridge support. As a result of the crash, the motorcoach driver received fatal injuries, and all 46 motorcoach passengers were injured; 15 passengers sustained serious injuries and 31 passengers sustained minor injuries.

The NTSB determined that the probable cause of the crash was the incapacitation of the driver due to an unknown medical event.

Recommendations: None
Brief Adopted: May 10, 2019

Motorcycle and Pickup Truck Crash During "Toy Run" Group Ride
Augusta, Maine
September 10, 2017

About noon local time on September 10, 2017, an estimated 3,000 motorcyclists gathered at the Augusta Civic Center in Augusta, Kennebec County, Maine, to participate in the 36th annual United Bikers of Maine (UBM) Toy Run, a charity event in which motorcyclists join in a group ride, bringing a toy to the gathering. About 12:05 p.m., a 2007 Harley-Davidson XL 1200 motorcycle participating in the group ride suddenly moved out of the right lane, traveled across the center lane, and entered the left lane in front of a 2008 Ford F250 pickup truck traveling north on I-95 occupied by a 67-year-old male driver and a 99-year-old female passenger. The motorcycle was carrying a 25-year-old male operator and a 26-year-old female passenger. Based on skid mark evidence, the pickup truck driver attempted an evasive maneuver but collided with the motorcycle, losing control of his vehicle, in part because the pickup truck had "collected" the Harley-Davidson XL 1200 motorcycle, causing the pickup truck to rotate clockwise. The pickup truck veered out of the left lane to the right and traveled across the center and right northbound lanes, striking four other motorcycles. The pickup truck then went through the right guardrail, overturned, and came to rest on its passenger side. The 2007 Harley-Davidson motorcycle traveled through the guardrail and came to rest on its right side in a ditch beside the pickup truck. As a result of the crash, two motorcyclists died. One motorcyclist and the pickup truck passenger received serious injuries. The pickup truck driver and four motorcyclists received minor injuries.

The NTSB determined that the probable cause of the crash was the motorcycle operator's unsafe maneuver in moving in front of the pickup truck. Contributing to this crash was the failure of the city of Augusta Police Department and the Toy Run event organizer, UBM, to identify and mitigate the risks associated with routing a group ride onto an interstate without providing supplemental traffic control or state police oversight.

The key safety issue identified was the safe planning for the routing of special events on streets and highways.

Two new recommendations were issued to the city of Augusta, Maine, and the UBM.

Recommendations: 2 new
Report Adopted: April 3, 2019

Collision Between Passenger Train and Refuse Truck at Active Grade Crossing
Crozet, Virginia
January 31, 2018

On January 31, 2018, about 11:16 a.m. local time, a 2018 Freightliner refuse truck operated by Time Disposal, LLC, was traveling south on Lane town Road near Crozet, Virginia. The truck was occupied by a 30-year-old driver and two passengers, who were en route to help another crew collect refuse. The truck's route required traversing a highway–railroad grade crossing on Lanetown Road, at railroad milepost 195.85 of the Buckingham Branch

Railroad. The grade crossing is located on a curved segment of the track and is equipped with an active warning system consisting of flashing warning lights, bells, and gate arms that lower at a train's approach. The crash resulted in the death of one truck passenger, serious injuries to the second passenger, and minor injuries to the truck driver. Four train crew members and three train passengers sustained minor injuries.

The NTSB determined that the probable cause of the crash was the truck driver's decision to enter an active grade crossing and his inaction when he encountered obstacles while attempting to cross the railroad tracks, most likely due to his impairment from the combined effects of the drugs marijuana and gabapentin. Contributing to the severity of the injuries was the lack of seat belt use by the truck occupants.

Recommendations: None
Brief Adopted: March 11, 2019

Intersection Collision and Rollover Involving School Bus and Pickup Truck
Helena, Montana
November 27, 2017

About 7:13 a.m. local time on November 27, 2017, a 2011 Chevrolet Express 12-passenger school bus, equipped with passenger lap/shoulder belts and operated by First Student, Inc., was traveling east on John G. Mine Road, near Helena, Montana, when the driver stopped at Green Meadow Drive before proceeding into the intersection, where the bus was struck by a 1998 Dodge Ram 1500 pickup truck. The bus was occupied by the driver, an adult aide, and two student passengers. The pickup truck—occupied by the driver and one passenger—was towing a flatbed equipment trailer and traveling south on Green Meadow Drive, on which traffic was not controlled by a stop sign. All vehicle occupants transported themselves to medical facilities, where four persons were treated for minor injuries. The pickup truck driver and one additional bus occupant complained of minor pain, but no records of treatment were found.

The NTSB determined that the probable cause of the collision was the bus driver's failure to see the pickup truck, which was approaching the intersection, and the acceleration of the bus into the intersection in front of the pickup truck. The use of passenger lap/shoulder belts mitigated the severity of injuries to the school bus occupants.

The report addressed school bus passenger lap/shoulder belt use and evacuation.

Recommendations: None
Brief Adopted: February 13, 2019

Intersection Collision Involving Motorcoach and Transit Bus
Flushing, New York
September 18, 2017

On September 18, 2017, about 6:16 a.m. local time, a 2015 Motor Coach Industries 56-passenger motorcoach, operated by Dahlia Group Inc. and occupied only by the driver,

collided with a 2015 New Flyer 35-passenger transit bus, operated by the New York City Transit (NYCT) Authority and occupied by the driver and 16 passengers, in Flushing, New York. The crash occurred at the intersection of Northern Boulevard (New York State Route 25A) and Main Street, about 0.8 mile from the motorcoach carrier's base of operations. The motorcoach was traveling 60–61 mph when it struck the left rear side of the transit bus, causing the transit bus to rotate 120 degrees counterclockwise and then strike two cars parked along the right curb of Northern Boulevard. One of the parked vehicles was unoccupied; the other was occupied by a driver and a front passenger. The motorcoach then departed the south side of Northern Boulevard; crossed over the sidewalk; and struck a building on the southeast corner of the intersection, where it came to rest. Three pedestrians were on the sidewalk at the time of the collision, one of whom ran out of the way. The motorcoach driver, one passenger on the transit bus, and one pedestrian died. The transit bus driver and five bus passengers were seriously injured, and 10 bus passengers received minor or no injuries. One pedestrian and the two occupants of the parked car were also injured.

The NTSB determined that the probable cause of the crash was the driver's unintended acceleration of the motorcoach and inability to brake for reasons that could not be conclusively determined from the information available.

Recommendations: None
Brief Adopted: February 11, 2019

Fatal Pedestrian Collision with Minivan
Thief River Falls, Minnesota
October 6, 2016

About 7:00 a.m. local time on October 6, 2016, a school bus was coming to a stop southbound on State Highway 59 about 10 miles south of Thief River Falls, Pennington County, Minnesota. The bus was occupied by the driver and about 12 student passengers, who were on their way to Challenger Elementary School in Thief River Falls. The bus had been traveling north, but the driver missed a scheduled stop and turned around to pick up a 7-year-old boy and his two siblings (ages 13 and 11) who were waiting on the east side of the highway (ordinarily, the boarding side for their bus). At the same time, a 69-year-old female was driving a minivan north on the highway. As the school bus was coming to a stop and activating its flashing yellow lights, the 7-year-old started across the highway toward the bus and crossed in front of the minivan, which struck him. The pedestrian was fatally injured. The minivan driver and the pedestrian's two siblings were not injured.

The NTSB determined that the probable cause of the crash was a combination of the pedestrian running across the highway travel lane in the path of the oncoming minivan; the minivan driver's speed; and the low-light conditions, which would have limited the minivan driver's ability to see the pedestrian. Further contributing to the crash was the bus driver's failure to pick the students up at their designated stop.

Pedestrian safety and conspicuity were safety issues addressed in this report.

One new safety recommendation was issued to the NHTSA.

Recommendations: 1 new
Brief Adopted: October 17, 2018

Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations outside of a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation is designated "Urgent."

Providing Occupant Protection for Limousine Passengers

The NTSB is investigating a collision involving a 2001 Ford Excursion stretch limousine, a 2015 Toyota Highlander sport utility vehicle (SUV), and two pedestrians that occurred in Schoharie, New York, on October 6, 2018. The limo driver, all 17 limo passengers, and two pedestrians received fatal injuries in the crash. In the course of our investigation, we have identified safety issues related to occupant protection, including the integrity of limousine seat and seat belt systems and the accessibility and use of seat belts by limousine passengers.

The NTSB will issue a final accident report at the completion of the Schoharie investigation, which will include the probable cause of the crash.

The key safety issue addressed in this safety recommendation report concerns occupant protection for limousine passengers. As a result of the investigation, the NTSB made safety recommendations to the NHTSA, to the New York State Department of Transportation, and to the National Limousine Association. In addition, the NTSB reiterated one recommendation to the state of New York.

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

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

The NTSB is investigating a fatal collision between a (SUV) and a previously damaged and nonoperational crash attenuator in Mountain View, California, on March 23, 2018. The driver and only occupant of the SUV was fatally injured in the crash. In the course of the investigation, we identified systemic problems within the California Department of Transportation that negatively affect the timely repair of traffic safety hardware.

The NTSB will issue a final accident report at the completion of the Mountain View investigation, which will include the probable cause of the crash.

The key safety issue addressed in this safety recommendation report concerns the timely repair of traffic safety hardware in California.

As a result of the investigation, the NTSB made one safety recommendation to the California State Transportation Agency.

Recommendations: 1 new
Report Adopted: August 12, 2019

Other Efforts and Focus Areas

Automated Vehicle Technologies

Automated vehicle systems and ADAS are on the nation's roadways today. We are investigating a variety of crashes to better understand these systems, their capabilities, and the associated data recorded during a crash. Further, we are focusing on developing staff for the complexity of automated vehicle technologies. In addition, we are working to enhance staff's technical capabilities to analyze systems data collected from automated vehicles.

Alternatively Fueled Vehicles

Electric vehicles, hydrogen fueled vehicles, and hybrid vehicles all operate on our roadways. These pose challenges to emergency responders and tow operators when a postcrash fire ensues. A greater understanding of these advanced systems is critical to transportation safety. The NTSB is focusing effort on investigating multiple electric vehicle crashes that have resulted in postcrash fires. The NTSB is further exploring recommendations to improve the outcome for these unique scenarios.

Ongoing Significant Highway Accident Investigations

Location	Date	Description	Fatalities
Bryce Canyon City, UT	9/20/2019	A medium size bus departed the roadway and as the driver attempted to regain control the vehicle rolled over.	4
SeaTac, WA	7/25/2019	A BMW passenger car crossed over a raised median and collided with a shuttle bus traveling in the opposite direction.	1

Location	Date	Description	Fatalities
Randolph, NH	6/21/2019	A pick-up truck towing a trailer collided with a group of motorcyclists on a two-lane highway.	7
Scooba, MS	6/3/2019	A box truck and a 15-passenger van traveling on a two-lane state highway each crossed the centerline and collided.	8
Delray Beach, FL	3/1/2019	A Tesla passenger vehicle collided with a combination vehicle at an intersection. The driver of the Tesla was killed as a result of the crash.	1
Alachua (Gainesville), FL	1/3/2019	A truck tractor crossed the center median of Interstate 75 and collided with a church van and another combination vehicle. Both CMV drivers and five occupants of the church van were fatally injured.	7
Rochester, IN	10/30/2018	Four children crossing a high-speed roadway to board a school bus were struck by a pickup truck. Three of the children died as a result of the collision.	3
Schoharie, NY	10/6/2018	A limousine occupied by a driver and 17-passengers drove through a T-intersection and collided with a parked car in a parking lot. Two pedestrians and all 18 occupants in the limousine were killed.	20
Thoreau, NM	8/30/2018	An eastbound truck tractor crossed the center median of Interstate 40 and collided with a motorcoach on the westbound side of the highway. Five occupants of the motor coach were fatally injured.	5
Boise, ID	6/16/2018	Multi-vehicle crash in a highway work-zone resulting in 4 fatalities.	4
Fort Lauderdale, FL	05/08/2018	An electric powered passenger car crashed into a wall resulting in a postcrash fire.	2
Mountain View, CA	3/23/2018	Following a crash into a previously damaged crash attenuator, an electric vehicle caught fire.	1
Tempe, AZ	3/18/2018	An Uber Technologies, Inc. test vehicle, based on a modified 2017 Volvo XC90 and operating with a self-driving system in computer control mode, struck a pedestrian.	1
Miami, FL	3/15/2018	An elevated pedestrian walkway collapsed onto several vehicles resulting in fatalities and injuries to vehicle occupants.	6

Location	Date	Description	Fatalities
Elmhurst, IL	3/1/2018	Six vehicles at the end of a traffic queue were struck from behind by a combination vehicle.	1
East Penn, PA	2/21/2018	A section of electrical conduit broke away from the ceiling of the Lehigh Tunnel in Washington Twp., PA, striking a combination vehicle and fatally injuring the driver.	1

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

MARINE SAFETY

	($000s)	FTEs
FY 2020 Estimate	$5,240	20
FY 2021 Request	$5,426	20
Increase/Decrease	$186	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The Office of Marine Safety (MS) investigates and determines the probable cause of major marine casualties in US territorial waters, major marine casualties involving US-flagged vessels worldwide, and accidents involving both US public (federal) and nonpublic vessels in the same casualty. In addition, the office investigates select catastrophic marine accidents and those of a recurring nature.

The Coast Guard conducts preliminary investigations of all marine accidents and notifies the NTSB when an accident qualifies as a major marine casualty, which includes any one of the following:

- The loss of six or more lives.
- The loss of a mechanically propelled vessel of 100 or more gross tons.
- Property damage initially estimated to be $500,000 or more.
- A serious threat, as determined by the Commandant of the Coast Guard and concurred in by the NTSB Chairman, to life, property, or the environment by hazardous materials.

For select major marine casualties, MS launches a full investigative team and presents the investigative product to the Board. For all other major marine casualties, the office launches a field team of marine investigators to the scene to gather information to develop a marine accident brief. Most of these brief investigation reports are issued by the MS Director through delegated authority; briefs involving public/nonpublic marine accidents and those briefs that result in safety recommendations are adopted by the Board.

MS is also responsible for the overall management of the NTSB's international marine safety program, under which the office investigates major marine casualties involving foreign-flagged vessels in US territorial waters and those involving US-flagged vessels anywhere in the world. Accidents involving foreign-flagged vessels accounted for 29 percent of NTSB marine accident investigations over the past 5 years. Under the International Maritime Organization (IMO) *Code of International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident* (Casualty Investigation Code), MS also participates with the Coast Guard as a substantially interested State in investigations of serious marine casualties involving foreign-flagged vessels in international waters. For example, the NTSB often participates in accident investigations that involve foreign-flagged cruise ships with US citizens on board. Every year, about 12 million US citizens travel on board these ships.

The MS international program involves reviewing US administration position papers related to marine accident investigations and participating in select IMO sub-committee meetings. During the past year, MS staff attended IMO meetings covering such topics as the review and classification of maritime accidents and accident reporting, the certification and training of mariners, ship design standards, and the technical standards and requirements for voyage data recorders.

As part of the international program, MS coordinates with other US and foreign agencies to ensure consistency with IMO conventions, most notably for joint US/flag-state marine accident investigations. MS also cooperates with other accident investigation organizations worldwide, such as the Marine Accident Investigators' International Forum (MAIIF), and tracks developments related to marine accident investigations and prevention.

The NTSB is the only federal organization that performs independent, comprehensive, and transparent multidisciplinary investigations to determine the probable cause of marine accidents, with the goal of making safety recommendations to prevent similar accidents. The thoroughness and independence of our investigations maintain public confidence in marine transportation systems and provide policymakers with unbiased analysis.

MS comprises the Office of the Director (Director, Deputy Director, Program Management Officer, and Administrative Officer), the Marine Investigations Division, and the Product Development Division.

Marine Investigations Division

The Marine Investigations Division manages the multidisciplinary go-teams that launch to accident sites, collect information, and analyze collected information to determine probable cause. The division is managed by a Division Chief and Deputy Division Chief. Currently, major accident investigations are conducted by one of two teams with either five or six investigators on each team. Each team is led by an IIC and includes subject-matter experts in nautical operations, marine engineering and naval architecture, survival factors, and human performance.

Product Development Division

The Product Development Division administers the investigative quality management program. The division consists of a chief and technical writer-editors who are responsible for drafting and editing major marine accident reports, marine accident brief reports, safety recommendation reports, special investigation reports, the *Safer Seas Digest* publication, responses to notices of proposed rulemaking, and general correspondence. Staff also reviews the contents of the accident dockets provided by investigative specialists.

Accomplishments and Ongoing Efforts

This office's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below together with information on other efforts and focus areas important to both the current and future mission of the agency.

Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Collision between US Navy Destroyer *John S McCain* and Tanker *Alnic MC*
Singapore Strait, 5 Miles Northeast of Horsburgh Lighthouse, Republic of Singapore
August 21, 2017

On August 21, 2017, the US Navy destroyer *John S McCain* was overtaking the Liberian-flagged tanker *Alnic MC* while both vessels were transiting the westbound lane in the Middle Channel passage of the Singapore Strait Traffic Separation Scheme. The destroyer's crew had a perceived loss of steering, and, while the crew attempted to regain control of the vessel, the *John S McCain* unintentionally turned to port into the path of the *Alnic MC*. At 5:24 a.m. local time, the vessels collided. As a result of the collision, 10 sailors on the *John S McCain* died, 48 were injured, and the vessel sustained over $100 million in damage. No one was injured on the *Alnic MC*, and the vessel sustained about $225,000 in damage. There was no report of pollution.

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

Safety issues identified in this accident include the following: the decision to transfer the location of thrust control on board the *John S McCain* while the vessel was in a congested

waterway, the lack of very high frequency radio communications between the vessels, the automatic identification system data transmission policy for Navy vessels, the procedures for the transfers of steering and thrust control on board the *John S McCain,* the training of Navy bridge watchstanders, the design of the destroyer's Integrated Bridge and Navigation System, Navy watchstanders' fatigue, and Navy oversight of the *John S McCain.*

As a result of this investigation, the NTSB makes new recommendations to the US Navy.

Recommendations: 7 new
Report Adopted: June 19, 2019

Fire On Board US Small Passenger Vessel *Island Lady*
Pithlachascotee River Near Port Richey, Florida
January 14, 2018

About 4:00 p.m. local time on the afternoon of January 14, 2018, a fire broke out in an unmanned space on the US-flagged small passenger vessel *Island Lady* near Port Richey, Florida, during a scheduled transit to a casino boat located about 9 miles offshore in the Gulf of Mexico. Fifty-three people were on board the *Island Lady*.

After receiving a high-temperature alarm on the port engine, the captain turned the *Island Lady* around to return to the dock. During the return trip, smoke began filling the lazarette, main deck, and engine room. The captain deliberately beached the vessel in shallow water near shore to evacuate the passengers. All crewmembers, employees, and passengers evacuated the vessel by entering the water and wading/crawling ashore. Fifteen people were injured and transported to local hospitals; one passenger died in the hospital several hours after the fire. The *Island Lady*, valued at $450,000, was declared a constructive total loss.

The NTSB determined that the probable cause of the fire was Tropical Breeze Casino Cruz's ineffective preventive maintenance program and insufficient guidance regarding the response to engine high-temperature conditions, which resulted in the captain's continued operation of an engine that was overheating due to a cooling water pump failure, leading to ignition of the exhaust tubing and surrounding structure. Contributing to the spread of the fire was the lack of fire detection in the vessel's lazarette, which was not required by regulations and which allowed the fire to take hold without the crew's knowledge.

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- Lack of company guidance regarding engine high-temperature alarms
- Lack of fire detection in unmanned spaces with exhaust tubing
- Insufficient preventive maintenance
- Insufficient crew training and documentation

- Inappropriate material and design of fuel tank level-indicator system

On the basis of its findings, the NTSB issued new safety recommendations to Tropical Breeze Casino Cruz LLC and the Coast Guard. Also, the NTSB reiterated safety recommendations to the Coast Guard.

Recommendations: 4 new, 2 reiterated
Report Adopted: December 11, 2018

Accident Briefs

Investigations resulting in accident briefs are more limited in scope than those leading to major accident reports and have the primary purpose of determining probable cause. These briefs may be issued by the office director under delegated authority or may be adopted by the Board. This report details 8 of the 33 briefs completed in FY 2019.

NTSB Lead Investigations of Public/Non-public Marine Casualties (Board Adopted) (Accidents involving Coast Guard; Navy and/or Army Corps of Engineers vessels with private vessels)

Barge Breakaway and Contact with the Emsworth Locks and Dams
Ohio River, mile 6.2, Emsworth, Pennsylvania
January 13, 2018

On January 13, 2018, at 6:30 a.m. local time, 27 dry cargo barges broke free from the Jacks Run barge fleeting area at mile 4 on the right descending bank of the Ohio River near Pittsburgh, Pennsylvania. The barges drifted uncontrolled downriver and, beginning at 7:12 a.m., struck the dams at the US Army Corps of Engineers Emsworth Locks and Dams complex, located at mile 6.2. Two Corps of Engineers workboats moored at the foot of the dam were also struck and driven into one of the dam's concrete piers, causing significant damage to both vessels. Nine barges and the Army workboats were declared constructive total losses in the accident. Total damage exceeded $12.5 million.

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

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- The breakaway of the barges occurred when the force of the river current acting on the extensive ice buildup at the front of the barge flotilla exceeded the capacity of the fleeting area's mooring cell fittings and the barge mooring wires.

