

NTSB

National
Transportation
Safety Board



2023

ANNUAL REPORT TO CONGRESS





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TO CONGRESS



On the cover

Top, left: Overhead view of the western portion of the Norfolk Southern Railway train that derailed in East Palestine, Ohio, on February 3, 2023. The five derailed cars shown were vinyl chloride monomer (VCM) tank cars.

Top, right: Overhead view of the eastern portion of the train showing additional derailed cars and hazardous materials burning after the derailment occurred.

Bottom, right: Representatives of the NTSB and the Transportation Safety Board of Canada listen to witness testimony on June 23, 2023, during the NTSB investigative hearing for the catastrophic derailment, hazardous materials release, and fires.

All cover photos taken by the NTSB.

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¹ Ongoing investigations are those that, as of December 31, 2023, were not yet completed. Any completed as of June 30, 2024, are noted in this report. Additional updates will be provided in the 2024 Annual Report.

Abbreviations, Acronyms, and Initialisms

ADS-B	Automatic Dependent Surveillance-Broadcast	NVIC	Navigation Vessel Inspection Circular
AG	vessel registration code for Antigua Barbuda	PA	vessel registration code for Panama
BS	vessel registration code for the Bahamas	PHMSA	Pipeline and Hazardous Materials Safety Administration
CSX	CSX Transportation	SMS	safety management system
FAA	Federal Aviation Administration	SOLAS	International Convention for the Safety of Life at Sea
FMCSA	Federal Motor Carrier Safety Administration	US DOT	US Department of Transportation
FRA	Federal Railroad Administration	V2X	vehicle-to-everything (connected vehicle)
GR	vessel registration code for Greece		
HK	vessel registration code for Hong Kong		
IACS	International Association of Classification Societies		
ICAO	International Civil Aviation Organization		
IMO	International Maritime Organization		
IT	vessel registration code for Italy		
MAIIF	Marine Accident Investigators' International Forum		
MWL	NTSB Most Wanted List of Transportation Safety Improvements		
NHTSA	National Highway Traffic Safety Administration		
NO	vessel registration code for Norway		
NS	Norfolk Southern Railway		
NTSB	National Transportation Safety Board		

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Chair's Message



Chair Jennifer Homendy

I am honored to present the [2023 Annual Report to Congress](#) for the National Transportation Safety Board (NTSB).

In 2023, we continued our agency's tradition as the world's leading accident investigation agency through relentless focus on our strategic goals: keeping pace with emerging transportation technologies and systems to meet our mission, improving processes and products, and optimizing organizational effectiveness and efficiency.

In the pages that follow, you can read more about our work over the past year. Highlights include these actions:

- Adopted over 1,300 investigative reports and dozens of new safety recommendations, even as we eliminated the number of open investigations over 2 years old from 442 in February 2022 to zero by the end of September 2023.
- Initiated, and continued ongoing investigations of, numerous accidents in all modes, including the following:
 - » Our investigation of the Fern Hollow Bridge collapse in Pittsburgh, Pennsylvania, that occurred on January 28, 2022 (Our investigation was [completed in 2024](#)).

- » Our investigation of the loss of the 21-foot-long submersible vessel *Titan* during its voyage to view the wreckage of the *Titanic* on June 18, 2023. The US Coast Guard declared this incident a major marine casualty and is leading this very challenging investigation, which involves many countries and interested entities and agencies. Additionally, due to its location at a depth of about 12,500 feet, finding and recovering the wreckage was difficult, requiring specific deep-diving expertise and resources. Our investigation will establish the accident's probable cause.
- » Our investigation of the East Palestine, Ohio, train derailment with subsequent hazardous material release and fires that occurred on February 3, 2023. We held a 2-day investigation hearing in East Palestine as a fact-finding step in June 2023; our investigation was subsequently completed in June 2024.
- Launched or traveled in support of 10 international aviation investigations as the US accredited representative and commented on behalf of the United States on three international investigations in which our nation had significant involvement.

-
- Participated in or led hundreds of advocacy and outreach events. These include several held at the NTSB Board room on vital safety topics, from runway incursions to mental health in aviation.
 - Announced our future approach to advocacy. We retired the Most Wanted List of Transportation Safety Improvements, born in a different era, in favor of new approaches to spur implementation of our recommendations, including holding Board meetings, field hearings, and community meetings in places impacted by accidents that we investigate. We launched this new approach in East Palestine, Ohio, in June 2023; we continued it in June 2024 when we held our en banc Board meeting there. During the meeting, we adopted our final report and 34 new safety recommendations to improve the safe transportation of hazardous materials by rail.
 - Issued two notices of proposed rulemaking (NPRMs) to clarify our authority to investigate rail and pipeline events and weighed in on 13 additional NPRMs issued by other agencies.