- Poor maintenance of the mooring cells and shoaling in the fleeting area prevented the towing vessel crews from establishing a suitable mooring arrangement for the barge fleet, which resulted in a failure of the moorings during highwater and ice conditions.
- Neither the owner, the Allegheny County Sanitary Authority, nor the operator, Industry Terminal and Salvage Company, of the Jacks Run fleeting area was adequately maintaining the facility and its moorings.
- Had the Pittsburgh area had a regulated navigation area with condition-based mooring requirements similar to those of the Mississippi River and Gulf Intracoastal Waterway regulated navigation areas, it is likely that the poor condition of the Jacks Run mooring cells would have been discovered and addressed.

As a result of its investigation, the NTSB issued new recommendations to the Coast Guard and the US Army Corps of Engineers.

Recommendations: 4 new
Brief Adopted: May 17, 2019

Board-Adopted Brief – NTSB participated in USCG Marine Board of Investigation (MBI) Public Hearing

Explosion and Fire aboard Articulated Tug and Barge *Buster Bouchard/B. No. 255*
Port Aransas, Aransas Pass Fairway, Anchorage, Texas
October 20, 2017

On October 20, 2017, at 4:30 a.m. local time, the crews of the articulated tug and barge *Buster Bouchard/B. No. 255* were preparing to get under way from anchorage to proceed into the Port of Corpus Christi, Texas, when an explosion and subsequent fire occurred on the bow of the barge. Two barge crewmembers who were on the bow were killed in the explosion. The fire was extinguished about 11:00 a.m. Approximately 2,000 barrels (84,000 gallons) of crude oil were released from the barge into the water or were consumed in the fire. The barge sustained over $5 million in damage and was scrapped after the accident. There was no damage to the tugboat.

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

From its investigation of this accident, the NTSB identified safety issues in the following areas:

- Bouchard Transportation's safety management and maintenance processes failed to ensure proper maintenance of the company's fleet of barges, including *B No. 255.*

- Bouchard Transportation management failed to promote and ensure a safety culture in the company, which compromised the safety of both the vessel and crew.
- Coast Guard marine inspectors who examined the *B. No 255* prior to the accident failed to identify unsafe conditions, which allowed the vessel to continue to operate at increased risk to the crews, the environment, and port facilities.
- The American Bureau of Shipping's survey program was ineffective in ensuring the safety of barge *B No. 255* and its crew.
- The lack of communications between the American Bureau of Shipping and the Coast Guard limited each organization's ability to assess the overall condition of *B No. 255* and identify hazardous conditions.

As a result of its investigation the NTSB issued new safety recommendations to Bouchard Transportation Company Inc., the Coast Guard, and the American Bureau of Shipping.

Recommendations: 3 new
Brief Adopted: April 18, 2019

Briefs Issued by the Office Director Under Delegated Authority

Pipeline Breach and Subsequent Fire aboard Cutter Suction Dredge *Jonathon King Boyd* and Towboat *Bayou Chevron*, Matagorda Bay, Texas
April 17, 2018

On the evening of April 17, 2018, the cutter suction dredge *Jonathon King Boyd* punctured a submarine natural gas pipeline with a spud during dredging operations in Matagorda Bay, Texas. A gas plume ignited and engulfed the dredge and its accompanying towboat, the *Bayou Chevron*. All 10 crewmembers abandoned the vessels uninjured. Damage to the pipeline was estimated at $1.7 million. The *Jonathon King Boyd* and the *Bayou Chevron* were constructive total losses, valued at $5.5 million and $125,000 respectively.

The NTSB determined that the probable cause of the fire aboard the cutter suction dredge *Jonathon King Boyd* was RLB Contracting's failure to inform the crew about utilities in the area due to ineffective oversight, which led to a spud being dropped onto a buried submarine pipeline, causing natural gas to release and ignite.

Recommendations: None
Brief Adopted: July 16, 2019

Anchor Contact of Articulated Tug and Barge *Clyde S VanEnkevort / Erie Trader* with Underwater Cables and Pipelines
Straits of Mackinac, about 2 miles west of Mackinac Bridge, Michigan
April 1, 2018

At 5:32 p.m. local time on April 1, 2018, the articulated tug and barge *Clyde S VanEnkevort/ Erie Trader* was westbound with a crew of 14 in the Straits of

Mackinac, Michigan, when the barge's starboard anchor, which had released and was dragging on the bottom, struck and damaged three underwater electrical transmission cables and two oil pipelines. About 800 gallons of dielectric mineral oil leaked into the water from the cables; the oil pipelines sustained only superficial damage. Repair and replacement of the cables was estimated at more than $100 million. No injuries were reported.

The NTSB determined that the probable cause of the accident with underwater electricity transmission cables and oil pipelines was the failure of the anchor detail to secure the barge's starboard anchor and the improper adjustment of the anchor brake band after the engineering crew replaced the brake liner, the combination of which allowed the anchor and chain to pay out under way.

Recommendations: None
Brief Adopted: May 21, 2019

Engine Room Fire on Board Towing Vessel *Leland Speakes*
Greenville, Mississippi, at Mile Marker 520.6 Lower Mississippi River
February 21, 2018

On February 21, 2018, at 7:40 a.m. local time, the towing vessel *Leland Speakes* was pushing 21 barges up the Lower Mississippi River when a fire broke out in the engine room at mile 520.6, south of Greenville, Mississippi. The nine crewmembers on board tried to fight the fire but, unable to control it, they abandoned the vessel to a skiff dispatched from a Good Samaritan towboat. The abandoned tow drifted 11 miles downriver until another towing vessel pushed it into a sandbar. The fire burned until later that evening before being extinguished by fire response teams and vessels. None of the crewmembers were injured, and no environmental damage was reported. The damage to the *Leland Speakes* was estimated at $4.5– $5 million.

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

Recommendations: None
Brief Adopted: May 15, 2019

Collision of Bulk Carrier *Yochow* with Articulated Tug and Barge *OSG Independence/OSG 243*
Houston Ship Channel, Houston, Texas
June 13, 2018

At 2:50 a.m. local time on June 13, 2018, the inbound bulk carrier *Yochow* collided with the articulated tug and barge *OSG Independence/OSG 243*, which was moored at the TPC Group, Inc. facility on the Houston Ship Channel in Houston, Texas. *OSG 243*'s tanks were empty and awaiting a cargo of methyl tert-butyl ether. As a result of the collision, two of the barge's tanks and *Yochow*'s bulbous bow sustained holes, and the facility suffered extensive structural damage. There were no injuries among the crew of 18 on the *Yochow* or the 8 aboard the tug *OSG Independence*, nor was any pollution reported. Damage to the facility ($20 million), the barge ($1 million), and the bulk carrier ($.3 million) amounted to an estimated $21.2 million.

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

Recommendations: None
Brief Adopted: April 23, 2019

Diesel Generator Failure Aboard Offshore Supply Vessel *Red Dawn*
Amchitka Island, Alaska
December 13, 2017

About 3:44 p.m. local time on December 13, 2017, the offshore supply vessel *Red Dawn* was transiting through the North Pacific Ocean en route to resupply the radar station Sea-Based X-Band Radar. When the vessel was about 375 miles south-southwest of Amchitka Island, Alaska, its no. 2 main diesel engine suffered a mechanical failure that led to the ejection of components from the cylinder block, consequently destroying the engine. No pollution or injuries to the 12 crewmembers or the 33 passengers on board were reported. The estimated damage to the Red Dawn totaled $1.0 million.

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

Recommendations: None
Brief Adopted: February 6, 2019

Breakaway of Containership *Helsinki Bridge* and Subsequent Allision with Black Falcon Cruise Terminal
Conley Container Terminal, Reserved Channel, Boston, Massachusetts.
December 6, 2017

On December 6, 2017, at 12:03 a.m. local time, the Panama-flagged containership *Helsinki Bridge* was moored in the Reserved Channel port side to the Paul W. Conley Container Terminal in Boston, Massachusetts. While the vessel was engaged in cargo operations at night, during a period of moderate-to-high winds, a mooring bollard to which five of the vessel's head lines were secured, failed. As a result, the wind caused the vessel to drift away from the terminal and the remaining nine mooring lines to part. The vessel's bow then swung across the channel and struck the Raymond L. Flynn Black Falcon Cruise Terminal pier. There were no reports of pollution and no injuries among the 24 crewmembers or the 10 longshoremen on board. The damage was estimated at $570,000 for the vessel and $40,500 for both terminals.

The NTSB determined that the probable cause of the accident was the failure of Massachusetts Port Authority to provide suitable berthing arrangements during ongoing construction at the Conley Container Terminal, which resulted in the overloading and failure of a single mooring bollard. Contributing to the accident was the lack of preparation by the vessel's master, who was aware of the less-than-suitable mooring arrangements and the deteriorating weather forecast but took no mitigating action to address the situation.

Recommendations: None
Brief Adopted: November 15, 2018

Investigative Hearings

Investigative hearings are public hearings related to investigations in which the agency is authorized to obtain testimony under oath.

NTSB participated in USCG Formal Investigation - Public Hearing into the Collision Between the Liquid Propane Gas Carrier *Genesis River* and barges being pushed by the Towing Vessel *Voyager*
Galveston, Texas,
September 16-20, 2019

On May 10, 2019 about 3:16 PM local time, the liquid propane gas carrier *Genesis River* collided with tank barges being pushed by the towing vessel *Voyager* in the Houston Ship Channel near Bayport, Texas. Cargo tanks in one of the barges were breached, spilling about 10,000 barrels of reformat, a gasoline blending stock, into the waterway. The second barge capsized. The Houston Ship Channel was shut down for two days after the accident during salvage operations and did not fully open for shipping traffic until Wednesday of the following week. There were no injuries in the accident. Damage to the Genesis River and the two barges was estimated at over $600,000.

NTSB participated in USCG Formal Investigation - Marine Board of Investigation (MBI) Public Hearing into the Allision of the Towing Vessel *Kristin Alexis* and Crane Barge *Mr Evin* With the Sunshine Bridge
St James Parish, Louisiana

May 6 – 11, 2019

Late in the evening on October 11, 2018, the tug *Kristin Alexis* left a mooring facility, pushing the crane barge *Mr Ervin* ahead, heading for a dock located about 8 miles upriver. About 1:42 a.m. on October 12, 2018, the crane barge struck and became lodged under the Sunshine (LA route 70) Bridge that crossed the Mississippi River about 30 miles south-southeast of Baton Rouge, Louisiana. Damage to the crane was minimal. Damage to the bridge is estimated at $3.5 million.

Safety Accomplishments

A safety accomplishment is defined as a positive measurable change within the transportation environment that is brought about through some direct action of an NTSB employee during an investigation. Such changes are considered safety accomplishments only if the action is taken voluntarily, without the issuance of a formal safety recommendation by the NTSB.

Safety accomplishment: Improvements to new towing vessel *Mendota*

The owner/operator changed the locations of emergency shutdown stations to safer locations that would keep the crew away from a possible engine room fire because of the events identified in a NTSB Marine Accident Brief.

Owner/operator Upper River Services, after reading the NTSB Marine Accident Brief "Engine Room Fire Aboard Towing Vessel *J.W. Herron*" (MAB1828, adopted December 2018), learned that the crew aboard that vessel had been unable to access the emergency shutdowns due to the heat and smoke during the fire. The owner, after discussions with MS investigators, made changes to a vessel in construction, the *Mendota,* to prevent a similar occurrence, based on lessons learned after reading MAB1828

Support to Foreign Accident Investigations

In FY 2019, MS participated with the Coast Guard as a Substantially Interested State (SIS) in the following completed investigation of a serious marine casualty involving a foreign-flagged vessel in international waters.

Location	Date	Description	Fatalities	Close-out Date
Exuma Island, Bahamas	06/30/2018	37-ft *Bahamas Tour Boat* (BH)	1	10/9/2018

Under the IMO Casualty Investigation Code, MS participated with the Coast Guard as a SIS in the following ongoing investigation of a serious marine casualty involving a foreign-flagged vessel in international waters:

Location	Date	Description	Fatalities
Molde, Norway	03/23/2019	Passenger Vessel (PV) *Viking Sky* (NO) – propulsion loss	0

Other Efforts and Focus Areas

Roundtables/Workshops

Seafloor Investigations Workshop
July 11, 2019

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

MS Advocacy and Outreach

In FY 2019 MS engaged extensively with various stakeholders through various briefings and presentations, described below:

Regulators/Government Stakeholders

Briefings*: Conception* casualty to Senator Feinstein's staff; USS *John S. McCain* report and associated recommendations to SECNAV and CNO Pentagon, Washington, DC.; Hosted US Navy party representatives for the investigation USS *John S McCain*, in reviewing Navy's submission with three Board Members; NTSB Headquarters, Washington, DC; Hosted (with AS) NTSB familiarization meeting RADM Leavitt, USN, Commanding Officer Navy Safety Center, NTSB HQ; Hosted (with SRC) CG-INV Commanding Officer Capt. Neubauer, USCG, regarding all open recommendations to CG, NTSB HQ, Washington, DC.

US Presentations: MITAGS, Subchapter M Conference-Towing Vessels, Linthicum, MD.; Committee on Marine Transportation System quarterly meetings; Safety issues at USACE Hydrographic Survey Community Conference, Craven Point, NJ.; Seafloor Recovery Workshop with domestic/international partners, NTSB HQ, Washington, DC; *El*

Faro casualty investigation to Coast Guard Sector Northern New England, Commanding Officer Conference on Leadership; Portland, ME.; NTSB–Coast Guard joint investigations at Coast Guard Training Center Course, Yorktown, VA.; Coast Guard Industry Training, NTSB Training Center.

***International Presentations*:** International Maritime Organization (IMO sub-committees) Working Groups, London: IMO III Sub-committee; IMO Hazardous and Toxic Waste Sub-committee; IMO SSE Sub-committee; Marine Accident Investigators International Forum (MAIIF); Presented at MAIIF 2018 Annual Meeting, Singapore; European MAIIF 2019, Slovenia; Americas MAIIF 2019, Mexico City.

Marine Industry Stakeholders

Briefings:
Cruise Line International Association representatives, NTSB HQ, Washington, DC.; Common issues affecting safety on the Mississippi River and associated investigation, representatives from New Orleans–Baton Rouge Pilots on NTSB Headquarters; NTSB Most Wanted List, Passenger Vessel Association Conference (PVA), St. Augustine, Fl.

Presentations:
Emerging Seafloor Recovery Technologies at Woods Hole Oceanographic Institution, Woods Hole, MA.; *El Faro* casualty investigation at Philadelphia Tug/Barge Conference 2019; Philadelphia, PA.; Keynote speech and presentation at Council of American Master Mariner's 2019 Annual Conference, San Diego, CA.; *El Faro* casualty investigation to New York City Bar Admiralty Law Committee 2019 Conference, New York City; *Island Lady* and *Stretch Duck 7* casualty investigation issues to Passenger Vessel Association, Alexandria, VA.; *El Faro* casualty at 2018 National Work Boat Show, New Orleans, LA.; MS-101 Investigation Familiarization Course-2018 to industry and government attendees, NTSB Training Center; NTSB Marine Safety Highlights at CLIA 2018 Annual Washington Conference, Washington; MS Director accompanied Chairman as Keynote Speaker at American Pilot Association 2018 Annual Convention, Savannah, GA.

Academia Stakeholders

Outreach: Agency contact with National Geographic cable television channel for two projects: *Disasters at Sea,* about the NTSB's *El Faro* casualty investigation, and *Drain the Ocean,* about the NTSB's search for *El Faro* voyage data recorder with federal partners, Washington, DC.

Presentations: *El Faro* casualty investigation to the Marine Board of the Transportation Research Board and National Science Foundation Washington; *El Faro* casualty investigation to the Chesapeake Area Professional Captains Association, Annapolis, MD.; *El Faro* casualty investigation to State Maritime Academies: State University of New York Maritime College, Ft. Schuyler, New York; Massachusetts Maritime Academy, 2019

Maritime Education Summit, Buzzards Bay, MA.; *El Faro* casualty investigation to the Maritime Legal Association Spring Meeting, Washington, DC.

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

MS-1 Strategic Advisor and MS-20 Division Chief served as the modal lead team in the development, modification, and vetting of the multi-modal Marine SAFTI Database. The international marine taxonomy adopted by the European Maritime Safety Agency's European Maritime Casualty Information Platform (EMCIP) was modified to be the basis for NTSB Marine Safety's database. When fully operational, the Marine SAFTI database will enhance efficiency and accuracy of marine data as an investigative tool.

Ongoing Significant Marine Accident Investigations

Location	Date	Description	Fatalities
Chesapeake, VA	9/23/2019	MV *Ijssel Confidence* stern struck NGL Energy Partners pier mooring dolphins and catwalk	0
Channelview, TX	9/20/2019	Barges broke free of fleeting area and struck I-40 interstate bridge	0
Dover, TN	9/15/2019	Leatherwood Resort & Marina fire – 4 boats sank and 6 boats were damaged	0
Dennis, MS	9/8/2019	Barge *PBL 3422* (US) while being pushed ahead by TV *Savage Voyager* (US) struck Jamie L Whitten lock on Tombigbee Waterway	0
Brunswick, GA	9/8/2019	MV *Golden Ray* (Flag: Marshall Islands) capsized while outbound in channel	0
SW Pass, LA	9/8/2019	Offshore supply vessel *Kristen Faye* (US) listed and sank.	0
Ventura, CA	9/2/2019	SPV *Conception* – dive vessel (US) caught fire and sank while at anchor	34
Port Gravina, AK	8/27/2019	CFV *Ariel* (US) caught fire and sank	0
800nm NW of Guam	8/4/2019	TV *Mangilo* (US) unmanned, being towed, sank	0
Seattle, WA	7/24/2019	Recreational vessel *Silver Lining* (US) took on water and sank in Hood Canal.	
Whitter, AK	7/8/2019	Barge exploded and caught fire to CFV *Alaganik* (US)	2
Hardin, IL	7/5/2019	TV *Chattie Sue Smith* (US) sank while tied to TV *Mary R* and *Mary Fern*	0
Elizabeth River, VA	6/19/2019	TV *Goose Creek* (US) with crane barge when crane boom made contact with 115 kV transmission lines	0
Pago Pago, Amer Samoa	6/17/2019	CFV *American Eagle* (US) collision w/CFV *Koorale* (US)	0

Location	Date	Description	Fatalities
Convent, LA	6/16/2019	MV *Dank Silver* (MI) collision w/Sunshine Bridge	0
Norco, LA	6/8/2019	MV *Century Queen* (Flag: Panama) collision w/*Kaytlin Marie* (US)	0
Deer Park, TX	5/30/2019	MV *Fairchem Filly* (Flag: Marshall Islands), cargo tank over pressurization	0
Webber Falls, OK	5/23/2019	Barge breakaway during high water	0
LMR MM 140, LaPlace, LA	5/16/2019	*American Liberty* (US) collision w/ *African Griffon* (Bahamas) and *Ever Grace* (Bahamas)	0
Houston Ship Channel south of Bayport intersection, Houston, TX	5/10/2019	*Genesis River* (Panama) collision w/ *Voyager* (US)	0
Krotz Springs, LA	4/25/2019	TV *Edna T Gattle* (US), contact w/ RR bridge	0
Venice, LA	4/15/2019	TV *Dejeane Maria*, (US), sank while pushing barges	0
Chicago, IL	4/13/2019	TV *Dewey R* (US) contact w/CSX RR bridge	0
Pascagoula, MS	3/29/2019	MV *Hawk* (NO) collision w/ moored vessels in shipyard	0
Molde, Norway	3/23/2019	PV *Viking Sky* (NO) ER fire and evacuation – IMO SIS investigation jointly w/ Coast Guard	0
Approach to Tokyo Bay, Japan	3/21/2019	MV APL Guam (US) collision	0
Pasadena, TX	3/15/2019	TV *Dixie Vandal* (US) collision	0
Tombigee River at MM 89.9, AL	3/10/2019	TV *Rivers Wilson* (US) bridge contact	0
Unalaska Island, AK	3/9/2019	*Freyja* grounding/stranding	0
Plaquemine Point (LMR MM 209), LA	3/8/2019	TV *Leviticus* (US) collision	0
Baton Rouge, LA	3/7/2019	TV *Saint Rita* (US) flooding/sinking	0
Vicksburg, MS	2/27/2019	TV *Chad Pregracke* (US) w/barges collision	0
Toledo, OH	2/16/2019	MV *St. Claire* (US) fire in lay-up	0
Natchez, TN	2/15/2019	TV *Bettye T Jenkins* (US) barge breakaway w/grain elevator	0
Kashea Bay, AK	2/15/2019	TV *Pacific 1* (US) sinking	0
New Orleans, LA	2/13/2019	*Miss Dixie* (US) tow collision w D&R Boney (US) tow	0
San Juan, PR	2/12/2019	PV *Norwegian Epic* (Flag: Bahamas) contact w/terminal	0
Houston, TX	2/11/2019	*TV Lindberg Crosby* (US) contact w/I-10 bridge	0
New Orleans, LA	1/16/2019	*MSRC 8-1* (US) capsized by two barges	2
Calvert City (MM15 TN R), LA	1/7/2019	TV *Tom Buster* (US) sinking	0
Naval Base Guam, GQ	12/30/2018	PV *Nippon Maru* (Flag: Japan) contact w/Navy Base pier.	0

Location	Date	Description	Fatalities
Warsaw, KY	12/18/2018	TV *Mary Lucy Lane (*US) contact w/ US Army Corps of Engineers' Dam and ACE *Gibson* (US).	0
Pago Pago, PO	12/5/2018	FV *Jeanette* (US) engine fire	0
Cape Cod, MA	12/2/2018	*ITV Big Jake* (US), barge breakaway	0
Point Reyes	11/19/2018	*CFV Imperial grounding*	0
Grand Isle, LA	11/18/2018	Lift Boat *RAM XVIII* (US), capsizing	0
Portland, ME	11/14/2018	CFV *Aaron & Melissa II* (US) sinking	0
LMR MM 442, Vicksburg, MS	10/23/2018	*Andrew Cargill MacMillon* (US), contact w/grain elevator	0
St James, LA	10/12/2018	TV *Kristin Alexis* (US) / *Mr. Ervin* (US) crane contact w/ Sunshine Bridge	0
LMR MM 142, Reserve, LA	10/9/2018	TV *Miss Roslyn* (US), sinking	0
Chandeleur Islands, LA	10/8/2018	SPV *Grand Sun* (US), fire	0
Stamford, CT	9/17/2018	ITV *Seeley* (US) / SV *Sea Jay* (US), collision	0
West Helena, AR	9/12/2018	TV *Jacob Kyle Rusthoven* (US), fire	0
Manhattan, NY	8/28/2018	PV *Carnival Horizon* (Flag: Panama), contact w/Manhattan Cruise Terminal Pier 90	0
Branson, MO	7/19/2018	APV *Stretch Duck 07* (US), capsizing	17
Yokosuka, Japan	6/17/2017	USS *Fitzgerald* (US) and container ship MV *ACX Crystal* (Flag: Phillipine)	7

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

RAILROAD, PIPELINE, AND HAZARDOUS MATERIALS INVESTIGATIONS

	($000s)	FTEs
FY 2020 Estimate	$8,706	33
FY 2021 Request	$9,296	34
Increase/Decrease	$590	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Railroad, Pipeline and Hazardous Materials Investigations (RPH) comprises four divisions: Railroad, Pipeline and Hazardous Materials, System Safety, and Report Development. The office investigates accidents involving railroads, pipelines, and hazardous materials, and evaluates the associated emergency response. Based on these investigations, the NTSB may issue safety recommendations to federal and state regulatory agencies, unions, industry and safety standards organizations, carriers and pipeline operators, equipment and container manufacturers, producers and shippers of hazardous materials, and emergency response organizations. The office also issues Safety Alerts to industry.

Railroad Division

Since 1967, Congress has assigned the primary responsibility for railroad accident investigations to the NTSB. As in the other surface modes, the NTSB investigates and analyzes select accidents, determines their probable causes, and issues recommendations to prevent similar accidents.

Staff investigate accidents and incidents involving passenger and freight railroads, commuter rail transit systems, and other fixed guideway systems. Accidents are typically collisions or derailments, some of which involve fatalities, severe injuries, release of hazardous materials, and evacuation of residences.

The division does not investigate every railroad accident reported to the FRA or every rail transit accident reported to the Federal Transit Administration (FTA). To most efficiently use NTSB resources, criteria have been established to help identify for investigation those accidents that pose significant safety issues. The division also assesses selected railroad

safety issues, often based on a set of accident investigations specifically undertaken as the basis for such study. In other cases, the special studies may focus on analyses of regulations, railroad safety programs or procedures, or audit reviews of management and operations practices.

Pipeline and Hazardous Materials Division

Staff investigate accidents occurring during the transport of natural gas or other hazardous liquids such as gasoline or propane through underground pipeline systems, as well as accidents that threaten public safety by the release of hazardous substances. Pipeline investigations focus on accidents that involve fatalities or result in substantial property or environmental damage.

The division investigates accidents involving the release of hazardous materials in all modes of transportation, including aviation, highway, railroad, and marine. The division may also investigate select hazardous materials accidents that highlight safety issues of national importance or involve a specific accident prevention issue. An investigation may include analysis of the performance of hazardous materials containers, such as rail tank cars, highway cargo tanks, or smaller non-bulk packaging. The division also investigates environmental response issues in all modes, including pipeline.

System Safety Division

Staff supports the investigations led by the Railroad Division and the Pipeline and Hazardous Materials Division. Staff investigates the role of system safety management in the regulated transportation mode, as well as the role of individual, workgroup, and organizational factors in an accident scenario. Staff also examines the role of regulatory, industry, and company practices in the accidents under investigation. The division maintains oversight of emerging safety regulations, methods, and data related to the railroad, pipeline, and hazardous materials areas.

Investigations typically involve inquiries that extend well beyond the debris field of an accident site. Failures of operational systems rarely are isolated to the last component to break or malfunction. Rather, the reasons for system failures often are traceable back to management decisions and corporate cultural influences. Once these systemic failures are identified and understood, the staff works to develop corresponding safety recommendations. Specific topics evaluated include drug and alcohol usage, work-rest cycles and human fatigue, individual and team training, organizational safety culture, safety management, and public awareness.

Report Development Division

The Report Development Division is responsible for drafting and editing railroad, pipeline, and hazardous materials reports and briefs. The staff reviews, writes, and edits work products to ensure the adequacy of logic, organization, and structure. In addition, the division's editors ensure the quality of NTSB reports, responses to notices of proposed rulemaking, papers, congressional testimony, and speeches (or portions thereof) on matters

pertaining to railroad, pipeline, and hazardous materials safety. The division is also responsible for the effective development of the NTSB transportation safety policy, guidance, protocols, applicable portions of the NTSB orders, and replies to safety inquiries from Congress, other federal agencies, state and local agencies, industry, and the public.

Accomplishments and Ongoing Efforts – Railroad Division

This division's accomplishments include the issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019 are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Railroad Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Amtrak Passenger Train Head-on Collision With Stationary CSX Freight Train
Cayce, South Carolina
February 4, 2018

On February 4, 2018, about 2:27 a.m. local time, southbound National Railroad Passenger Corporation (Amtrak) train P91, operating on a track warrant, was diverted from the main track through a reversed hand-throw switch into a track and collided head-on with a stationary CSX Transportation Corporation (CSX) local freight train F777. The accident occurred on CSX's Florence Division, Columbia Subdivision in Cayce, South Carolina.

The engineer and conductor of the Amtrak train died because of the collision. Ninety-one passengers and crewmembers on the Amtrak train were transported to medical facilities. The engineer of the stopped CSX train had exited the lead locomotive before the Amtrak train entered the track. When he saw that it was entering the track, he ran to safety and was not injured. The conductor on the CSX lead locomotive saw the Amtrak train approaching on the track and ran to the back of the locomotive. The conductor was thrown off the locomotive and sustained minor injuries. Damage was estimated at $25.4 million.

The normal method of operation on this segment of track was by wayside signal indications of a traffic control system. On the day prior to the accident, CSX signal personnel began upgrading signal system components to implement positive train control (PTC) on the subdivision. Signal personnel ceased work for the day at 7:00 p.m., prior to completing planned work. The signal suspension remained in place resulting in the continued use of track warrants to move trains through the affected area of signal suspension.

The NTSB determined the probable cause of this collision was the failure of the CSX to assess and mitigate the risk associated with operating through a signal suspension, which eliminated system redundancy for detecting a switch in the wrong position. The CSX conductor failed to properly reposition the switch for the main track, which allowed Amtrak

train P91 to be routed onto the Silica Storage track where the standing CSX train F777 was located. Contributing to the accident was the FRA's failure to implement effective regulation to mitigate the risk of misaligned switch accidents. Also contributing to the accident was Amtrak's failure to conduct a risk assessment prior to operating during a signal suspension.

The safety issues identified in this accident investigation include operations during signal suspensions, the actions and responsibilities of train crews handling switches, the CSX efficiency testing program and staffing, the implementation of a safety management system by Amtrak to assess and mitigate risks for operation on host railroads, occupant protection in passenger railcars, and the medical examination process for railroad employees.

The NTSB made new safety recommendations to CSX and to the 29 host railroads that own and maintain track over which Amtrak operates. The NTSB also reiterated recommendations to the FRA and to Amtrak and classified prior recommendations to the FRA.

Recommendations: 3 new, 5 reiterated, 2 classified
Report Adopted: July 23, 2019

Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017

On December 18, 2017, at 7:34 a.m. local time, southbound Amtrak passenger train 501, consisting of 10 passenger railcars, a power railcar, a baggage railcar, and a locomotive at either end, derailed from a bridge near DuPont, Washington.

The train was on its first revenue service run on a single main track (Lakewood Subdivision) at milepost 19.86; there had been one run for special guests the week before the accident. Several passenger railcars fell onto Interstate 5 and hit multiple highway vehicles. At the time of the accident 77 passengers, 5 Amtrak employees, and 1 Talgo, Inc., technician were on the train. 3 passengers were killed, and 57 passengers and crewmembers were injured. Additionally, 8 individuals in highway vehicles were injured. The damage is estimated to be more than $25.8 million.

The NTSB determined that the probable cause of the derailment was Central Puget Sound Regional Transit Authority's failure to provide an effective mitigation for the hazardous curve without implementing PTC, which allowed the Amtrak engineer to enter the 30-mph curve at too high of a speed due to his inadequate training on the territory and inadequate training on the newer equipment. Contributing to the accident was the Washington State Department of Transportation's decision to start revenue service without being assured that safety certification and verification had been completed to the level determined in the preliminary hazard assessment. Contributing to the severity of the accident was the FRA's decision to permit railcars that did not meet regulatory strength requirements to be used in revenue passenger service, resulting in (1) the loss of survivable space and (2) the failed

articulated railcar-to-railcar connections that enabled secondary collisions with the surrounding environment, causing severe damage to railcar-body structures which then failed to provide occupant protection resulting in passenger ejections, injuries, and fatalities.

The safety issues identified in this accident include individual agency responsibilities in preparation for inaugural service, multiagency participation in preparation for inaugural service, Amtrak safety on a host railroad, implementation of PTC, training and qualifying operating crews, the crashworthiness of the Talgo equipment, survival factors and emergency design of equipment, and multiagency emergency response.

The NTSB made new safety recommendations to the Secretary of Transportation, the FRA, the United States Department of Defense Fire and Emergency Services Working Group, the Washington State Department of Transportation, the Oregon Department of Transportation, Amtrak, and Central Puget Sound Regional Transit Authority. The NTSB also reiterated and classified safety recommendations to the FRA.

Recommendations: 26 new, 4 reiterated, 3 classified
Report Adopted: May 21, 2019

Derailment and Hazardous Materials Release of Union Pacific Railroad Unit Ethanol Train
Graettinger, Iowa
March 10, 2017

On March 10, 2017, at about 12:50 a.m. local time, an eastbound Union Pacific Railroad unit ethanol train with 3 locomotives, 98 loaded tank cars, and 2 buffer cars filled with sand derailed near milepost 56.8 at a timber railroad bridge near Graettinger, Iowa, near Jack Creek, a tributary of the Des Moines River. Twenty loaded tank cars in positions 21 through 40 derailed. Fourteen of the derailed tank cars released about 322,000 gallons of undenatured ethanol, ethyl alcohol without a denaturant added to it, fueling a postaccident fire. There were no injuries; however, three nearby homes were evacuated. About 400 feet of railroad track and a 152-foot railroad bridge were destroyed in the accident. Union Pacific Railroad estimated damages, excluding environmental remediation or the cost of clearing the accident, at $4 million.

The NTSB determined that the probable cause of the derailment was a rail that had broken as the train was traveling over the west approach of the Jack Creek Bridge as a result of Union Pacific Railroad's inadequate track maintenance and inspection program and the FRA's inadequate oversight of the application of federal track safety standards. Contributing to the consequences of the accident was the continued use of DOT Specification-111 tank cars.

The safety issues identified include the inadequacy of Union Pacific Railroad's track maintenance and inspection program, the inadequacy of the FRA's oversight, and the transportation of fuel ethanol without the use of volatile organic chemical denaturants.

The NTSB made new safety recommendations to the FRA, Pipeline and Hazardous Materials Safety Administration (PHMSA), and Union Pacific Railroad. The NTSB reiterated one recommendation to PHMSA.

Recommendations: 3 new, 1 reiterated
Report Adopted: October 30, 2018

Railroad Accident Briefs

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

Metropolitan Atlanta Rapid Transit Authority Train 401 Strikes On-Track Equipment
Sandy Springs, Georgia
June 3, 2018

On June 3, 2018, at about 8:46 p.m. local time, Metropolitan Atlanta Rapid Transit Authority (MARTA) northbound train 401 struck on-track equipment (OTE) about 120 yards north of the Medical Center Station, near Sandy Springs, Georgia. The train had departed the MARTA Medical Center Station just prior to the accident. The Cleveland Electric Company, a MARTA contractor, owned and operated the OTE. A contract employee, who was the operator of the OTE, died from injuries sustained during the collision. Neither the passengers nor the train operator reported any injuries. The train speed at the time of collision was 22 mph.

The NTSB determined that the probable cause of this collision was the primary flagperson's moving the on-track equipment outside of the restriction area without authority and on-track protection. Contributing to the accident was the rail operator's failure to make a visual check of the immediate track area ahead of the train before commencing movement from the Medical Center Station and the failure to maintain a constant visual check of track conditions as far ahead as possible.

Following the accident, MARTA conducted mandatory refresher training on standard operating procedures for all personnel that might require access to the wayside.

Recommendations: None
Brief Adopted: August 6, 2019

New York City Transit Train Strikes Two Flagmen
Brooklyn, New York
November 3, 2016

On November 3, 2016, at 12:05 a.m. local time, NYCT subway train 2328G, operating underground in a tunnel between the Fort Hamilton Parkway and Church Avenue stations, struck two NYCT employees on the F Line in Brooklyn, New York. The employees were setting up flagging protection for a contractor who needed to cross the track to access an instrument control room in the tunnel. One employee was killed, and one was seriously injured. After the accident, 23 passengers were evacuated while the crew remained with the train. The transit equipment and the track structure did not sustain any damage.

The NTSB determined that the probable cause of the accident was the failure of the Rail Control Center to communicate to the train dispatcher and tower operator that flaggers were on the track. Also contributing to the accident is NYCT's absence of a risk assessment when planning its flagging operations and permitting train movements into unprotected work zones.

The investigation of the accident identified safety issues of flagging operations and risk assessments to ensure track worker safety.

The NTSB made three new safety recommendations to the Metropolitan Transportation Authority for NYCT.

Recommendations: 3 new
Brief Adopted: June 21, 2019

BNSF Railway Head-On Collision
Panhandle, Texas
June 28, 2016

On June 28, 2016, at 8:21 a.m. local time, eastbound BNSF Railway (BNSF) train S LACLPC1-26K (striking train) collided with BNSF train Q CHISBD6 27L (westbound train) at milepost (MP) 525.4 on the BNSF Panhandle Subdivision near Panhandle, Texas. The collision occurred about 0.5 mile east of the east switch of the Panhandle siding. A significant fire resulted from the collision. The locomotive engineer and conductor on the striking train and the conductor on the westbound train died in the accident. The three head-end locomotives and 10 intermodal cars of the striking train derailed. All five head-end locomotives and three intermodal cars of the westbound train derailed.

The NTSB determined that the probable cause of the collision was the failure of the striking train's crewmembers to comply with signal indications requiring them to slow and stop their train before signal 5261 due to (1) the engineer's disengagement from operating, possibly due to fatigue arising from untreated obstructive sleep apnea and insufficient sleep quality and quantity on the night preceding the collision, and (2) the conductor's

disengagement from operating, possibly due to the effects of two sedating medications. A functional PTC system would have prevented the collision.

After the accident, BNSF revised its policy on the use of certain medications for personnel in safety-sensitive positions. BNSF also revised their procedures for employees returning to duty following some medical conditions.

Recommendations: None
Brief Adopted: June 11, 2019

CSX Transportation Employee Fatalities at Ivy City
Washington, DC
June 27, 2017

On June 27, 2017, at 11:18 p.m. local time, two CSX employees (conductor and conductor trainee) from train Q137 were struck and killed by southbound Amtrak train P175 at Amtrak milepost 134.5 in Ivy City, a small neighborhood in Northeast Washington, DC. The two employees were on the track walking toward the front of their southbound train after inspecting a railcar with elevated temperature reported by a track-side detector. Their backs were to the approaching southbound Amtrak train when they were struck.

The NTSB determined that the probable cause of the accident was the CSX train Q137 crew's decision to walk near an active track without protection. Contributing to the accident was their focus on northbound Amtrak train P66 and their failure to realize Amtrak train P175 was approaching them from behind.

The investigation of the accident identified safety issues of railroad employee training and limited direct communications between different railroads.

The NTSB made one new safety recommendation to CSX and Amtrak.

Recommendations: 1 new
Brief Adopted: March 25, 2019

Passenger Fatality on the Long Island Rail Road
Lynbrook, New York
April 5, 2018

On April 5, 2018, about 8:00 p.m. local time, a passenger walking eastward on the Long Island Rail Road Lynbrook Station platform in Lynbrook, New York, reached out to touch a moving train, leaned into the train, and was subsequently dragged and killed as the train left the station. Video cameras captured the event from beginning to end.

An autopsy revealed that the deceased had a high blood alcohol concentration that likely impacted his judgement.

The NTSB determined that the probable cause of the accident was the failure of the passenger to recognize that the departing train was moving as he walked on the station platform. Contributing to the cause of the accident was the passenger's high blood alcohol concentration at the time of the accident.

Recommendations: None
Brief Adopted: December 3, 2018

Railroad Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations before a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation issued is designated "Urgent."

Train Emergency Brake Communication
Granite Canyon, Wyoming
October 4, 2018

On October 4, 2018, at 7:40 p.m. local time, eastbound Union Pacific (UP) freight train MGRCY04 (striking train) collided with the rear of stationary UP freight train MPCNP03 (stationary train) after cresting a hill and traveling down a descending grade of up to 1.58 percent for about 13 miles. The striking train consisted of 3 leading locomotives and 105 railcars. The engineer and conductor of the striking train were killed, and 3 locomotives and 57 railcars of the striking train derailed while 9 railcars of the stationary train derailed. Prior to the accident, the crew of the striking UP freight train reported problems with the train's air brake system and radioed the UP Harriman Dispatch Center to advise them they had accelerated to 50 mph and were unable to stop.

The safety issues identified in this accident investigation include operational problems that could interfere with the air-brake system on trains, such as misconfigured end-of-railcar air hoses and/or loss of communication between head-of-train and end-of-train devices.

As a result of this ongoing investigation, the NTSB issued new safety recommendations to all Class I Railroads and to the American Short Line and Regional Railroad Association.

Recommendations: 3 new
Report Adopted: September 16, 2019

Hazards of Moving Between Transit Railcars
Philadelphia, Pennsylvania
September 23, 2018

On September 23, 2018, about 5:35 p.m. local time, a Southeastern Pennsylvania Transportation Authority (SEPTA) subway train operator stopped a southbound train between the Alleghany Station and the North Philadelphia Station on the Broad Street Line when a passenger activated an emergency alert. The train dispatcher instructed the train operator to perform a ground-level inspection of the train. Between the running rails about 10 feet south of the Alleghany Station platform, the operator found a child that had been struck and killed by the train. According to witness statements provided to SEPTA officials, the child, a 7-year-old boy, was walking through the end-of-railcar doors from car 516 to car 536, when he fell between the railcars as the train moved out of the Alleghany Station.

The safety issues identified in this accident investigation include a lack of consistent application and uniformity of appearance for end-of-railcar door safety messaging in railcars across transit agencies.

As a result of this ongoing investigation, the NTSB issued new safety recommendations to the FTA.

Recommendations: 2 new
Report Adopted: August 28, 2019

Ongoing Significant Railroad Accident Investigations

Location	Date	Description	Fatalities
Sacramento, CA	8/22/2019	Collision of two Sacramento Regional Transit District trains	0
Carey, OH	8/12/2019	Collision of two CSX freight trains	0
Philadelphia, PA	7/8/2019	SEPTA train struck 2 track workers	1
Sarnia, Ontario, Canada	6/28/2019	CN derailment in tunnel with hazardous material release	0
Fort Worth, TX	4/24/2019	Union Pacific derailment and release of denatured ethanol	0
Chattanooga, TN	4/13/2019	CSX worker struck in railyard	1

Location	Date	Description	Fatalities
Hamilton, NJ	4/8/2019	Amtrak near-miss of worker	0
Baltimore, MD	2/7/2019	Norfolk Southern conductor struck during switching operation	1
Bronx, NY	12/5/2018	NYCT passenger fell while standing between cars	1
Estill, SC	11/30/2018	CSX train struck worker	1
Granite Canyon, WY	10/4/2018	Union Pacific rear-end collision	2
Philadelphia, PA	9/23/2018	SEPTA passenger fatality	1
Dallas, TX	8/13/2018	Dallas, Garland & Northeastern Railroad Inc employee fatality	1
Kingman, AZ	6/5/2018	Herzog Railroad Services employee fatality	1
Alexandria, VA	5/19/2018	CSX freight train derailed	0
Bowie, MD	4/24/2018	Amtrak employee fatality	1
Wartrace, TN	3/12/2018	CSX employee fatality while working the ballast regulator	1
Arlington, TX	9/22/2017	UP employee fatality	1
Upper Darby, PA	8/22/2017	2 SEPTA trains collided	0
Hyndman, PA	8/2/2017	31 tank cars derailed: 1 propane tank car cracked, breached, and caught fire; residents evacuated	0
Queens Village, NY	6/10/2017	Train struck track worker	1
Rye, NY	5/18/2017	Commuter train derailed	0

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

Accomplishments and Ongoing Efforts – Pipeline

This division's accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019, are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Pipeline Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Overpressurization of Natural Gas Distribution System, Explosions, and Fires
Merrimack Valley, Massachusetts
September 13, 2018

On September 13, 2018, about 4:00 p.m. local time, a series of structure fires and explosions occurred after high-pressure natural gas was released into a low-pressure natural gas distribution system in the northeast region of the Merrimack Valley in the Commonwealth of Massachusetts. The natural gas distribution system was owned and operated by Columbia Gas of Massachusetts, a subsidiary of NiSource Inc. Columbia Gas of Massachusetts delivers natural gas to about 325,000 customers in Massachusetts. One person was killed and 22 individuals, including three firefighters, were transported to local hospitals due to injuries; seven other firefighters incurred minor injuries. The fires and explosions damaged 131 structures, including at least 5 homes that were destroyed in the city of Lawrence and the towns of Andover and North Andover. Most of the damage occurred from fires ignited by natural gas-fueled appliances; several of the homes were destroyed by natural gas-fueled explosions. Fire departments from the three municipalities were dispatched to the fires and explosions. First responders initiated the Massachusetts fire-mobilization plan and received mutual aid from neighboring districts in Massachusetts, New Hampshire, and Maine. Emergency management officials had National Grid United States (the electric utility) shut down electrical power in the area, the state police closed local roads, and freight and passenger railroad operations in the area were suspended. Columbia Gas of Massachusetts shut down the low-pressure natural gas distribution system, affecting 10,894 customers, including some outside the area who had their service shut off as a precaution.

The NTSB determined that the probable cause of the overpressurization of the natural gas distribution system was Columbia Gas of Massachusetts' weak engineering management that did not adequately plan, review, sequence, and oversee the construction project that led to the abandonment of a cast iron main without first relocating regulator sensing lines to the new polyethylene main. Contributing to the accident was a low-pressure natural gas distribution system designed and operated without adequate overpressure protection.

The investigation identified a number of safety issues, including the adequacy of natural gas regulations; pipeline project management, risk assessments, project documentation and constructability reviews; pipeline safety management systems; licensed professional engineer approval of natural gas projects; and emergency response.

As a result of this investigation, the NTSB issued new safety recommendations to PHMSA, to the 31 states that exempt infrastructure projects from the requirement for a professional engineer to approve design plans, to the Commonwealth of Massachusetts Executive Office of Public Safety and Security, and to NiSource Inc. As outlined in the Safety Recommendation Report section below, the NTSB had previously issued recommendations to the Commonwealth of Massachusetts and to NiSource Inc. in a safety recommendation

report adopted on November 14, 2018; those recommendations were classified in this pipeline accident report.

Recommendations: 5 new, 5 classified
Report Adopted: September 24, 2019

Building Explosion and Fire
Silver Spring, Maryland
August 10, 2016

On August 10, 2016, at 11:51 p.m. local time, a 14-unit apartment building, located at 8701 Arliss Street, Silver Spring, Maryland, partially collapsed due to a natural gas-fueled explosion and fire, which also heavily damaged an adjacent apartment building attached by a shared wall. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital. Damages exceeded $1 million.

The NTSB determined that the probable cause of the explosion was the failure of an indoor mercury service regulator with an unconnected vent line that had allowed natural gas into the meter room where it accumulated and ignited from an unknown ignition source. Contributing to the accident was the location of the mercury service regulators where a leak would not easily be detected by odor.

The investigation identified several safety issues, including the location and inspection of service regulators within a structure, the inspection of the gas meter assembly, the notification of the natural gas odor to Washington Gas Light Company, and the detection of natural gas through odorants and methane.

As a result of this investigation, the NTSB issued new safety recommendations to PHMSA, the Public Service Commission of Maryland, the Commonwealth of Virginia State Corporation Commission Division of Public Utility Regulation, the Public Service Commission of the District of Columbia, the International Academies of Emergency Dispatch, the International Code Council, the National Fire Protection Association, the Gas Technology Institute, and Washington Gas Light Company.

Recommendations: 13 new
Report Adopted: April 24, 2019

Pipeline Accident Briefs

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

UGI Utilities Natural Gas-Fueled Explosion
Millersville, Pennsylvania
July 2, 2017

On July 2, 2017, at 12:32 p.m. local time, a natural gas-fueled explosion occurred at a single-family residence at 206 Springdale Lane, Millersville, Pennsylvania. The explosion killed one person and injured three others, destroyed the residence, and significantly damaged six neighboring homes, one of which was subsequently condemned.

Following the accident, the natural gas main and service pipelines for all the homes on the cul-de-sac were tested for leaks. All segments held pressure, except for the service line at the 206 Springdale Lane connection at the main; this segment had a Permalock mechanical tapping tee. Subsequent inspection of the Permalock tee revealed that gas was leaking at the connection of the tee to the 2-inch main, and two of the four nylon bolts securing the tee to the main had fractured. At the time of the accident, the operating pressure of the line was 54 pounds per square inch, gauge (psig), as measured at the closest monitoring point about 0.5 mile away from 206 Springdale Lane.

The NTSB determined that the probable cause of the explosion was an improperly installed mechanical tapping tee that had leaked and allowed gas to migrate into the house, where the gas ignited. The investigation identified safety issues related to mechanical tapping tee installation procedures and instructions and to the dissemination of information important for distribution integrity management programs.

As a result of the investigation, the NTSB issued early safety recommendations to PHMSA and Honeywell, the manufacturer of the Permalock tapping tees, in a safety recommendation report that was adopted on June 18, 2018. Those safety recommendations were classified in the brief adopted February 25, 2019.

Recommendations: 4 classified
Brief Adopted: February 25, 2019

Third-party Damage by Sure Shot Communications to Ameren Natural Gas Distribution System
Canton, Illinois
November 16, 2016

On November 16, 2016, about 5:44 p.m. local time, a natural gas-fueled explosion occurred at a two-level commercial building located at 45 East Side Square in Canton, Illinois. One Ameren employee was killed, and 11 people were injured, including two Ameren employees.

Prior to the accident, Sure Shot Communications LLC was performing directional drilling adjacent to the building to install conduit for fiber optic cable. At 3:58 p.m., the contractor reported to the Joint Utility Locating Information for Excavators, the one-call message handling and delivery service for identifying underground utilities, that a marked gas line

had been damaged. At 4:06 p.m., Ameren Illinois, the owner and operator of the gas line, received a damage report from Sure Shot and dispatched field technicians to evaluate the situation. The lead Ameren responder contacted his supervisor to confirm that the pipeline had been struck and to request excavation equipment to uncover the service line. A backhoe excavator arrived at 4:41p.m. and Ameren technicians began to isolate the leak. By 5:37 p.m., Ameren technicians shut off the natural gas flow to the service line by squeezing off the pipeline. At 5:44 p.m., the Opera House Annex behind the Opera House Professional Center exploded, killing one and injuring 11 who were impacted by debris from the blast.

The NTSB determined that the probable cause of the accident was third-party damage from Sure Shot's directional drilling to install underground fiber optic conduit. Contributing to the pipeline damage was Sure Shot's decision not to excavate at the utility crossing to visually inspect the work, while in progress, until clear of the underground utilities, as required by Illinois law. Contributing to the severity of the accident was the failure of Sure Shot and Ameren to evacuate the area.

Recommendations: None
Brief Adopted: December 3, 2018

Pipeline Safety Recommendation Reports

During accident or incident investigations, safety issues are sometimes identified that warrant Board adoption of safety recommendations before a final report or brief. Safety recommendation reports are used to make recommendations on such issues; these reports may be issued at any time during an accident investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar accident, the safety recommendation issued is designated "Urgent."

Natural Gas Distribution System Project Development and Review
Merrimack Valley, Massachusetts
September 13, 2018

On September 13, 2018, about 4:00 p.m. local time, a series of explosions and fires occurred after high-pressure natural gas was released into a low-pressure gas distribution system in the northeast region of the Merrimack Valley, Massachusetts. The distribution system was owned and operated by Columbia Gas of Massachusetts, a subsidiary of NiSource, Inc. The system overpressure damaged 131 structures, including at least 5 homes that were destroyed in the city of Lawrence and the towns of Andover and North Andover. Most of the damage was a result of structure fires ignited by gas-fueled appliances. Several structures were destroyed by natural gas explosions. One person was killed and at least 21 individuals, including 2 firefighters, were transported to the hospital. Seven other firefighters received minor injuries.

On September 13, prior to the overpressure event, a Columbia Gas-contracted work crew, which included a Columbia Gas inspector, had executed one of the Columbia Gas-designed

and -approved pipe-replacement projects at the intersection of South Union Street and Salem Street in South Lawrence. The project was to install a plastic distribution main and abandon in place a cast-iron distribution main. The distribution main that was abandoned still had the regulator-sensing lines that were used to detect pressure in the distribution system and provide input to the regulators to control the system pressure. Once the contractor crews disconnected the distribution main that was being abandoned, the section containing the regulator-sensing lines began losing pressure.

As the pressure in the abandoned distribution main dropped, the pressure regulators responded by opening further, increasing pressure in the distribution system. The pressure regulators opened completely when they no longer sensed system pressure, allowing the full flow of high-pressure gas to release into the distribution system supplying the neighborhood. As a result, natural gas was delivered to customers at a pressure well above the maximum-allowable operating pressure which led to the ignition of fires and explosions in homes.

The investigation of this accident identified several safety issues, including the engineering work package approval process, the pipeline recordkeeping process, and the management of maintenance and construction changes to pipelines and pipeline operations.

Accordingly, the NTSB issued urgent safety recommendations to the Commonwealth of Massachusetts and to NiSource Inc.

Recommendations: 5 new, Urgent
Report Adopted: November 14, 2018

Ongoing Significant Pipeline Accident Investigations

Location	Date	Description	Fatalities
Danville, KY	8/1/2019	Natural gas transmission line rupture and fire	1
San Francisco, CA	2/6/2019	Excavator damaged natural gas main	0
Dallas, TX	2/23/2018	Single-family residence explosion (2 previous houses had fire/explosions)	1
Minneapolis, MN	8/2/2017	Minnehaha Academy exploded	2
Firestone, CO	4/17/2017	Single-family residence explosion	2
Helena, AL	10/31/2016	Track hoe struck gas pipeline	1
Tekamah, NE	10/17/2016	Pipeline release of anhydrous ammonia	1

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

Accomplishments and Ongoing Efforts – Hazardous Materials Investigations

This division's accomplishments include issuance of numerous products related to transportation safety arising from completed and ongoing investigations. Products completed in FY 2019, are highlighted below, together with information on other efforts and focus areas important to both the current and future mission of the agency.

Hazardous Materials Investigations Accident Reports

Accident reports, adopted by the Board, are issued for major accidents.

Rupture of a DOT-105 Rail Tank Car and Subsequent Chlorine Release at Axiall Corporation
New Martinsville, West Virginia
August 27, 2016

On August 27, 2016, about 8:26 a.m. local time, a railroad tank car sustained a 42-inch-long crack in its tank shell shortly after being loaded with 178,400 pounds of liquefied compressed chlorine at the Axiall Corporation Natrium plant in New Martinsville, West Virginia. Over the next 2.5 hours, the entire 178,400-pound load of chlorine was released and formed a large vapor cloud that migrated south along the Ohio River valley. The railroad tank car, AXLX1702, built in June 1979 by ACF Industries, Incorporated, was a 17,388-gallon US DOT specification–105J500W tank car, also known as a class DOT-105 tank car, with a stenciled load limit of 178,400 pounds and a maximum gross rail load of 263,000 pounds.

The tank car was equipped with an ACF Industries, Incorporated ACF-200 stub sill underframe design, which the FRA noted in a 2006 safety advisory as being prone to such defects as tank head cracks, pad-to-tank cracks, sill web cracks, and tank shell buckling that in some instances has led to release of hazardous materials.

The NTSB determined that the probable cause of the chlorine release was an undetected preexisting crack near the inboard end of the stub sill cradle pad, that failed because of the changing tank shell stresses during the thermal equalization of the car after loading with low-temperature chlorine. Contributing to the failure was Axiall Corporation's insufficiently frequent stub sill inspection interval that did not detect the crack, the low fracture resistance of the nonnormalized steel used in the tank car construction, and the presence of residual stresses associated with Rescar Companies' tank wall corrosion repairs and uncontrolled local postweld heat treatment.

In the course of the investigation, the NTSB identified several safety issues, including the continued use of pre-1989 tank cars constructed of nonnormalized steel in chlorine and other poison inhalation hazard/toxic inhalation hazard service, the tank car manufacturer's maintenance and repair instructions, postweld heat treating procedures, and qualification and maintenance intervals.

As a result of this investigation, the NTSB made new safety recommendations to PHMSA, the Association of American Railroads, and American Railcar Industries, Inc. The NTSB also classified one prior recommendation to the FRA.

Recommendations: 5 new, 1 classified
Brief Adopted: February 11, 2019

Hazardous Materials Investigations-Other Efforts and Focus Areas

Outreach Activities

- Staff have regularly attended the Association of American Railroads Tank Car Committee meetings, also attended by representatives of railroads, tank car owners, shippers, tank car builders, equipment manufacturers, government regulators, advocacy organizations, and the interested public. Staff provides presentations about new safety recommendations, ongoing investigations, relevant safety issues, new Board products, and upcoming events. Topics covered in recent meetings include the development of industry standards for continued use of non-normalized steel pressure tank cars for poison inhalation hazard (PIH) service, oversight of tank car shops that conduct qualification and maintenance activities, monitoring phaseout of existing fleet of DOT-111 tank cars, identification of emerging tank car safety issues, and implementation of the Board's safety recommendations related to tank car safety. The carriage of flammable liquids in rail tank cars is also associated with one of the issue areas on the NTSB Most Wanted List for 2019 – 2020, Ensuring the Safe Shipment of Hazardous Materials.

- Since the Lac-Mégantic, Quebec, freight train accident of July 2013, hazardous materials staff have maintained a close working relationship with their counterparts at the Transportation Safety Board (TSB) of Canada. The NTSB and TSB continue collaboration and sharing information about the accident performance of US DOT and Transport Canada specification flammable liquid tank cars, particularly those used to transport crude oil. During the past year, NTSB and TSB investigators have deployed together to accidents in Doon, Iowa, and St. Lazare, Manitoba. The findings from these investigations will be used to support jointly developed reports about the effectiveness of new requirements for DOT-117 tank cars used in high-hazard flammable trains.

- Staff attended the Battery Show Conference in Novi, Michigan, in September 2019, which provided educational sessions and exhibits on the full supply chain of lithium batteries—from raw materials to recycling. Topics such as battery design, thermal management, and regulatory requirements were covered in the sessions. Lithium-based batteries are listed as a hazardous material by the US DOT and found in a number of applications in the automobile, aviation, consumer electronics, and medical device industries. The NTSB hosted a forum, Lithium Ion Batteries in

Transportation, in 2013 and continues to investigate accidents involving lithium batteries in all modes of transportation.

Ongoing Significant Hazardous Materials Investigations

Location	Date	Description	Fatalities
Beach Park, IL	4/25/2019	Anhydrous ammonia trailer leak	0
St. Lazare, Manitoba, Canada	2/16/2019	CN crude oil train derailment	0
Diamond Bar, CA	2/11/2018	Tube trailer carrying composite cylinders loaded with hydrogen caught fire; evacuation	0
Fredericksburg, VA	11/2/2016	CSX tank car leaked ethanol	0
Brampton, Ontario, Canada	6/3/2016	Battery fire on delivery truck	0

Note: We are devoting significant resources to the accident investigations listed and anticipate producing an accident report or brief for adoption upon the completion of each investigation.

RESEARCH AND ENGINEERING

	($000s)	FTEs
FY 2020 Estimate	$12,607	45
FY 2021 Request	$13,310	46
Increase/Decrease	$703	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Research and Engineering (RE) is an investigative office providing scientific and technical expertise for NTSB accident investigations in all modes of transportation. The office, which includes four divisions and two program areas, also conducts safety research, generates periodic statistical reviews of aviation accidents, and provides medical and toxicology expertise for investigations in all modes.

Safety Research Division

The Safety Research Division examines transportation accidents, accident trends, and technological changes to identify problems and associated remedial actions that will reduce risk and improve the safety of the transportation system. Division staff includes transportation safety research and data analysts, who conduct systematic examinations of (1) risks or hazards in the transportation environment that may influence accidents or injury, (2) the techniques and methods of accident investigation, and (3) the effectiveness of various safety countermeasures such as policies, programs, or technologies. The division also provides data science, data visualization, and statistical expertise to support accident launches and investigations, assist in the development of safety recommendations, and publish annual statistical reviews for the NTSB, Congress, and the public.

Materials Laboratory Division

The Materials Laboratory Division performs expert multidisciplinary engineering and scientific analyses to determine whether the performance of materials and structures is related to the cause or severity of an accident. Engineers also analyze wreckage to determine the causes of fires and explosions. The division provides chemical and forensic science expertise, as well as technical advice and resources for experimental testing and research in the physical sciences.

Vehicle Recorder Division

The Vehicle Recorder Division extracts, formats, and analyzes data from aircraft flight data recorders (FDRs) and cockpit voice recorders (CVRs), and from recorders installed in locomotives, large ships, and some highway vehicles. Engineers also examine recorded electronic audio and video information captured by aircraft, ship, train, and support communication systems; provide electronic engineering expertise for all accident investigation modes in examining communication and control systems; provide time synchronization to correlate voice, data, and video recorder outputs; use advanced digital and analog filtering and signal representation techniques to extract critical recorder information; and perform forensic examinations of personal electronic devices and other computer hardware.

Vehicle Performance Division

The Vehicle Performance Division provides specialized aeronautical, mechanical, structural, and biomechanical engineering expertise; three-dimensional laser scanning and accident reconstruction; photogrammetry and video analysis; and animation and graphics development for all modes. Engineers use computational and visualization technology to provide accurate time-motion histories of the sequence of events and evaluate data from multiple sources to determine vehicle and occupant motion and the underlying causes of that motion. Engineers also develop video animations of accident scenarios, evaluate occupant injury mechanisms, and participate in and direct research into special projects as required.

Program Area - Medical Investigative Consultation Program

RE medical staff evaluates the medical aspects of investigations, including medical fitness, pathology, toxicology, injury causation, and biomechanics. Examples of medical issues addressed include operator incapacitation, injury prevention, night vision, hypoxia, substance impairment, obstructive sleep apnea, and use of prescription and over-the-counter medications as well as illicit substances.

Program Area - Chief Data Scientist

The Chief Data Scientist supports the agency-wide effort to better utilize data for strategic decision-making, and is designated the agency's Chief Data Officer as required by the Foundations for Evidence-Based Policymaking Act of 2018. The Chief Data Scientist is also responsible for the application of machine learning and advanced data science methods and techniques to support agency investigations and research, analysis, and reporting of emerging transportation safety trends.

Accomplishments and Ongoing Efforts

Safety Research Division

In a typical year, Safety Research Division analysts complete more than 250 requests for data reports, geospatial maps, and statistical analysis from NTSB Board Members and offices, Congress, transportation industry, and the public. The division completed 261 of these requests in FY 2019. In addition to supporting accident investigations, the division compiled and published two aviation accident statistical reviews, conducted a transportation safety research study, and developed safety recommendations for the study report. Below are some examples of these efforts:

Bicyclist Safety on US Roadways: Crash Risks and Countermeasures
Safety Research Study and Report

Bicyclists, like pedestrians and motorcyclists, are considered vulnerable road users because they are not protected by an enclosed vehicle compartment, which makes the likelihood of injury or death much greater in the event of a crash with a motor vehicle. In 2016, more than 800 bicyclists died and almost 200,000 were injured in motor vehicle crashes in the United States. On September 12, 2019, division analysts submitted an in-depth analysis of bicyclist crash risks and select countermeasures designed to improve bicyclist safety. The research goals were to (1) describe fatal and nonfatal injury trends associated with bicycle crashes involving motor vehicles, (2) examine the scope and nature of bicyclist crash and injury risk factors and assess data limitations, (3) identify proven safety countermeasures that may be underused, (4) assess obstacles that may interfere with the full use of the identified countermeasures, and (5) explore emerging issues that are relevant to bicycling safety. The final study report will be presented to the NTSB Board Members for their consideration on November 5, 2019.

Report in Process

Electric Vehicle Battery Fires
Safety Report

The relative likelihood of fuel system fires associated with electric vehicle batteries compared to vehicles with gasoline-fueled internal combustion engines is an emerging highway safety question of interest. Division analysts provided a data report on the prevalence of electric vehicle battery fires and assisted with the development of recommendations in support of the multiple highway safety investigations involving electric vehicles (from 2017-2018) that are being analyzed for this safety report.

Report in Process

2016 US Civil Aviation Accident Summary
2017 Preliminary Aviation Accident Statistics
Annual Reports

Staff compiled, organized, and summarized the agency's *2016 Summary of US Civil Aviation Accidents*, which was published online December 19, 2018, as well as the 2017 preliminary aviation accident data and statistics, released November 1, 2018. Staff also wrote structured query language scripts and other computer code to extract, clean, and compile these data and their associated graphs and charts.

Accident Investigations:

Amtrak Passenger Train Head-On Collision With Stationary CSX Freight Train
Cayce, South Carolina
February 4, 2018

On February 4, 2018, about 2:37 a.m. local time, southbound Amtrak train 91, operating on a track warrant, was diverted from the main track through a reversed hand-throw switch into a siding and collided head-on with a stationary CSX local freight train. Division analysts provided a data report addressing rail accidents associated with improperly lined switches in the United States from 2013 to 2017 and developed geospatial mapping products for the investigation.

Report Adopted: July 23, 2019

Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017

Three passengers were killed and 65 others including passengers, crew and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Report Adopted: May 21, 2019

Motorcoach Roadway Departure and Crash Into Ravine
Loxley, Alabama
March 13, 2018

One driver was killed and 46 passengers were injured when a 2018 Prevost 56-passenger motorcoach departed Interstate 10 and fell into Cowpen Creek ravine near Loxley, Alabama. Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Report Adopted: May 10, 2019

Diving vessel *CONCEPTION* sunk after fire
Santa Cruz Island, California
September 2, 2019

A 75-foot commercial diving vessel *Conception,* with 39 persons on board burned to the waterline and subsequently sank in about 60 feet of water. Thirty-three passengers and one crewmember died. Division analysts provided a data report on accidents involving diving and other charter operations for the investigative launch team.

Investigation in Process

Truck Tractor Combination Vehicle Cross-Median Collision With Passenger Van, Combination Vehicle, and Pickup Truck
Gainesville, Florida
January 3, 2019

Two combination vehicle drivers and 5 van passengers were killed, and multiple other van passengers were injured when a 2018 truck tractor in combination with a van semitrailer crossed the center median of Interstate 75 and collided with a 2006 Chevy van operated by a church group, a second combination vehicle, and a 2006 Chevy pickup truck near Gainesville, Florida. Division analysts provided a data report addressing median crossing accident statistics and developed geospatial mapping products for the investigation.

Investigation in Process

Duck Boat Capsize and Sinking
Branson, Missouri
July 19, 2018

Seventeen passengers were killed when the amphibious passenger vessel *Stretch Duck 7*, owned and operated by Ride the Ducks Branson, sank in Table Rock Lake, near Branson, Missouri. Division analysts provided a preliminary data report on similar vessel accidents over a 20-year period and are completing an in-depth data report on small passenger vessel accidents in support of this investigation.

Investigation in process

Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured when a partially constructed pedestrian bridge crossing an eight-lane roadway in Miami, Florida, experienced a structural failure and collapsed.

Division analysts provided geographic information and developed geospatial mapping products for the investigation.

Investigation in process

Materials Laboratory Division

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

In-flight Breakup of a Piper PA28
Daytona Beach, Florida
April 4, 2018

The airplane collided with terrain following an in-flight breakup shortly after takeoff from Daytona Beach International Airport, Daytona Beach, Florida. The airplane was registered to and operated by Embry-Riddle Aeronautical University, under the provisions of 14 *CFR* Part 91 as an instructional flight. The left wing was found separated from the aircraft near the wreckage location. The pilot and instructor were fatally injured. Staff conducted a metallurgical failure analysis of the left-wing main-spar lower cap and supported nondestructive evaluation inspection techniques.

Report adopted September 3, 2019

Building Explosion and Fire
Silver Spring, Maryland
August 10, 2016

A 14-unit apartment building in Silver Spring, Maryland, partially collapsed due to a natural gas-fueled explosion and fire. The explosion and fire also heavily damaged an adjacent apartment building, which shared a common wall with the first building. As a result of this accident, 7 residents died, 65 residents were transported to the hospital, and 3 firefighters were treated and released from the hospital. Staff conducted a metallurgical failure analysis of the jurisdictionally service piping, evaluated gas regulators, and created computation fluid dynamics models for the gas-filling process in the building's basement utility room.

Report adopted April 24, 2019

Explosion and Fire aboard Articulated Tug and Barge *Buster Bouchard/B. No. 255*
Port Aransas, Texas
October 20, 2017

While getting under way from Anchorage, the articulated tug and barge suffered an explosion and subsequent fire occurred on its bow. Two barge crewmembers who were on the bow were killed in the explosion. Staff conducted on scene fire, explosion, and metallurgical examinations and conducted a metallurgical failure analysis of a forward bulkhead.

Report adopted April 18, 2019

Rupture of a DOT-105 Rail Tank Car and Subsequent Chlorine Release at Axiall Corporation
New Martinsville, West Virginia
August 27, 2016

A railroad tank car sustained a 42-inch long crack in its tank shell shortly after being loaded with 178,400 pounds of liquefied compressed chlorine at the Axiall Corporation Natrium plant. Over the next 2.5 hours, the entire load of chlorine was released and formed a large vapor cloud that migrated south along the Ohio River valley. The accident tank car had recently been overhauled, repaired, and inspected, and this was its first use since its return to service. Staff conducted a metallurgical failure analysis of the fracture and studied nondestructive evaluation options for welds and repair welds.

Report adopted February 11, 2019

Diving vessel *CONCEPTION* sunk after fire
Santa Cruz Island, California
September 02, 2019

A 75-foot commercial diving vessel *Conception,* with 39 persons on board, burned to the waterline and subsequently sank in about 60 feet of water. Thirty-three passengers and one crewmember died. Staff provided fire and explosion expertise—examining the vessel wreckage and determination of the fire origin, cause, and tenability.

Investigation in Process

Natural Gas Pipeline Rupture and Fire
Danville, Kentucky
August 01, 2019

A 30-inch-diameter natural gas transmission pipeline owned and operated by Enbridge Inc. ruptured and released about 66 million cubic feet of natural gas which ignited. The accident resulted in the death of 1 person, the hospitalization of 6 people and the evacuation of 75 residents from the Indian Camp mobile home park The fire destroyed 5 nearby

residences, damaged 14 other residences, and burned about 30 acres of land including railroad tracks owned and operated by Norfolk Southern Corporation. Staff provided metallurgical expertise at the accident scene, determined the key evidence to examine, and performed a full metallurgical failure analysis of the failed pipe section.

Investigation in Process

Median Cross-Over Crash Involving a Combination Vehicle and a Motorcoach
Thoreau, New Mexico
August 30, 2018

A truck-tractor in combination with a van semitrailer was traveling eastbound on Interstate 40 (I-40), near Gonzales, in McKinley County, New Mexico. At the same time, a motor coach operated by Greyhound Lines Inc. was traveling westbound on I-40. The combination vehicle experienced an issue with the left wheel/tire on the steer axle, crossed the center median, and entered the westbound lanes, where it collided with the motor coach. As a result of the crash, seven motor coach occupants were fatally injured. Staff conducted a failure analysis of a front tire from the combination vehicle.

Investigation in Process

Southwest Airlines Engine Incident
Philadelphia, Pennsylvania
April 17, 2018

Southwest Airlines flight 1380, a Boeing 737-700, N772SW, experienced a failure of the left CFM International CFM-56-7B engine and loss of engine inlet and cowling during climb about flight level 320 (32,000 feet). Fragments from the engine inlet and cowling struck the wing and fuselage, resulting in a rapid depressurization after the loss of one passenger window. Staff conducted a metallurgical failure analysis of the failed engine fan blades and developed crack growth rate data to enable remediation.

Investigation in Process

Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured, when a partially constructed pedestrian bridge crossing an eight-lane roadway in Miami, Florida, experienced a structural failure and collapsed. Staff analyzed the metallurgical and materials engineering failure and oversaw both the mechanical testing of concrete and reinforcing steel and the animation development of the collapse sequence.

Investigation in process

High-Pressure Hydrogen Gas Cylinder Fire During Transportation
Diamond Bar, California
February 11, 2018

An Air Products and Chemicals Inc. module of 25 horizontally mounted high-pressure gas cylinders loaded with 240 kilograms of compressed hydrogen caught fire while being transported. About 500 persons within a 10-block business district were evacuated. Staff conducted metallurgical evaluations of pressure release devices.

Investigation in Process

Vehicle Recorder Division

In a typical year, the Vehicle Recorder Division's laboratories process about 400 recording devices and complete essential readouts, transcripts, and studies for aviation, rail, marine, and highway investigations. Here are some examples of these efforts:

Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017

Three passengers were killed and 65 others including passengers, crew, and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. NTSB recorder specialists recovered and reviewed data from locomotive event data recorders, on-board image recorders, and the engineer's continuous positive airway pressure (CPAP) machine. The event and image recorders had been damaged by the accident and exposed to rain for several hours prior to their recovery. The NTSB's Vehicle Recorder Laboratory used established procedures and protocols to recover the recorded event and video data, including data from inward-facing video that had captured the operating compartment. These data were crucial in reconstructing the events leading up to the accident. The data from the CPAP machine was used by the NTSB's medical officers in their investigation of the engineer's medical history.

Report Adopted May 21, 2019

Ethiopian Airlines Flight 302
Addis Ababa, Ethiopia
March 10, 2019

A Boing 737 MAX 8 aircraft operated by Ethiopian Airlines crashed approximately 6 minutes after takeoff, killing all 157 people aboard. NTSB recorder specialists were extensively involved in the recovery and interpretation of data from the FDR and CVR, which had both been severely damaged. Recorder specialists in the United States identified

the components and procedures necessary while another specialist traveled to Paris, France, to assist directly in the data recovery. Numerous challenges were overcome during the recovery process, aided by the unique expertise brought to the table by the NTSB's recorder specialist. Once the data was recovered, the specialist continued to Addis Ababa to continue the interpretation and analysis of the data and audio. The recovered information has been key to reconstructing the events of the accident flight.

Investigation in process

Tesla Model 3 Accident with Combination Vehicle
Delray Beach, Florida
March 1, 2019

The driver of a Tesla Model 3 was killed when the vehicle collided with a combination vehicle, shearing off the roof of the Model 3 as the vehicle under-rode the combination vehicle's trailer. This accident highlights the continued challenges and opportunities in the emerging area of autonomous and semi-autonomous vehicle systems. NTSB recorder specialists analyzed multiple sources of data including airbag module data, outward-facing video, and vehicle telemetry data provided by the manufacturer. Specialists needed to work with the manufacturer in order to properly understand, validate, and interpret the data. This accident will increase the NTSB's expertise in handling future accidents involving autonomous and semi-autonomous vehicles.

Investigation in process

Duck Boat Capsize and Sinking
Branson, Missouri
July 19, 2018

Seventeen passengers were killed when the amphibious passenger vessel *Stretch Duck 7*, owned and operated by Ride the Ducks Branson, sank in Table Rock Lake, near Branson, Missouri. The vessel was equipped with an on-board digital video recorder (DVR) containing a hard drive and memory card that was retrieved from the submerged wreckage and sent to the NTSB's Vehicle Recorder Laboratory. The lab used established procedures and protocols for drying and recovering data from those devices as well as numerous other electronic devices including cell phones and a digital camera. The video recovered from the DVR was crucial in aiding the investigation in the areas of operations, human factors, and meteorology. A recorder specialist traveled to the accident site to facilitate an on-scene review of the recorded video to aid investigators. Recorder specialists also facilitated the transcription of audio and video from the DVRs of *Stretch Duck 7* and her sister vessels from the accident date, performed time correlations, and used advanced digital signal–processing techniques to improve the intelligibility of the audio recordings.

Investigation in process

Vehicle Performance Division

In a typical year, Vehicle Performance staff members produce about 55 study reports and animations, launch to accident sites to acquire evidence for performance reports, and participate in the development of safety recommendations and modal accident reports. Here are some examples of these efforts through September 30, 2019:

Departure From Controlled Flight Trans-Pacific Air Charter, LLC Learjet 35A, N452DA
Teterboro, New Jersey
May 15, 2017

A Gates Learjet 35A departed controlled flight while on a circling approach to runway 1 at the Teterboro Airport and impacted a commercial building and parking lot. The two pilots onboard the aircraft died. Staff evaluated the vehicle performance and developed an animation depicting the sequence of events during the accident flight.

Report Adopted March 12, 2019

Motorcoach Run-Off-the-Road and Overturn US Highway 83
Laredo, Texas
May 14, 2016

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, departed the east side of the highway and, after entering the earthen right-of-way, overturned onto its left side. Nine passengers died, 36 passengers experienced minor-to-serious injuries, and the motorcoach driver and trip coordinator were treated for minor injuries. Staff performed simulations to show that the departure from the roadway was caused by driver input, possibly in reaction to the wet, slippery conditions.

Report Adopted November 7, 2018

Derailment and Hazardous Materials Release of Union Pacific Railroad Unit Ethanol Train
Graettinger, Iowa
March 10, 2017

On March 10, 2017, at 12:50 a.m. local time, 20 cars of a Union Pacific unit train derailed near Graettinger, Iowa; 14 of the cars released about 322,000 gallons of ethanol, causing a fire. As an investigation tool, staff used Google Earth to display recorded video, audio, and parametric data and to animate the sequence of events; the final animation developed in

Google Earth was shown at the Board Meeting.

Report adopted October 30, 2018

Pickup Truck Centerline Crossover Collision with Medium Bus on US Highway 83
Concan, Texas
March 29, 2017

About 12:20 p.m. local time on March 29, 2017, a 20-year-old male driver in a 2007 Dodge Ram 3500 pickup truck traveling north on U.S. Highway 83 collided with a southbound medium-size bus, occupied by a 67-year-old driver and 13 passengers. The bus driver and 12 of the 13 bus passengers were killed, and the truck driver and one bus passenger suffered serious injuries. For the Board Meeting, staff used image stabilization software on a hand-held cell phone video taken from a vehicle behind the pickup truck and then extracted clips from the stabilized video to show the erratic path of the pickup truck before the accident.

Report adopted October 16, 2018

Robinson R-44 Collision with the Ground
Hayward, California
July 15, 2019

On July 15, 2019, at 2:26 p.m. local time, a Robinson R44 II helicopter, N144TG, was substantially damaged during a low altitude maneuver at Hayward Executive Airport (HWD), Hayward, California. The commercial pilot was fatally injured and the student pilot was seriously injured. Staff developed new algorithms and custom software unique to this case to analyze video recorded by a fixed camera installed on a nearby building that showed the shadow of the helicopter on the ground. From this, staff was able to obtain quantitative estimates of the helicopter ground track, heading, and roll angle up to the time when it impacted the ground.

Investigation in Process

Beech BE-300 Collision with Hangar after Takeoff
Addison, Texas
June 30, 2019

On June 30, 2019, about 9:11 a.m. local time, a Beech BE-300, N534FF, collided with a hangar and terrain after takeoff from Addison Airport (KADS), Addison, Texas. The airline transport pilot, the commercial co-pilot, and eight passengers sustained fatal injuries, and the airplane was destroyed. A postimpact fire ensued. Staff performed a detailed video analysis of surveillance video which captured the accident sequence. From this ground track, altitude, speed, roll angle and pitch angle of the airplane during the last 8 seconds of flight were quantitatively derived that ended when the airplane impacted a

hangar.

Investigation in Process

Beech 65A90 Skydiving Aircraft Impact with Terrain After Takeoff
Mokuleia, Hawaii
June 21, 2019

On June 21, 2019, about 6:20 p.m. local time, a Beech 65-A90, N256TA, operating as a local sky-diving flight under the provisions of Title 14 CFR Part 91, collided with terrain following takeoff from Dillingham Airfield, Mokuleia, Hawaii. The commercial pilot and ten passengers sustained fatal injuries, and the airplane was destroyed. Limited video footage from a security camera located at the end of the runway was recovered for the accident. The airplane did not have (nor require) a Flight Data recorder, and no radar data were available. Staff performed weight and balance calculations showing that the airplane was loaded at or beyond the allowable aft center of gravity limit and analyzed flight test data provided by Beechcraft that indicates the accident airplane was likely operating in an area of the flight envelope with reduced or negative longitudinal stability.

Investigation in Process

Midair Collision Between a De Havilland DHC-2 and a DHC-3 Aircraft
Ketchikan, Alaska
May 13, 2019

On May 13, 2019, about 12:21 p.m. local time, a float-equipped De Havilland DHC-2 (Beaver) airplane, N952DB, and a float-equipped De Havilland DHC-3 (Turbine Otter) airplane, N959PA, collided in midair, about 7 miles northeast of Ketchikan, Alaska. The DHC-2 commercial pilot, and four passengers sustained fatal injuries. The DHC-3 airline transport pilot sustained minor injuries, nine passengers sustained serious injuries, and one passenger sustained fatal injuries. The DHC-2 was destroyed during the collision, uncontrolled descent, and impact with tree covered terrain and water. The DHC-3 sustained substantial damage during the collision and impact with the water. Staff used radar, Automatic Dependent Surveillance-Broadcast (ADS-B), and recorded global positioning system (GPS) data recovered from the accident aircraft to determine a time history for the relative position of aircraft and the collision geometry. Staff performed detailed FARO FOCUS 3D laser scans of two exemplar aircraft. Advanced analysis and modeling software developed in-house (DANTE) was used to fuse this data into a simulation illustrating the likely appearance and visibility of each aircraft to the pilot of the other aircraft. Staff is also using MATLAB to reconstruct the appearance of the electronic displays in each aircraft illustrating the traffic information likely displayed to the pilot of each aircraft.

Investigation in Process

Miami Air International B-737-800 Landing Overrun
Jacksonville, Florida
May 3, 2019

On May 3, 2019, at 9:42 p.m. local time, Miami Air International flight 293, a Boeing 737-81Q, N732MA, departed the end of the runway 10 at Jacksonville Naval Air Station (KNIP), Jacksonville, Florida, and came to rest in shallow water in St. Johns River. There were no serious injuries to the 142 passengers and crew onboard. The airplane was substantially damaged. Staff used recorded FDR data along with GPS and runway condition data collected on-scene to analyze the motion of the aircraft and derive the physical forces acting on aircraft throughout accident. Staff employed a Trimble Geo7x survey-grade handheld GPS receiver to document runway geolocation data, and an ELA Textur runway macrotexture laser scanner to document runway surface characteristics. Staff used advanced analysis and modeling software developed in-house (DANTE) to fuse this data and obtain a derivation of the wheel braking coefficient acting of the aircraft and an evaluation of runway friction performance and airplane anti-skid system performance.

Investigation in Process

Ethiopian Airlines Flight 302
Addis Ababa, Ethiopia
March 10, 2019

A Boing 737 MAX 8 aircraft operated by Ethiopian Airlines crashed approximately 6 minutes after takeoff, killing all 157 people aboard. Staff are supporting the investigation through evaluations of aircraft performance and the pilots' interactions with the control systems. Staff will also assist with validating planned pilot-in-the-loop simulations.

Investigation in Process

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

On February 23, 2019, about 12:30 p.m. local time, Atlas Air flight 3591, a Boeing 767-300, N1217A, entered a rapid descent from 6,000 feet and impacted a marshy bay area about 30 miles from Houston George Bush Intercontinental Airport (IAH), Houston, Texas. The airplane was destroyed and highly fragmented. Two pilots and one non-revenue jumpseat pilot were fatally injured. Based on meteorological and ADS-B data, Flight 3591 had just penetrated a cold front and entered instrument meteorological conditions shortly before the final descent. Staff used ADS-B data to investigate the possibility of spatial disorientation.

Investigation in Process

2001 Ford Excursion Limousine Accident
Schoharie, New York
January 3, 2019

A 2001 Ford Excursion, modified post-manufacture into a limousine by extending the body to accommodate a bar and additional passenger seating, crashed at a high rate of speed after failing to stop at a stop sign after descending a steep grade. No changes were made to the original braking system to accommodate the additional weight resulting from these modifications. A total of 17 fatalities resulted from the accident. Staff is leading a study to understand the overall adequacy of the Original Equipment Manufacturer/Original Equipment Supplier (OEM/OES) braking system on the vehicle for the weight of the modified vehicle. Staff is developing full scale vehicle testing including dynamometer tests to evaluate how this additional weight would have affected the performance of the OEM/OES braking system with concentration on the increased risk for brake fade. Advanced vehicle dynamics modeling software (CarSim) will be employed to evaluate the performance of the braking system as the limousine made its final descent down the steep grade before the crash.

Investigation in Process

Cessna 500 Departure from Controlled Flight on Landing
Fargo, ND
November 30, 2018

On November 30, 2018, about 1:49 p.m. local time, a Cessna 550 Citation II, N941JM, departed controlled flight while on approach to Hector International Airport (FAR) in Fargo, North Dakota, and impacted terrain to the right of the runway. The pilot and one passenger were not injured, and 9 passengers received minor injuries. Instrument meteorological conditions prevailed at the time of the accident, and the flight was operating on an instrument flight plan. The accident airplane did not have (nor require) a flight data recorder. Staff used flight-test validated simulation models to "fly through" the available radar data and show that the flight likely stalled during the last 2 minutes of the approach as the airplane continued to fly without ice protection into areas where ice had been both forecast and reported. The simulation provided valuable insight into critical aerodynamic parameters that would not otherwise be available.

Investigation in Process

Collapse of Pedestrian Bridge Under Construction
Miami, Florida
March 15, 2018

One bridge worker and five vehicle occupants were killed, and five bridge workers and five other people were injured when a partially constructed pedestrian bridge crossing an eight-lane roadway separating Florida International University from the City of Sweetwater in Miami, Florida, experienced a structural failure and collapsed. Staff created

a detailed three-dimensional computer model and overlaid laser scan and photogrammetric point clouds on the model to assist with documenting the elements associated with the collapse. Staff also created a combined animation and video visualization used at the Board Meeting (held in October 2019) for the investigation.

Investigation in Process

Sightseeing Helicopter Loss of Engine Power and Descent into the East River
New York, New York
March 11, 2018

An Airbus Helicopters AS350B2, operated by Liberty Helicopters Inc. through a contractual agreement with NYONair, was substantially damaged when it impacted the East River and subsequently rolled inverted after the pilot reported a loss of engine power. The pilot, who sustained minor injuries, was able to escape the sinking helicopter, but the five passengers were not, and all five died. Staff are evaluating the aircraft performance and rate of descent into the river through recorded radar data along with onboard and witness videos. Staff are also creating an animation illustrating the sequence of events in the accident, to be used at the Board Meeting for the investigation.

Investigation in Process

Aircraft Investigators Performance (AIP) Workshop

Aircraft Investigators Performance is an international organization comprising governmental accident investigators focused on vehicle performance work. Currently, membership consists of investigators from the NTSB, the French Bureau of Enquiry and Analysis for Civil Aviation Safety (BEA), the TSB of Canada, the National Research Council (NRC) of Canada, the Air Accidents Investigation Branch (AAIB) from the United Kingdom, the Australian Transport Safety Board, and the Russian Interstate Aviation Committee (MAK). Membership meets yearly both in person and via teleconference to discuss aviation performance work related to accident investigations. Topics include aircraft performance simulation, video analysis, estimation of aerodynamic coefficients, and animation of results. The goal of the group is to share knowledge across organizations to further improve each agency's work in the area of accident aircraft performance

Medical Investigative Consultation Program

Medical staff participate in numerous NTSB accident investigations in all transportation modes each year, evaluating and addressing medical issues through formal factual and analytical reports, safety recommendations, coordination with other agencies, and formal presentations to the NTSB and external audiences. In FY 2019, medical staff completed

110 medical accident investigations and completed more than 175 reports for these cases. Here are some examples of recent efforts:

Head-on Collision Between Amtrak Passenger Train and CSX Freight Train
Cayce, South Carolina
February 4, 2018

On February 4, 2018, about 2:27 a.m. local time, southbound Amtrak train 91, operating on a track warrant, diverted from the main track through a hand-thrown switch into a siding and collided head-on with a stationary CSX freight train. Medical staff participated in the on-scene investigation, performed fitness-for-duty evaluations of the two train crews, and performed the injury evaluation of the train occupants.

Report Adopted July 23, 2019

Amtrak Passenger Train 501 Derailment
DuPont, Washington
December 18, 2017

Three passengers were killed and 65 others including passengers, crew, and occupants of highway vehicles were injured when Amtrak train 501, traveling at 78 mph, derailed from a highway overpass near DuPont, Washington. Medical staff participated in the on-scene investigation, evaluated the involved train crew for fitness-for-duty, reviewed relevant video, and assisted with the description of the injuries to the train occupants and highway vehicle occupants. By downloading and reviewing data from the engineer's CPAP machine, medical staff were able to eliminate fatigue as a contributor to this accident.

Report Adopted May 21, 2019

Motorcoach Roadway Departure and Crash Into Ravine
Loxley, Alabama
March 13, 2018

About 5:28 a.m. local time on March 13, 2018, a 2018 Prevost 56-passenger motorcoach, occupied by a 65-year-old male driver and 46 passengers, was traveling westbound on Interstate 10 (I-10) in Baldwin County near Loxley, Alabama. The crash event began when the 2018 Prevost motorcoach departed the westbound lanes, crossed the center median, and traveled across the two opposing eastbound travel lanes and onto the shoulder, striking the guardrail adjacent to the south shoulder of the roadway. The guardrail redirected the motorcoach, which then crossed the eastbound travel lanes in the opposite direction, returning to the center median. Medical staff performed the medical evaluation of the driver, who was witnessed to have become incapacitated at the time of the deviation from

the roadway, but were unable to determine the exact cause of his incapacitation.

Report Adopted May 10, 2019

Motorcoach Run-Off-the-Road and Overturn US Highway 83
Laredo, Texas
May 14, 2016

On May 14, 2016, shortly before 11:24 a.m. local time, a 1998 Van Hool 49-passenger motorcoach, operated by OGA Charters LLC of San Juan, Texas, was traveling northbound on US Highway 83 near Laredo, Texas. The motorcoach entered a horizontal curve to the right, departed the east side of the highway, and, after entering the earthen right-of-way, overturned onto its left side. Medical staff performed a fitness-for-duty evaluation of the motorcoach driver, who was found to have poorly controlled diabetes that likely reduced his vision at the time of the crash.

Report Adopted November 7, 2018

TRAINING CENTER

	($000s)	FTEs
FY 2020 Estimate	$1,207	4
FY 2021 Request	$1,216	4
Increase/Decrease	$9	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The NTSB Training Center is an organizational component of the Office of the Managing Director. Budget exhibits have historically shown these activities as program resources outside the policy and direction line that incorporates the Office of the Managing Director. The Training Center is responsible for training NTSB staff and our partners in investigations, for developing training plans, and for overseeing the development and implementation of workforce development programs.

Accomplishments and Ongoing Efforts

The Training Center continues to move forward in its evaluation of courses to further refine the offerings and improve instruction in all areas of technical, investigative, supervisory, and leadership development, and other mission support. The center offers course content in investigative skills that target processes, procedures, and technical issues critical to the agency's mission of accident investigation. The center adds new courses and initiatives in response to senior leadership strategic priorities for the agency's workforce. These courses are generally open only to NTSB investigative and support staff.

In FY 2019, the Training Center implemented FedTalent, its new learning management system, to aid in scheduling, approving, delivering, and evaluating all agency training. The system tracks and maintains a permanent record of all staff education and training activities and will provide a valuable tool for tracking staff competencies and skills. Additional capabilities, such as the ability to create and track progress on Individual Development Plans, will be added as they become available.

Full-time training officers and advisers coordinate the development of group training by regularly conducting needs analyses and assessments for each office and by focusing on longer-term training requirements. Workforce development course offerings undergo continuous evaluation and improvement to adapt to the NTSB's changing needs and

priorities. The skills developed and enhanced by workforce development training are highly transferable and add significant value to the investigative and mission support functions.

These are some of the ongoing activities of the Training Center:

- ***Providing general aviation forums/symposia*:** Several years ago, the Training Center developed and hosted a Volunteer Pilots Safety Stand Down Day. The success of this safety seminar prompted the Training Center to develop and present other seminars on a regular and continuing basis. The NTSB partners with the FAA and other interested groups to develop programs addressing the regulatory and private aspects of general aviation safety. In the last several years we have produced 16 safety seminars on various topics that have received high marks from the aviation community. In December 2018, the Training Center and AS staff delivered a safety seminar on Night Flying, addressing the risks involved when pilots operate under nighttime conditions. In March 2019, the Training Center and AS staff delivered the third annual Inspection Authorization Renewal Safety Seminar.

  Future safety seminars will continue to concentrate on areas of general aviation operations that have the highest fatality rates and on emerging and trending issues identified by an increasing number of accidents. As appropriate, the Training Center continues to partner with other federal agencies and such private organizations as the Aircraft Owners and Pilots Association, the Experimental Aircraft Association, and the Society of Aviation and Flight Educators.

- ***Expanding workforce development for all NTSB Staff*:** We continue to expand the course offerings for NTSB career professionals. After much success in the past year, we continued online retirement planning training in FY 2019. Online training helps to address the needs of our regional and teleworking personnel, as well as those of investigative staff whose on-call status demands greater scheduling flexibility. During FY 2019 we entered into interagency partnerships with the US Department of Interior and the Treasury Executive Institute to provide required training for contracting officers and new supervisors, and to greatly expand the leadership and managerial development course offerings available to the agency's senior executives, managers, and aspiring leaders. We also continued our participation in the Federal Small Agency Council's training cooperative, sharing excess course capacity among agencies. The workforce development curriculum is designed to address important cross-functional technical, administrative, and leadership competencies at the agency.

- ***Strongly emphasizing technical training for NTSB investigators*:** We continue to upgrade and refine investigators' skills with such upcoming courses as Cognitive Interviewing, Accident Site Photography, Investigating Human Fatigue Factors, and Project Management.

- ***Offering investigation courses for federal agencies and external stakeholders:*** The Training Center is often contacted to develop and present classes for other agencies in

aviation accident investigation and in other modes of transportation. Thus far, the Training Center has developed and provided training for the US Department of Energy, the FBI, the US Army National Guard, and the Coast Guard. Through September 30, 2019, we held four classes for the Coast Guard and conducted training for external stakeholders Air Methods, Alaska Air, Dallas-Ft. Worth International Airport, Delta Airlines, Cathay Pacific Airways, and Air New Zealand on managing communications during a major transportation accident. We continue to present both a 2-week Aircraft Accident Investigation class (now in its 10th year), and a 1-week Helicopter Accident Investigation class for the US Army National Guard, as well as courses in Advanced Aircraft Mishap Analysis and Reporting, and Advanced Marine Mishap Analysis and Reporting for the Coast Guard. Employees from the DOT and its modal administrations also attend many of our courses.

- ***Evaluating and updating current courses and developing courses to produce new revenue streams.*** The Training Center staff evaluates each course that we offer and makes swift and necessary adjustments for the next offering. We continuously evaluate and update content with more recent examples and case studies to enhance learning and add modules as necessary based on upcoming and new transportation tools.

- ***Continuing to increase awareness of the NTSB and its mission by offering TWA 800 briefings to other federal agencies and groups involved with transportation safety and security, and to promote interest in transportation safety-related science, technology, engineering, and math careers.***

FY 2019 Activities

Courses With External Enrollment	Students
Courses at Training Center:	
Aircraft Accident Investigations Orientation for Aviation Professionals (offered twice)	53
Cognitive Interviewing (offered twice)	40
Family Assistance (offered twice)	93
Aircraft Accident Investigations (offered twice)	95
Investigating Human Fatigue Factors	24
Inspection Authorization Renewal Safety Seminar	94
Accident Site Photography	13
Managing Communications Following an Aircraft Accident or Incident	90
Helicopter Accident Investigation	25
Accident Investigation Orientation for Rail Professionals	41
Highway Crash Investigation	13
Marine Accident Investigation	85
Night Flying Safety Seminar	65

Courses With External Enrollment	Students
Attendance Subtotal– Courses at Training Center	**731**
Offsite Courses:	
Managing Communications During a Major Transportation Accident – Cathay Pacific Airways	29
Managing Communications During a Major Transportation Accident – Delta Airlines	51
Managing Communications During a Major Transportation Accident – Air New Zealand	68
Managing Communications During a Major Transportation Accident – Alaska Air	62
Managing Communications During a Major Transportation Accident – Air Methods	84
Managing Communications During a Major Transportation Accident – Dallas-Ft. Worth International Airport	35
Attendance Subtotal – Off Site Courses	**329**
Private Courses at Training Center:	
Advanced Aircraft Mishap Analysis and Reporting – Coast Guard (offered twice)	118
Advanced Marine Mishap Analysis and Reporting – Coast Guard (offered twice)	111
Aircraft Accident Investigation – Army National Guard	36
Subtotal Attendance – Private Courses at Training Center	**265**
Total Attendance – Courses with Public Enrollment (October 1, 2018 – September 30, 2019)	**1,325**

Courses Conducted Exclusively for NTSB Employees	Students
A Prescription to Relieve Financial Stress	5
Audio Books	104
Building Resiliency After a Distressing Event	13
Civil Service Retirement System (CSRS) Retirement Planning – Part I	5
Civil Service Retirement System (CSRS) Retirement Planning – Part II	8
Civil Treatment Employee Training Webinar	28
Comprehensive Project Management: Principles for Project Managers	16
Covey's 7 Habits for Managers	15
Hazwoper Refresher 8-hour course	34
Mid-Career Retirement Planning	48
Federal Employees Retirement System Retirement Planning	37
Civil Service Retirement System Retirement Planning	9
Social Security & Medicare	44
Federal Insurances	36
Financial Planning	31

Courses Conducted Exclusively for NTSB Employees	Students
Income Tax Planning	16
Transition to Retirement	10
Project Management: PMP Prep	4
The Path to Becoming Highly Effective	11
Media Training for NTSB Investigators	21
Confined Space Entry (offered twice)	24
Contracting Officer's Representative (COR) Level II	15
Covey's 7 Habits for Managers	13
Crane Operator Safety	3
Crucial Accountability	11
EEO for Supervisors and Managers	19
Estate Planning – Part I	3
Estate Planning – Part II	11
Federal Insurances	36
FERS Benefits for Mid-Career Planning – Part I	18
FERS Benefits for Mid-Career Planning – Part II	15
FERS Retirement Benefits – Part I	12
FERS Retirement Benefits – Part II	14
Financial Planning – Getting Organized	23
Financial Planning – Have a Plan	11
Forklift Operator	4
Get Control: Time Management and Productivity Series	15
Hazwoper Refresher – 24-hour course (online)	1
Hazwoper Refresher – 8-hour course (offered twice)	32
Hazwoper Refresher – 8-hour course (online)	2
Income Tax Planning	11
Institute for Management Studies	6
Foreign Language Training	38
Media Training for NTSB Investigators	21
Mid-Career Retirement Planning	48
NTSB 101 – New Employee Orientation (offered twice)	33
OSHA 2225 Respiratory Protection and Fit Test	93
Project Management Application (PMA) Basics	8
Project Management PMP Prep	19
SeaFloor Investigations Workshop	16
Social Security and Medicare	10
Strategies for Managing Stress	8
The Path to Becoming Highly Effective	10
The Power of Positivity	12

Courses Conducted Exclusively for NTSB Employees	Students
The Struggle is Real: Strategies for Time Management	23
Transition to Retirement	12
US Constitution Training	350
Using the PMA Copy Feature and Mail Merge	4
What We All Need to Understand About Mental Health	13
Workplace Communication	4
Attendance Total – Courses Conducted Exclusively for NTSB Employees (October 1, 2018 – September 30, 2019)	**1,516**

ADMINISTRATIVE LAW JUDGES

	($000s)	FTEs
FY 2020 Estimate	$2,313	9
FY 2021 Request	$2,397	9
Increase/Decrease	$84	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The NTSB serves as the court of appeals for airmen and aircraft mechanics against whom the FAA has taken a certificate action, and for mariners against whom the Coast Guard has taken a certificate action. The agency's administrative law judges hear, consider, and issue initial decisions on administrative appeals regarding FAA aviation enforcement actions. Included are appeals of the following:

- Orders issued by the FAA Administrator amending, modifying, suspending, or revoking, in whole or in part, certificates of airmen, air agencies, and air carriers for alleged violations of the *Federal Aviation Regulations* or for lack of qualifications.
- FAA actions denying applications for the issuance or renewal of airman certificates, including airman medical certificates.
- Certain FAA civil penalty orders issued against individuals, pilots, flight engineers, mechanics, or repairmen where the amount in dispute is less than $50,000.

The judges also adjudicate claims under the Equal Access to Justice Act for fees and expenses stemming from FAA certificate and civil penalty actions.

The NTSB currently has three judges assigned to headquarters in Washington, DC, (including one who teleworks full time from Arlington, Texas), and one judge located in the Denver Regional Office. The Pilot's Bill of Rights, Public Law No. 112-53 (August 3, 2012), requires judges to apply the Federal Rules of Evidence and Federal Rules of Civil Procedure to their proceedings. Either the certificate holder or the FAA can appeal a judge's decision in these cases to the five-member Board. The Board's review on appeal of an administrative law judge's decision is based on the record of the proceeding, which

includes hearing testimony (the transcript), exhibits, the judge's decision, and appeal briefs submitted by the parties.

The FAA has the right to appeal the Board's decisions to the US Court of Appeals when it determines that the decisions "will have a significant adverse impact" with respect to aviation safety duties and powers designated to be carried out by the FAA. Under the Pilot's Bill of Rights, airmen and mechanics now also have the right to appeal all adverse Board decisions to a US District Court or to a US Court of Appeals. The District Court's review of the Board's decision is based on the evidence from the record before the Board, including hearing testimony, transcripts, exhibits, decisions, and briefs submitted by the parties. The Court of Appeals has the power to affirm, modify, or set aside the decision, in whole or in part, or, if the need is determined, to order further proceedings by the Board. The decision of the Court of Appeals is subject to review by the US Supreme Court on writ of certiorari.

Section 716 of the Aviation Investment and Reform Act for the 21st Century, Public Law 106-181 (April 5, 2000), expanded the NTSB's jurisdiction to include, upon petition by the affected certificate holder, reviews of FAA designations of safety enforcement actions as emergencies that require the order to be effective immediately. The Board has delegated this review authority to its administrative law judges. However, in the event of an appeal to the Board from a law judge's decision on the merits of the emergency or other immediately effective order, the Board may, at its discretion, note in its order disposing of the appeal its views on the law judge's ruling on the petition, and such views serve as binding precedent in all future cases. The Pilot's Bill of Rights provides for substantive independent and expedited review by the US District Court of any decision by the FAA Administrator to make such an order effective immediately.

An administrative law judge must issue an Oral Initial Decision regarding the appeal of an emergency order or an immediately effective order within 30 days of receipt. If the law judge's decision is appealed to the full Board, an Opinion and Order must be issued within 60 days of the appeal's initial receipt.

Marine certificate actions are heard first by the Coast Guard administrative law judges and may be appealed to the Vice Commandant of the Coast Guard. The ruling of the Vice Commandant may then be appealed to the NTSB's full Board. The same higher appellate process is followed for marine certificate actions.

Accomplishments and Ongoing Efforts

The Office of Administrative Law Judges completed these actions in FY 2019:

- Met its goal of conducting hearings and rendering decisions in emergency cases within 30 days of the receipt of an appeal; the office rendered decisions on 46 emergency appeals and held 25 emergency hearings.
- Made rulings, within the 5-day statutory time frame, on 18 petitions challenging the FAA Determination that an Emergency Exists in Air Safety.
- Issued a total of 58 decisions and held 19 hearings.

- Processed 19 new appeals of decisions made by NTSB administrative law judges to the full board.
- Closed a total of 111 cases.

INFORMATION TECHNOLOGY AND SERVICES

	($000s)	FTEs
FY 2020 Estimate	$8,863	26
FY 2021 Request	$9,105	26
Increase/Decrease	$242	0

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. No other program changes are planned.

Program Description

The OCIO provides strategic direction and operational support for NTSB information systems and develops and distributes programs and products for use by the agency and the public. The office consists of four divisions and one program area, as described below.

Computer Services Division

The Computer Services Division (CSD) provides computer and network services for headquarters and regional offices, including Internet access, web services, e-mail, backup, continuity of operations infrastructure, and disaster recovery. The help desk staff performs a wide range of tasks, including desktop/laptop setup, repair, and replacement; network connectivity; and software installation and upgrades. In short, the CSD is responsible for deploying and maintaining essential systems and services that range from desktop telephones to enterprise storage systems, cell phones, and tablets.

Systems Support Division

The Systems Support Division (SSD) develops, distributes, and maintains agency-specific applications, provides web design and content management, and provides database administration services. Applications include accident data collection, storage, analysis, and dissemination for all modes, as well as management of systems for accident records, safety recommendations, correspondence, FOIA requests, and general administration. This division also develops office-centric applications for modal and/or support office business functions.

Records Management Division

The Records Management Division (RMD) maintains the archives of accident investigation files, NTSB reports, and other agency records. It is responsible for fulfilling public requests for information, including FOIA requests; for providing training for the docket management system and guidance on redaction policies and techniques; and for monitoring the privacy and confidentiality of data and information. This division also provides general records management.

Enterprise Architect Division

The Enterprise Architect Division (EAD) supports the NTSB mission and strategic goals by providing a blueprint—in logical or business terms, as well as technology terms—for how the organization operates today, plans to operate in the future, and intends to invest in technology. Enterprise architecture defines the business, processes, and information necessary to operate the business, support technologies, and transitional processes required to implement new technologies in response to changing business needs.

Information Technology Security Program

The chief information security officer protects the availability, confidentiality, and integrity of information technology (IT) resources through the application of requirements specified in OMB Circular A-130, the Federal Information Security Management Act (FISMA), and various US Department of Commerce National Institute of Standards and Technology publications. The IT security program uses a risk-based, cost-effective approach to secure information and systems, identify and resolve current IT security weaknesses and risks, and protect against future vulnerabilities and threats.

Accomplishments and Ongoing Efforts

The core of OCIO activities revolve around two major initiatives: digital transformation and meeting the goals identified in the Presidential Executive Order on Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure. These two initiatives focus on the need to efficiently and effectively deliver services and products on a more secure and reliable technical platform while reevaluating agency processes, procedures, technologies, and use of data in meeting mission objectives in delivery of services and products to the public. Foundational to meeting these initiatives, the OCIO will need to upgrade its long outdated technical platform, while moving to cloud as appropriate, and enhance the agencies' cybersecurity environment/program. Having completed in FY 2018 the efforts to upgrade and improve the resiliency and performance of the agency's wide area network, priorities in FY 2019 and the following years include replacement of the internal technical infrastructure, implementation of a foundational cloud platform, and enhancement of the cybersecurity program. Separately, but in line with meeting the May 11, 2019, Executive Order, is compliance with the mandates of the enhanced governmentwide FISMA addressing all aspects of cybersecurity and risk management.

Computer Services Division

The CSD resolved more than 3,172 service desk requests for the NTSB's distributed locations (headquarters, regional offices, and teleworkers) in FY 2019. The division's IT specialists also launched on multiple major accident investigations to further assist members and staff on-scene. Additionally, the division provided both front- and back-end computing services to the agency with minimal downtime from unplanned outages and implemented personal identity verification (PIV) card access for privileged users by deploying PIV cards for administrative access.

The CSD also updated the mobile devices (cell phones) for all applicable users and is currently installing upgrades to all internal network systems. Additionally, during FY 2019, the CSD worked to bring all the agency's systems into compliance with the Department of Homeland Security's (DHS) continuous diagnostics and mitigation initiative.

Systems Support Division

Either individually or through one of the OCIO teams, SSD staff are engaged in all aspects of the day-to-day IT activities that support the agency, from the Service Desk to the Network Operations Center/Security Operations Center and SharePoint teams. For example, in FY 2019, we addressed more than 478 Service Desk Incident/Service tickets, covering everything from Portal requests to application support.

In addition to its routine responsibilities, the SSD is working on several high-profile projects: SQL Server (database), SharePoint Farm (Portal and public-facing), and Service Desk application upgrades, all of which are pursuant to the government's cloud-first initiative. Because these activities are all interdependent, completion dates are expected to extend into the first or second quarter of FY 2020.

The SSD continues to provide updates to its suite of in-house applications, to include the Product Management Application, the Project Status Board, Supply Inventory, Case Appeal Filing System, the National Archives and Records tracking tool, and the SharePoint-based International Advocacy Travel Form. These applications are critical to the offices they support, as noted in the agency's recent Business Impact Analysis.

Records Management Division

In FY 2019, the RMD posted 1197 accident dockets. During the same period, the division received 435 FOIA requests and processed 761 FOIA requests. Revamped FOIA practices were put in place to mitigate and reduce the FOIA backlog. The RMD continues to work with the chief privacy officer to create a Controlled Unclassified Information Program to review all Privacy Impact Assessments and System of Records Notices for the agency.

Enterprise Architecture Division

Enterprise architecture continues to work on various efforts to standardize business processes, analyze/ visualize NTSB's data to more effectively comprehend and identify

trends and patterns, and to enable all NTSBs data users to make better decisions based on that data.

EAD launched the Multi-Modal Accident Management Application for all modal offices, enabling these offices to standardize the accident investigation process, resulting in structured data. The team is now working on the post-implementation enhancements requests and data integration.

The team has started working on the development of a robust query tool that allows creation of data queries involving the full spectrum of private and public data contained in databases, facilitating holistic research across the NTSB's data elements. This tool is designed with enough flexibility to allow the query framework to be used by all modes, and contains user-friendly features, such as the ability to save, share, and export query results. The team has released a beta version of the tool and is working on integrating it with the Mult-Modal Accident Management Application.

EAD continues to provide guidance, design oversight, and technical advice in all NTSB software development efforts, IT consulting services to various divisions, and contracting officer's technical representative services to various IT initiatives.

IT Security Program

The security program continued to advise the CIO regarding the agency's FISMA compliance requirements and advocated the expanded use of such external cybersecurity enhancement services as DHS's Continuous Diagnostics and Mitigation program phase 2, Einstein 3A threat monitoring, and weekly Cyber Hygiene Assessment reports. The IT Security program coordinated with our external cybersecurity oversight agencies and provided responses to several ongoing reporting directives, Cybersecurity Incident Reports, and the FY 2018 Annual FISMA report. For the 8th consecutive year, the Inspector General's audit found that the agency's IT security program complied with FISMA requirements. In FY 2019, the NTSB Security Program submitted the final Trusted Internet Connection 3.0 pilot use case proposal to OMB and DHS; as of the end of FY 2019, the proposal was under review.

ADMINISTRATION

	($000s)	FTEs
FY 2020 Estimate	$9,759	34
FY 2021 Request	$10,359	35
Increase/Decrease	$600	1

Overview of the Request

The funding level for this program includes the pro-rated impact of the FY 2019 3.1 percent pay raise, increases in FERS contribution rates, increased non-SES, non-SL awards as per Circular A-11 and a 2.0 percent non-pay inflation factor. An increase of 1 FTE is supported by this funding level. No other program changes are planned.

Program Description

The Office of Administration coordinates and manages infrastructure and support activities for the NTSB, providing support in the areas of human resource management, labor relations, facilities management, safety, security, and acquisition and lease management. Physical inventory, shipping and receiving, and management of the NTSB conference and training center facilities are also major functions. Four divisions carry out the office's work: Administrative Operations and Security, Acquisition and Lease Management, Human Resources (HR), and Safety.

Administrative Operations and Security Division

The Administrative Operations and Security Division is responsible for the day-to-day support for the direction and operation of NTSB facilities and our building management program including security, property management, facilities management, mail services, and fleet vehicle transportation.

Acquisition and Lease Management Division

The Acquisition and Lease Management Division manages the NTSB acquisition program and provides best value business solutions to support the agency's mission. The division is a full-service acquisition organization that awards and administers contracts and agreements, manages the purchase card program, awards and manages real property leases for both the NTSB headquarters and regional offices, and provides customers with acquisition guidance and training.

Human Resources Division

The HR Division is responsible for human capital planning and management, policy and program development and administration, and recruitment and hiring. The division also manages labor and employee relations, benefits, pay and leave, performance management and awards, the telework program, and the employee assistance program.

Safety Division

The Safety Division is responsible for ensuring compliance with federal, state, and local statutory and regulatory mandates, guidelines, standards, and procedures, and for ensuring safe working conditions for NTSB employees (in the office and at on-scene investigations). This includes planning, implementing, and evaluating the agency's Occupational Safety and Health Program (OSHP) to reduce the potential for human and economic losses associated with incidents and accidents.

Accomplishments and Ongoing Efforts

Administrative Operations and Security Division

The Administrative Operations and Security Division maintains an agreement with the General Services Administration (GSA) to meet the requirements of Homeland Security Presidential Directive 12 (HSPD-12) for PIV credentials for all employees and contractors. This agreement continues the implementation of the physical access control system upgrades for NTSB headquarters, the regional offices, and the Training Center to comply with the new HSPD-12 program requirements. The installation of the physical access control system upgrades for the NTSB's headquarters facility has begun with expected completion for all NTSB's facilities by May 31, 2020.

The division has conducted its annual accountable asset inventory and validation for FY 2019 in accordance with agency policy and has reported to GSA the agency's property disposition in accordance with the GSA Federal Management Regulation. The division participated in the annual Continuity of Operations Plan Eagle Horizon 2019 drill in accordance with Federal Emergency Management Agency regulations and is in the process of reviewing, updating and revising the agency's plan. The division also performed an assessment of fleet vehicles it receives from GSA and determined that the vehicle assigned to the Denver Regional Office should be returned to GSA, which was accomplished on May 30, 2019.

Acquisition and Lease Management Division

In FY 2019, the Acquisition and Lease Management Division executed 329 contract actions to support the mission of the agency. The division continued to provide support and training to investigators regarding the acquisition process and the roles and responsibilities for purchase cardholders. This training ensures that investigators are better prepared to request

and receive the mission critical goods and services necessary to complete accident investigations.

The Acquisition and Lease Management Division transitioned the agency's charge card management program from SmartPay 2 to SmartPay 3. SmartPay is a GSA contractual vehicle that provides government agencies with commercial charge cards and payment solutions through a master contract and subsequent independent agency task orders. The program is essential to NTSB accident investigations, enabling investigators to make micro-purchases on-scene in support of investigations.

Human Resources Division

HR works with the Office of Personnel Management each year to administer the Federal Employee Viewpoint Survey. Employee participation in the survey resulted in a 70 percent response rate in 2019, nearly matching the record 2017 and 2018 response rates. The survey provided valuable information that senior leadership subsequently used to improve the work environment and, ultimately, productivity and mission accomplishments. The Employee Engagement Index increased to 75 percent (versus 68 percent government-wide). Management actions that contributed to these results included improving communication, encouraging collaboration and teamwork, focusing training and development on enhancing employee competencies, and showcasing and recognizing staff members' achievements.

In FY 2019, HR collaborated with the program offices throughout the agency to recruit and hire 35 new employees for mission-critical and support positions and to provide 19 current employees internal career promotions. Additionally, we provided employment opportunities to 23 students through the Federal Pathways Program and 3 volunteer opportunities through established agreements with the Chickasaw Nation, the Washington Scholars Program, and the On Ramps to Careers Program (DC Summer Youth). The summer program is designed to provide an enriching employment experience with a variety of briefings, workshops, and activities about the NTSB's mission and goals combined with meaningful work assignments.

We continued the implementation of position management principles to identify staffing priorities in accordance with the administration's requirements. We also considered the impact of emerging transportation technologies in relation to the current skill level of the agency staff and identified recruitment and training options for closing skills gaps.

The NTSB has pursued various avenues to market our technical positions. In 2019, we expanded our presence on LinkedIn and encouraged NTSB employees to use their networks to market vacant positions. We also updated the Careers page on the NTSB website to showcase jobs, to provide information about the agency, and to give prospective applicants information about applying for federal jobs. These actions are intended to

expand our ability to attract a highly talented applicant pool for job vacancy announcements.

We are improving our hiring by using our staffing software, USA Staffing, to help managers focus their efforts on the most promising candidates. In FY 2019, our use of software to send and receive forms for new employees in the onboarding process improved efficiency, effectiveness, and quality because the information is now routed directly into new-hires' electronic official personnel folders. Our onboarding program has been strengthened by the identification of mentors who help guide each new employee to become engaged and productive as quickly as possible. In FY 2019, HR focused attention on work/life flexibilities for our employees. We promoted the expanded services provided by the employee assistance program and provided workshops and training for supervisors and employees on the updated telework policy to improve their understanding of options available to address work life balance and address our mission needs during adverse weather and other emergency situations. Revised policies specifying hours of duty and work schedules and the administration of premium pay under the Fair Labor Standards Act served to further clarify the variety of ways that the NTSB's workforce could plan and carry out their work and receive fair compensation.

In FY 2020, we will continue to explore a Student Loan Repayment Program to increase the NTSB's ability to compete for and retain talent for positions throughout the agency. We are also revising our policies on probationary periods for new employees and for new supervisors and managers and directing attention to career ladder promotions. This initiative will help educate supervisors and managers on ways to use the tools and program initiatives to develop and retain employees with the skills we need to accomplish our mission.

In FY 2019, HR received full certification of the performance management system for senior executives in response to our bi-annual request to the Office of Personnel Management. Achievement of full certification allows the agency to facilitate the recruitment and retention of the most talented of these employees by offering more competitive compensation.

Safety Division

As part of the continuous improvement of the OSHP, the Safety Division implemented a more efficient method to provide annual training to participants in the respiratory protection program. Regional and full-time telework employees will complete an online respiratory protection course followed by the annual fit-testing by NTSB personnel. This approach is an alternative to the traditional method of in-person training followed by fit-testing by Federal Occupational Health, creating flexibility for employees while ensuring compliance with requirements and reducing ongoing vendor training costs.

To improve the safety guidance for investigators launching to accident scenes, the Safety Division followed up with investigators while on the accident scene to determine whether site conditions had changed and to ensure that the proper Personal Protective Equipment

(PPE) was available. This continuous safety involvement in the accident investigation process placed the focus on employee safety and allowed for discussion of specific safety hazards to mitigate risk.

In FY 2019, the Safety Division completed the annual OSHP audit and will provide its findings in the 2020 Annual Report to the Occupational Safety and Health Administration. The Safety Division will continue to lead efforts to improve the agency's OSHP through internal audits, increased safety-related training, annual facility inspections, and a focus on fatigue risk management.

APPENDIX A: MOST WANTED LIST

The NTSB issued its first Most Wanted List (MWL) of Transportation Safety Improvements in October 1990 to highlight specific recommendations that could significantly reduce transportation accidents, deaths, and injuries. Since then the MWL, now organized by topic area, is the NTSB's premier advocacy tool. It identifies the top safety improvements that can be made across all modes to prevent accidents, minimize injuries, and save lives in the future. Listed below are the 10 issue areas contained in the 2019-2020 NTSB Most Wanted List of Transportation Safety Improvements.

ELIMINATE DISTRACTIONS

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

END ALCOHOL AND OTHER DRUG IMPAIRMENT

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

ENSURE THE SAFE SHIPMENT OF HAZARDOUS MATERIALS

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

FULLY IMPLEMENT POSITIVE TRAIN CONTROL

Positive train control (PTC) can stop a train before a crash happens. Although Congress mandated that PTC be installed and operating by December 31, 2018, only 25 percent of passenger route miles and just 60 percent of passenger locomotives have met that criteria.

A two-year extension has been granted to rail lines that are not fully compliant. PTC must be fully implemented before the extended deadline to ensure the safety of railroad passengers and the people who live and work near railroads.

IMPLEMENT A COMPREHENSIVE STRATEGY TO REDUCE SPEEDING-RELATED CRASHES

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

IMPROVE THE SAFETY OF PART 135 AIRCRAFT FLIGHT OPERATIONS

Air tour, air medical service, air taxi, charter, and on-demand flights are not required to meet the same safety requirements as commercial airlines, leaving them susceptible to disaster. Part 135 operators must implement safety management systems that include a flight data monitoring program, and they should mandate controlled-flight-into-terrain-avoidance training that addresses current terrain-avoidance warning system technologies.

INCREASE IMPLEMENTATION OF COLLISION AVOIDANCE SYSTEMS IN ALL NEW HIGHWAY VEHICLES

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

REDUCE FATIGUE-RELATED ACCIDENTS

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

REQUIRE MEDICAL FITNESS – SCREEN FOR AND TREAT OBSTRUCTIVE SLEEP APNEA

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

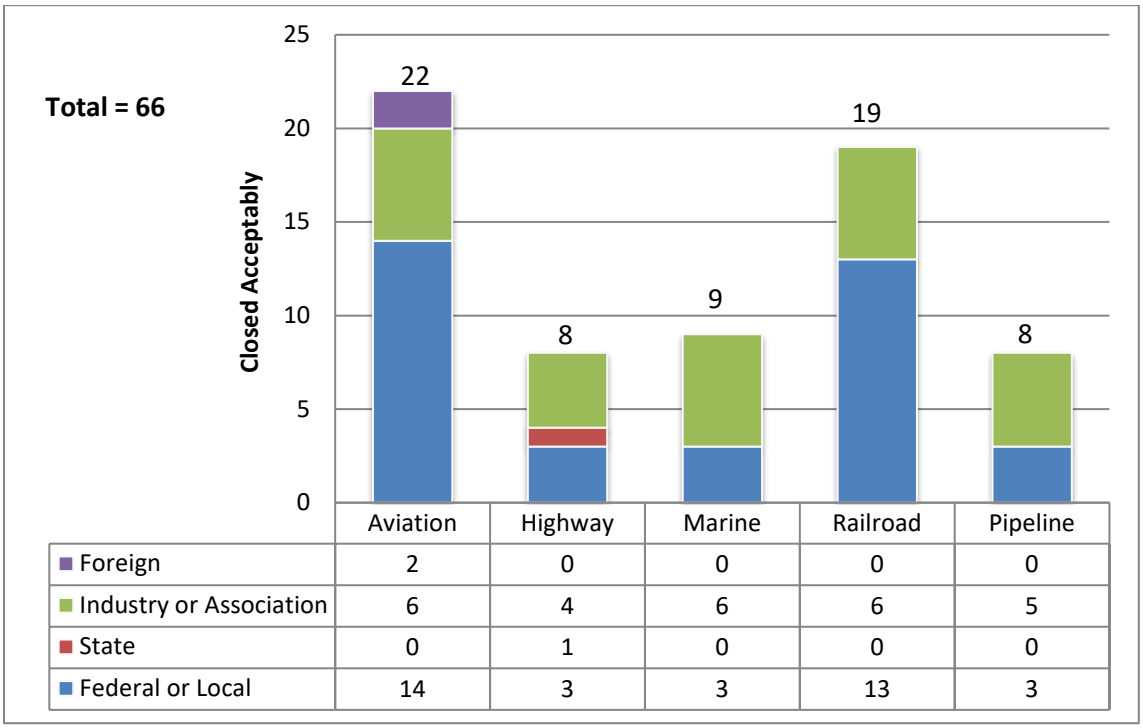
STRENGTHEN OCCUPANT PROTECTION

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

APPENDIX B: STATUS OF SAFETY RECOMMENDATIONS

Safety Recommendations Closed

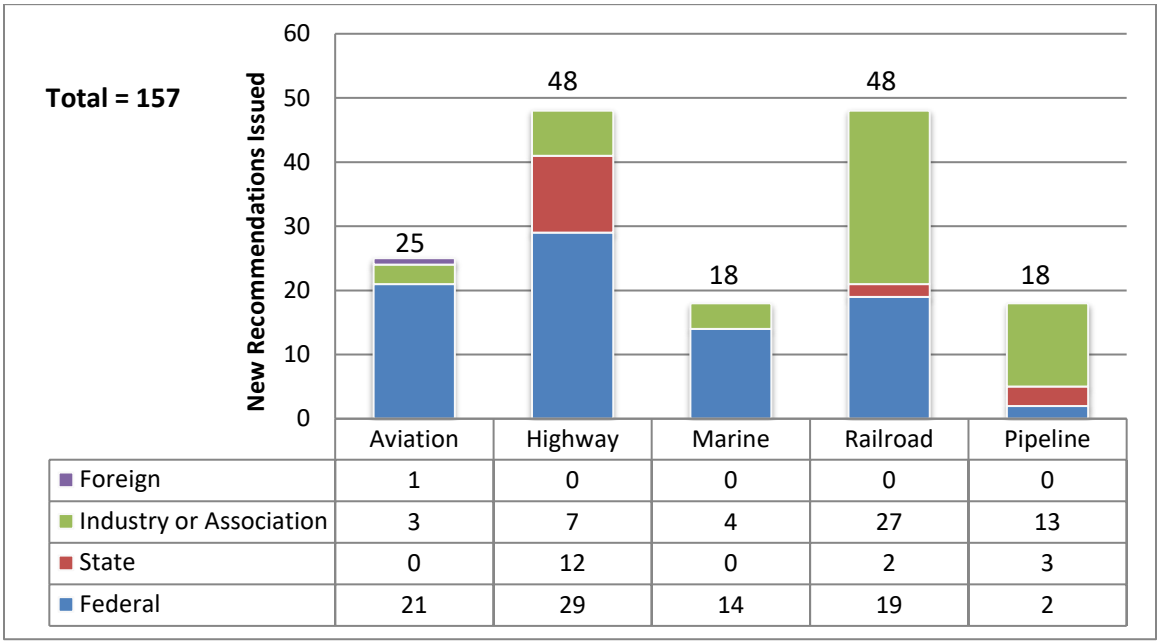
The chart below shows the distribution by mode of the 66 NTSB safety recommendations closed in an acceptable status October 1, 2018 through September 30, 2019.



	Aviation	Highway	Marine	Railroad	Pipeline
Foreign	2	0	0	0	0
Industry or Association	6	4	6	6	5
State	0	1	0	0	0
Federal or Local	14	3	3	13	3

New Safety Recommendations Issued

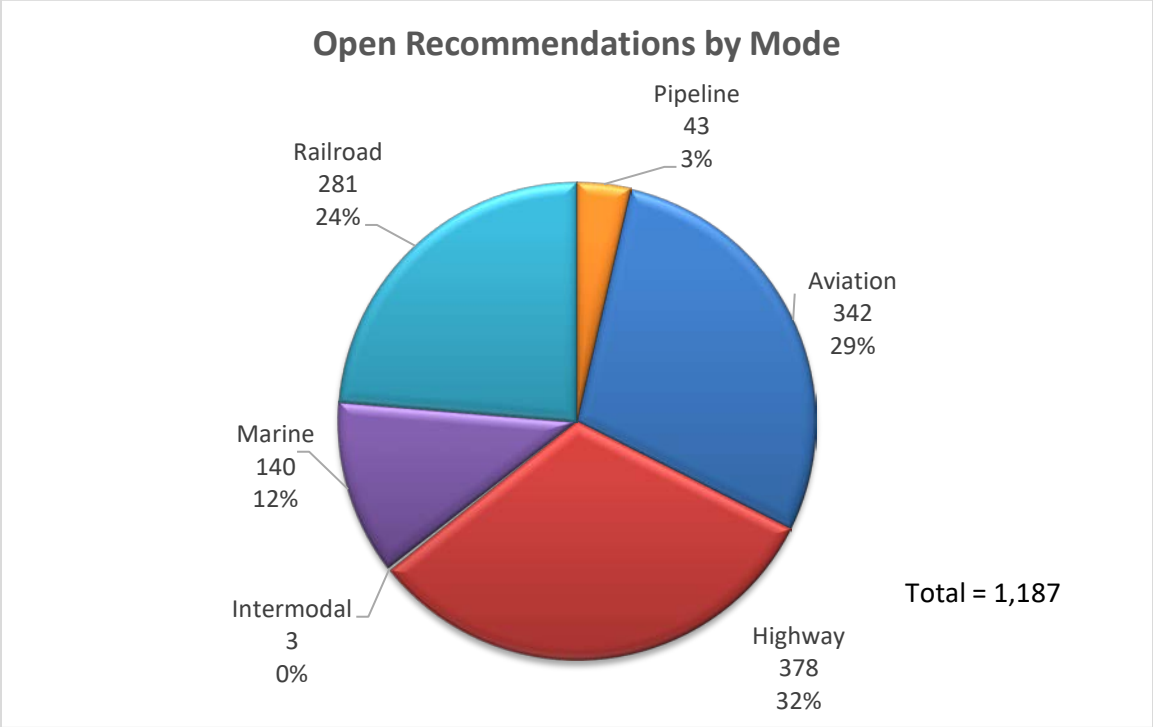
The chart below shows the distribution by transportation mode of the 157 new safety recommendations issued by the NTSB October 1, 2018 through September 30, 2019.



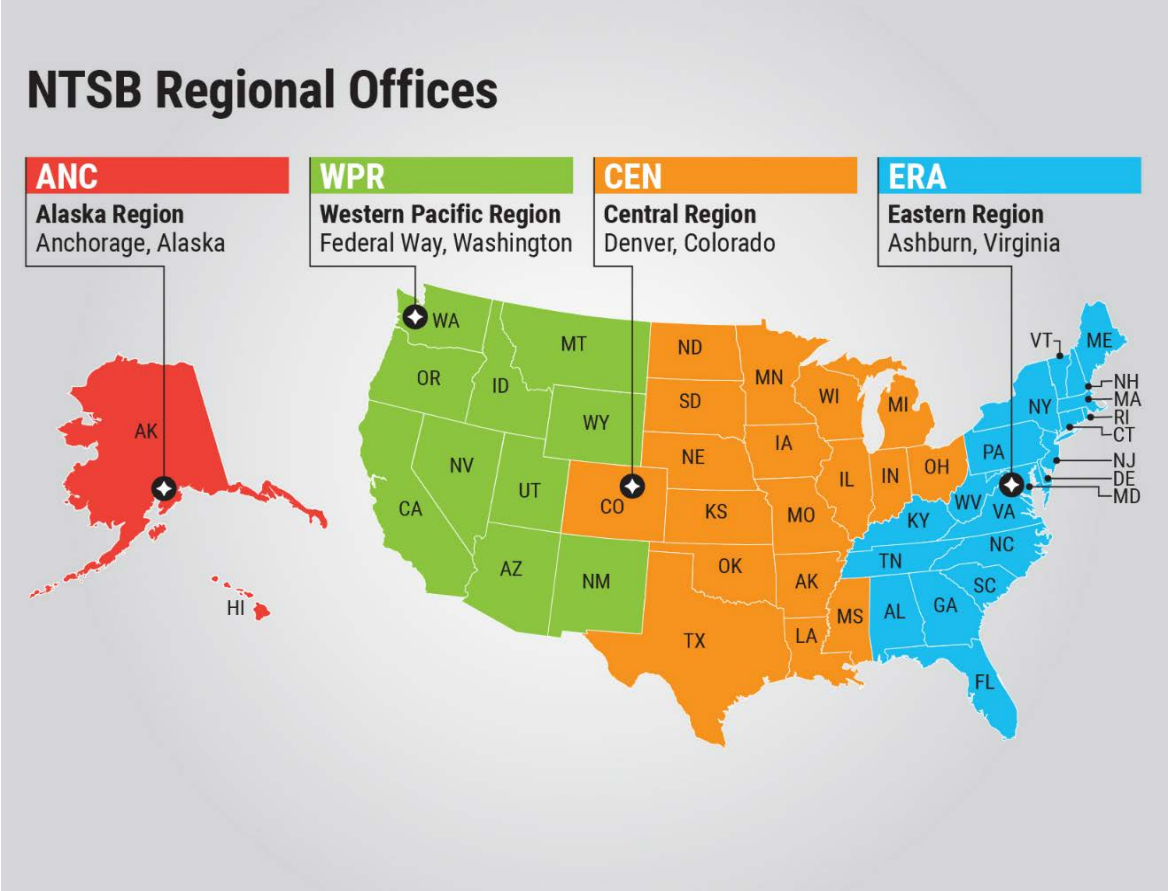
	Aviation	Highway	Marine	Railroad	Pipeline
Foreign	1	0	0	0	0
Industry or Association	3	7	4	27	13
State	0	12	0	2	3
Federal	21	29	14	19	2

Open Safety Recommendations

The chart below displays the distribution by transportation mode of the 1,187 open safety recommendations as of September 30, 2019.



APPENDIX C: AVIATION SAFETY REGIONAL OFFICES



	Alaska Region	Western Pacific Region	Central Region	Eastern Region
Coverage Area	Alaska, Hawaii	Montana, Idaho, Utah, Arizona, Nevada, Washington, Oregon, California, Wyoming and New Mexico as well as the territories of Guam, American Samoa and Northern Mariana Islands	Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, Louisiana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, and Colorado	Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Delaware, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Mississippi, Alabama, Georgia, and Florida, as well as the District of Columbia, Puerto Rico, and the US Virgin Islands

APPENDIX D: HISTORICAL INFORMATION

NTSB Salaries and Expenses Funding History (in millions)

FY	Amount
2000*	$56.8
2001*	$62.8
2002*	$67.9
2003*	$72.0
2004*	$73.1
2005*	$76.1
2006*	$75.9
2007	$79.3
2008	$84.4
2009	$91.0
2010	$98.0
2011*	$97.8
2012	$102.4
2013*	$97.0
2014	$103.0
2015	$104.0
2016	$105.2
2017	$106.0
2018	$110.4
2019	$110.4

* Includes across-the-board rescissions

Current Board Members

Name	Board Title	Appointment	Term Expiration
Robert L. Sumwalt	Chairman	August 5, 2019	August 8, 2022
Bruce Landsberg	Vice-Chairman	July 25, 2018	December 31, 2022
Jennifer Homendy	Member	August 6, 2019	December 31, 2024
Michael Graham	Member	December 19, 2019	December 31, 2025
Thomas B. Chapman	Member	December 19, 2019	December 3, 2023

Emergency Fund Activity

Fiscal Year	Appropriations (Rescissions)	Obligation Activity	Balance	Purpose/Source
2000			$2,000,000	No Activity
2001			$2,000,000	No Activity
2002		$491,687	$1,508,313	Extraordinary costs related to the crash of American Airlines Flight 587 at Belle Harbor, NY
2003		$4,914	$1,503,399	Adjustment of FY 2002 Obligations
2004		($138,000)	$1,641,399	Adjustment of FY 2002 Obligations
2004	$358,601		$2,000,000	Appropriation (P.L. 108-199)
2004	($2,116)		$1,997,884	Rescission (P.L. 108-199)
2005			$1,997,884	No activity
2006			$1,997,884	No activity
2007			$1,997,884	No activity
2008			$1,997,884	No activity
2009			$1,997,884	No activity
2010			$1,997,884	No activity
2011			$1,997,884	No activity
2012			$1,997,884	No activity
2013			$1,997,884	No activity
2014			$1,997,884	No activity
2015			$1,997,884	No activity
2016			$1,997,884	No activity
2017			$1,997,884	No activity
2018			$1,997,884	No activity
2019			$1,997,884	No activity

Training Center Costs and Revenues

	FY 2017	FY 2018	FY 2019
Earned revenue	$954,567	$1,164,133	$1,133,921
Subleases	$0	$0	$0
Total revenue	$954,567	$1,164,133	$1,133,921
Costs:			
Pay	$864,886	$593,021	$654,678
Travel	$70,495	$93,287	$75,593
Contracts	$339,963	$228,087	$392,599
Supplies	$13,589	$4,534	$2,468
Equipment	$6,849	$0	$0
Costs before space rental	$1,295,782	$918,929	$1,125,338
Space rental	$2,616,876	$2,626,073	$2,626,073
Total operating costs	$3,912.658	$3,545,002	$3,751,411
Deficit	$2,958,091	$2,380,869	$2,617,489

FTE Staffing at Year End by Headquarters and Field Offices

FY	Headquarters	Regional	Total
2000	346	81	427
2001	345	71	416
2002	337	89	426
2003	329	98	427
2004	314	107	421
2005	308	109	417
2006	286	101	387
2007	292	85	377
2008	286	102	388
2009	293	100	393
2010	283	101	384
2011	296	107	403
2012	304	108	412
2013	307	105	412
2014	299	103	402
2015	307	111	418
2016	304	115	419
2017	299	115	414
2018	291	112	403
2019	291	112	399

FTE Staffing by State and Region
FY 2019

Location	Administration	Administrative Law Judges	Aviation Safety	Highway Safety	Information Technology & Services	Marine Safety	Policy & Direction	Railroad, Pipeline & Hazardous Materials	Research & Engineering	Safety Recommendations & Communications	Training Center	Total
Alaska			5									5
Colorado		1	11	1								13
Illinois			9		1			1				11
Indiana								1				1
Louisiana								1				1
Minnesota			2									2
Missouri			1									1
Texas		1	6	6				1				14
Wisconsin			1									1
Alabama			1									1
Connecticut			1									1
Delaware				1								1
Florida			3							1		4
Georgia			3							1		4
New Hampshire			1									1
New Jersey			1					1				2
New York			1									1
North Carolina			3									3
South Carolina												1
Tennessee				1								1
Virginia	1		10					1			3	15
Washington, DC	29	7	43	18	28	20	45	23	42	32		287
Arizona			2									2
California			7	1				4				12
Montana			1	1								1
Oregon			2	1								3
Washington			9	1								10
Grand Total	**30**	**9**	**123**	**31**	**29**	**20**	**45**	**33**	**42**	**34**	**3**	**399**

Alaska
Central Region
Eastern Region
Western

International Investigations

*FY 2019 Investigation Costs by Accident**

Description	Location	Amount
A Lion Air B737 crashed into the Java Sea.	Jakarta, Indonesia	$ 657,945
An Ethiopian Airline B737MAX crashed shortly after takeoff.	Addis Ababa, Ethiopia	$ 444,281
The *USS John S McCain* collided with Tank Vessel *Alnic MC* east of Singapore.	Singapore, Republic of Singapore	$ 112,765
An Agusta A109S helicopter impacted terrain shortly after takeoff.	Santa Maria Coronango, Mexico	$ 98,939
A helicopter crashed shortly after departure into the Atlantic Ocean.	Big Grand Cay, Bahamas	$ 97,929
An Air Niugini B737-800 crashed into lagoon on approach.	Chuuk, Federated States of Micronesia	$ 72,657
A UPS flight rejected takeoff due to blown tire indication.	Incheon, Republic of Korea	$ 64,647
US Navy destroyer *USS Fitzgerald* collided with Philippine-flagged MV *ACX Crystal*.	Yokosuka, Japan	$ 51,648
An Air France A380 with Engine Alliance GP7200 engines had No. 4 engine fan and inlet cowling separation.	Goose Bay, Canada	$ 47,929
A Korean Air A220 with PW1521 engines sustained turbine damage.	Busan, Republic of Korea	$ 46,431
A B737 crashed shortly after takeoff.	Havana, Cuba	$ 38,554
A Fly Jamaica B-757 experienced hydraulic failure and runway overrun during landing.	Georgetown, Guyana	$ 37,814
Passenger vessel *Viking Sky* experienced main engine failure; vessel had to be evacuated	Molde, Norway	$ 36,881
A TI-BEI Cessna 208B-0900 crashed during departure with no survivors.	Punta Islita, Costa Rica	$ 31,027
A small fire broke out in tail of Dassault Falcon 7X at Changi Airport.	Singapore, Republic of Singapore	$ 24,753
A St. Lazare, Manitoba, Canada, train derailed with DOT-117R Tank Cars.	St. Lazare Manitoba, Canada	$ 19,925
A Boeing 777-300 experienced a main landing gear failure.	Narita, Japan	$ 16,802
An ATR 42-500 crashed after reporting a No. 1 engine failure/shutdown.	Havelian, Pakistan	$ 15,639

Description	Location	Amount
A Swiss International Airbus A220 had an inflight shutdown of the No. 1 engine.	Paris, France	$ 15,523
A Honda HA-420 runway overrun occurred during landing.	Foz do Iguacu, Brazil	$ 15,296
A Cessna Citation experienced in-commanded roll, possibly caused by a malfunction of the Tamarack Atlas Active Winglets.	Bournemouth, United Kingdom	$ 13,728
A Bell 214B helicopter impacted remote mountainous terrain.	Dongducheon, Republic of Korea	$ 13,087
A B777 encountered an electrical failure.	Belo Horizonte, Brazil	$ 14,058
A Bravo Airways flight experienced a "thunder-gust," resulting in a runway excursion.	Zhuliany, Ukraine	$ 11,982
A Boeing 787 experienced lower engine thrust than commanded while descending.	Osaka, Japan	$ 10,254
A US flagged container ship *APL Guam* collided with the bow of the Antigua Barbuda flagged container ship *Marcliff*. Following this collision, the *Marcliff* collided with the anchored vessel *Hansa Steinburg*.	Tokyo Bay, Japan	$ 9,691
A Belgium Airlines A330 experienced a No. 1 engine flameout during cruise while flying.	Brussels, Belgium	$ 9,275
A RJ85 powered by Honeywell (Lycoming LF507-1F) had an uncontained No. 1 engine turbine failure.	Bishkek, Kyrgyzstan	$ 9,212
An Avior Airlines (Venezuelan) B737 tailstrike occurred on landing.	Callao, Peru	$ 9,164
An Aerotransportes de Cargo Union operating as Tampa Cargo had 3 main landing gear tires that were damaged during braking.	Mexico City, Mexico	$ 8,290
A B737 gear collapse occurred.	La Paz, Bolivia	$ 7,403
On an Embraer 190-200, the pilot noticed a burning smell in the cockpit and declared an emergency.	Dublin, Ireland	$ 7,293
A CRJ-700 experienced an internal engine failure shortly after takeoff.	East London, South Africa	$ 7,117
A Peruvian Airline SAC B737-48E #1 engine quit during cruise flight.	Arequipa, Peru	$ 6,760

Description	Location	Amount
A SA de CV Embraer ERJ190-100 IGW lost control during climb, and the aircraft was destroyed by impact and fire.	Durango, Mexico	$ 6,474
A Piper PA-46-301P, N264DB, disappeared from radar 15 miles north of Guernsey, the Channel Islands, off the coast of France.	St. Peter Port, United Kingdom	$ 6,205
A Boeing 747 overran runway 32 at Halifax Stanfield International Airport.	Halifax, Canada	$ 6,162
Safe Skies for Africa	Senegal, Nigeria	$ 22,785
Grand Total		**$ 2,126,327**

*Report includes accidents, whether occurring in the current year or previously, with more than $5,000 in FY 2019 expenses. Costs include payroll as well as travel and other direct costs incurred in FY 2019.

*Total International Accident Investigation Costs by Fiscal Year 2012 - 2019**

FY	Costs
2012 (a)	$1,641,132
2013 (b)	$2,366,274
2014 (c)	$976,642
2015 (d)	$1,838,241
2016 (e)	$1,664,764
2017 (f)	$826,248
2018 (g)	$902,981
2019 (h)	$2,126,327

* Beginning with FY 2012, the agency can capture both payroll and other directs costs (such as travel) through its cost accounting systems. The totals above reflect these costs.

(a) Includes $149,707 billed to DOT under the SSA Program.
(b) Includes $42,727 billed to DOT under the SSA Program.
(c) Includes $64,897 billed to DOT under the SSA Program.
(d) Includes $120,026 billed to DOT under the SSA Program.
(e) Includes $138,115 billed to DOT under the SSA Program.
(f) Includes $35,146 billed to DOT under the SSA Program.
(g) Includes $88,300 billed to DOT under the SSA Program.
(h) Includes $22,785 billed to DOT under the SSA Program.

Status of Action by State for Motor Vehicle Safety Recommendations

State	Child Passenger Safety	Primary Seat Belt Enforcement	Passenger Restriction (a)	Cell Phone	Ignition Interlock	Motorcycle Helmets
Alabama	Partial	Partial	Yes	Partial	Yes	Partial
Alaska	Yes	Yes	Yes	Partial	Yes	
Arizona	Yes		Partial	Partial		
Arkansas	Partial	Partial	Yes	Partial	Yes	
California	Yes	Yes	Yes	Partial		Yes
Colorado	Yes		Yes	Partial	Yes	
Connecticut	Yes	Partial	Yes	Partial	Yes	
Delaware	Yes	Yes	Yes	Partial	Yes	
District of Columbia	Yes	Yes	Yes	Partial	Yes	Partial
Florida	Partial	Partial		Partial		
Georgia	Yes	Partial	Yes	Partial		Yes
Hawaii	Yes	Yes	Partial	Partial	Yes	
Idaho	Partial		Partial	Partial		
Illinois	Yes	Yes	Yes	Partial	Yes	
Indiana	Yes	Yes	Yes	Partial		
Iowa	Partial	Partial		Partial		
Kansas	Yes	Yes	Partial	Partial	Yes	
Kentucky	Yes	Yes	Yes	Partial		
Louisiana	Yes	Yes	Partial	Partial	Yes	Yes
Maine	Yes	Yes	Yes	Partial	Yes	
Maryland	Yes	Yes	Partial	Partial	Yes	Partial
Massachusetts	Yes		Partial	Partial		Yes
Michigan	Yes	Partial	Yes	Partial		
Minnesota	Yes	Yes	Yes	Partial		
Mississippi	Partial	Yes		Partial	Yes	Partial
Missouri	Yes		Partial	Partial	Yes	Yes
Montana	Partial		Partial			
Nebraska	Yes		Partial	Partial	Yes	Yes
Nevada	Partial		Partial	Partial	Yes	Partial
New Hampshire	Partial		Yes	Partial	Yes	
New Jersey	Yes	Yes	Yes	Partial		Yes
New Mexico	Partial	Yes	Yes	Partial	Yes	
New York	Yes	Partial	Yes	Partial	Yes	Yes
North Carolina	Yes	Yes	Yes	Partial		Yes
North Dakota	Yes			Partial		
Ohio	Yes		Yes	Partial		

State	Child Passenger Safety	Primary Seat Belt Enforcement	Passenger Restriction (a)	Cell Phone	Ignition Interlock	Motorcycle Helmets
Oklahoma	Yes	Partial	Yes	Partial		
Oregon	Yes	Yes	Yes	Partial	Yes	Yes
Pennsylvania	Yes		Partial	Partial		
Rhode Island	Yes	Yes	Yes	Partial	Yes	
South Carolina	Yes	Yes	Partial	Partial		
South Dakota				Partial		
Tennessee	Yes	Partial	Yes	Partial	Yes	Yes
Texas	Yes	Yes	Yes	Partial	Yes	
Utah	Yes	Yes	Yes	Partial	Yes	
Vermont	Yes		Yes	Partial	Yes	Yes
Virginia	Yes		Yes	Partial	Yes	Partial
Washington	Yes	Yes	Yes	Partial	Yes	Yes
West Virginia	Yes	Yes	Yes	Partial	Yes	Partial
Wisconsin	Yes	Yes	Yes	Partial		
Wyoming	Yes		Partial	Partial		
Total	Yes = 39 + DC Partial = 10	Yes = 24 + DC Partial = 10	Yes = 31 + DC Partial = 14	Yes = 0 Partial = 49 + DC	Yes = 28 + DC	Yes = 13 Partial = 6 + DC

(a) "Restriction" refers to drivers in the intermediate (also referred to as provisional or second) stage. Unless accompanied by a supervising driver who is at least 21 years old, these drivers are limited to no more than one passenger under age 20, family excepted, until they receive an unrestricted license for at least 6 months.

US Transportation Fatalities, 2018

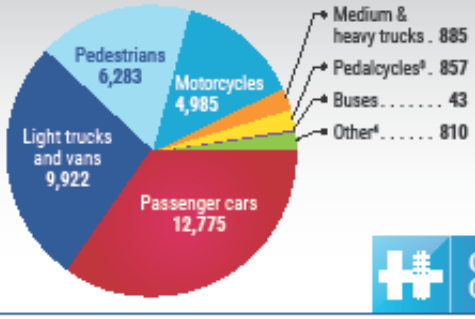
National Transportation Safety Board

US Transportation Fatalities in 2018[1] – by Mode

Total: 38,515[2]

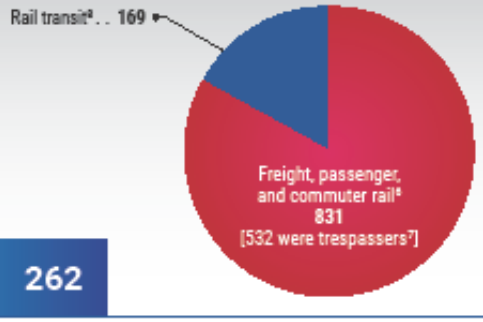
Aviation data is sourced from the NTSB's 1999–2018 Preliminary Aviation Statistics. For other transportation modes, the NTSB used data from the Bureau of Transportation Statistics, Transportation Fatalities by Mode.

Highway 36,560



National Highway Traffic Safety Administration

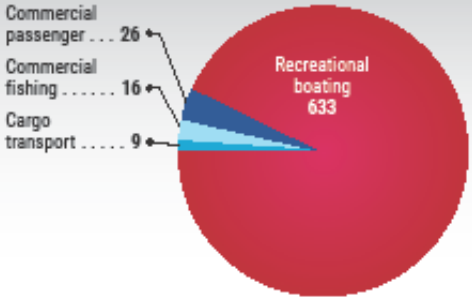
Railroad 1,000



Federal Railroad Administration and Federal Transit Administration

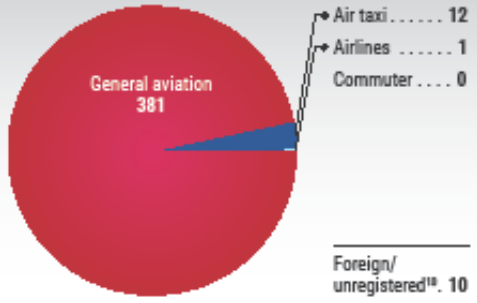
Grade Crossings[5] 262

Marine 684



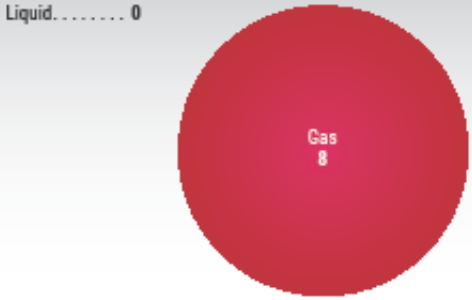
Department of Homeland Security/US Coast Guard

Aviation[9] 393



National Transportation Safety Board

Pipeline 8



Pipeline and Hazardous Materials Safety Administration

Footnotes

1. Numbers for 2018 are preliminary estimates. Aviation data are from the NTSB; marine data are reported by the US Department of Homeland Security; all other data are reported by the US Department of Transportation.
2. To reduce double counting, BTS excludes railroad fatalities involving motor vehicles at public highway-rail grade crossings and transit fatalities involving non-rail modes from the overall total fatalities.
3. Pedalcycles include bicycles and other cycles.
4. Other refers to occupants of other vehicle types, other non-motorists, and unknown.
5. Grade crossing fatalities are reported as a separate category but should not be added to the total because they are included in the highway and rail fatalities as appropriate.
6. Freight, passenger, and commuter rail data are reported by the Federal Railroad Administration. The FRA does not include suicides.
7. Trespassing fatalities are reported as a separate category but should not be added to the total because they are included in the freight, passenger, and commuter rail fatalities. Trespassing fatalities are not included for rail transit.
8. Rail transit data are reported by the Federal Transit Administration and include fatalities (including suicides) involving heavy rail, light rail, cable car, inclined plane, monorail/automated guideway, streetcar rail, and hybrid rail.
9. Total fatalities may not equal the sum of each category because accidents may involve multiple categories.
10. Foreign/unregistered includes non-US registered aircraft involved in accidents in the United States.