Among our many accomplishments, this report also describes the missed safety opportunities due to our agency's limited resources. For example, Appendix B lists thousands of railroad and transit investigations

we were unable to investigate despite being required by law to do so. I appreciate that Congress addressed this requirement in the National Transportation Safety Board Amendments Act of 2024 to give the Board more flexibility to focus our resources on investigating rail accidents for which there are safety benefits. However, although some of these trespassing or minor-damage accidents do not need to be investigated, a significant number remain that do warrant a deeper dive. I respectfully ask Congress to keep this in mind as you consider increased funding for the NTSB.

We hope that you find the NTSB's [2023 Annual Report to Congress](#) to be an informative presentation of our agency's many accomplishments, none of which would be possible without our dedicated and highly skilled workforce. Because of our staff, the NTSB is better positioned than ever to make transportation safer for all.

Sincerely,



Jennifer Homendy
Chair

Who We Are and What We Do

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in the other modes of transportation—railroad, transit, highway, marine, pipeline, hazardous materials, and commercial space. We determine the probable causes of the accidents and events that we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for any accident or event investigated by the agency. We also 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.

OUR MISSION

Making transportation safer. We carry out our mission by—

- Maintaining our congressionally mandated independence
- Conducting objective, thorough investigations and safety studies
- Deciding, fairly and objectively, appeals of enforcement actions by the FAA and US Coast Guard and certificate denials by the FAA
- Advocating implementation of safety recommendations
- Assisting victims and survivors of transportation disasters and their families

History

The NTSB's origins can be traced to the Air Commerce Act of 1926, in which Congress charged the US Department of Commerce with investigating the causes of aircraft accidents. That responsibility was transferred to the Civil Aeronautics Board's Bureau of Aviation Safety when it was created in 1940. In 1967, Congress consolidated all federal transportation agencies into a new US Department of Transportation (DOT) and established the NTSB as an independent agency within the US DOT. In creating the NTSB, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of safety in the transportation system than the individual modal agencies could working separately. Since 1967, the NTSB has investigated accidents, crashes, and other events in the aviation, highway, marine, pipeline, and railroad transportation modes, as well as those related to the transportation of hazardous materials. In 2022, the investigation of accidents in commercial space transportation was added to our mission.



Figure 1. In 1966, President Lyndon Johnson signed the Department of Transportation Act that created the NTSB.

SOURCE: US DOT

In 1974, Congress reestablished the NTSB as a separate entity outside the US DOT, reasoning that “no federal agency can properly perform such [investigatory] functions unless it is totally separate and independent from any other agency of the United States.”

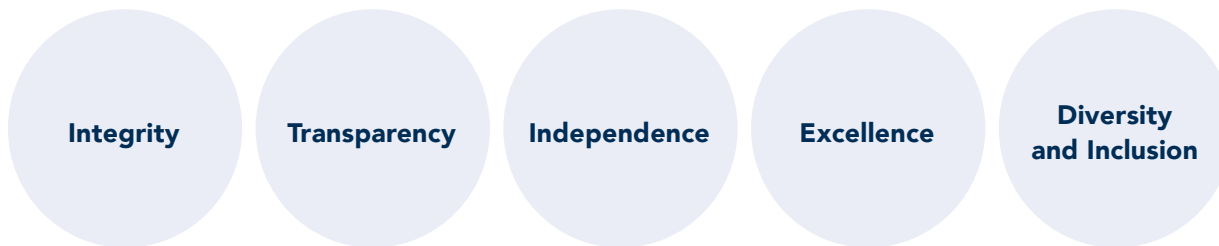
Because the US DOT has broad operational and regulatory responsibilities that affect the safety and efficiency of the transportation system, and transportation accidents may suggest deficiencies in that system, the NTSB's independence was deemed necessary to provide objectivity in its investigations and recommendations.

Role in Transportation Safety

Since its inception in 1967, the NTSB has investigated more than 153,000 aviation accidents and thousands of significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, hazardous materials, and commercial space. On call 24 hours a day, 365 days a year, our investigators travel throughout the country and to every corner of the world in response to transportation disasters. The NTSB investigates accidents to determine their probable cause, examines safety issues, and devises recommendations to prevent the occurrence of similar accidents in the future. We have issued more than 15,400 safety recommendations to more than 2,470 recipients in all transportation modes. The recommended action has been implemented for 82 percent of the over 12,900 recommendations that have been closed. The agency also develops safety research studies focused on broader safety questions and topics, enabling us to better perform our mission.

Additionally, we serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the FAA and the US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

Our Core Values



Strategic Goals and Objectives

1. ENSURE OUR PREPAREDNESS FOR INVESTIGATIONS INVOLVING EMERGING TRANSPORTATION TECHNOLOGIES AND SYSTEMS

Objective:

- Prepare the agency for new transportation technologies and systems

2. IMPROVE PROCESSES AND PRODUCTS

Objectives:

- Improve enterprise data governance
- Enhance enterprise risk management
- Improve information technology planning
- Improve the effectiveness of agency processes and products

3. OPTIMIZE ORGANIZATIONAL EFFECTIVENESS AND EFFICIENCY

Objectives:

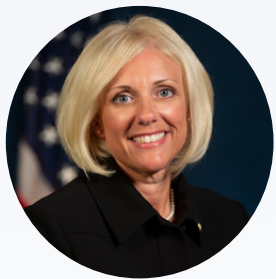
- Strengthen human capital planning
- Engage, connect, and protect the workforce
- Develop model supervisors and leaders
- Attract, develop, and retain a diverse and inclusive workforce

Organization and Program Structure

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

Our current Board members are pictured in [Figure 2](#).²

Figure 2. NTSB Board Members



Honorable
Jennifer Homendy
Chair



Honorable
Michael E. Graham
Board Member



Honorable
Thomas B. Chapman
Board Member



Honorable
Alvin Brown
Board Member

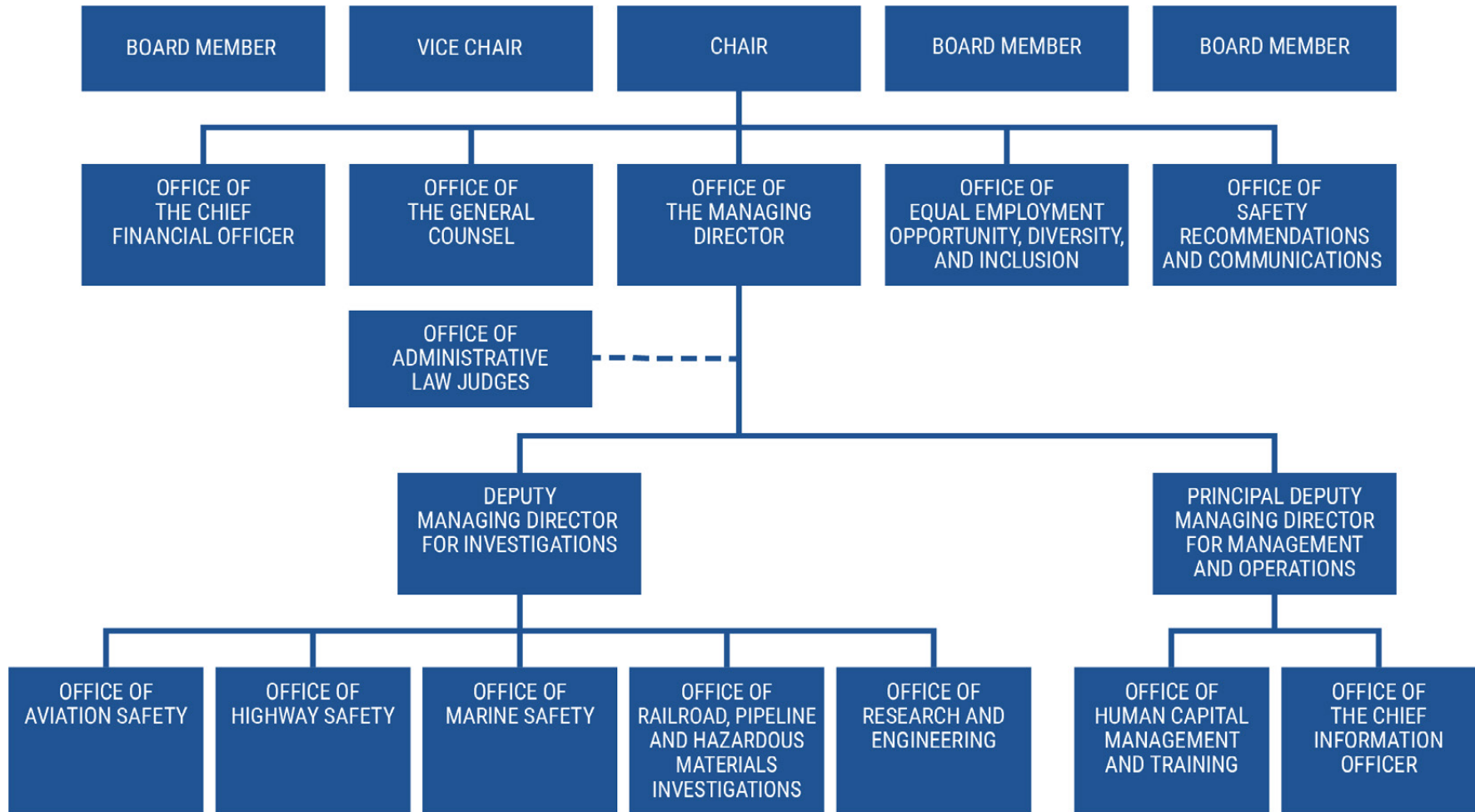


Honorable
J. Todd Inman
Board Member

² The position of vice chair is currently vacant.

Figure 3 shows our organizational structure. For more information about our offices and their functions, please visit the [Organization](#) page of our website.

Figure 3. NTSB organization chart



3/18/2024

The NTSB is headquartered in Washington, DC, where most of our staff work, within the Eastern Region. Others work remotely throughout the country or are assigned to one of the regional offices in Anchorage, Alaska; Federal Way, Washington; or Aurora, Colorado.

The map in **Figure 3** depicts the four NTSB regions.

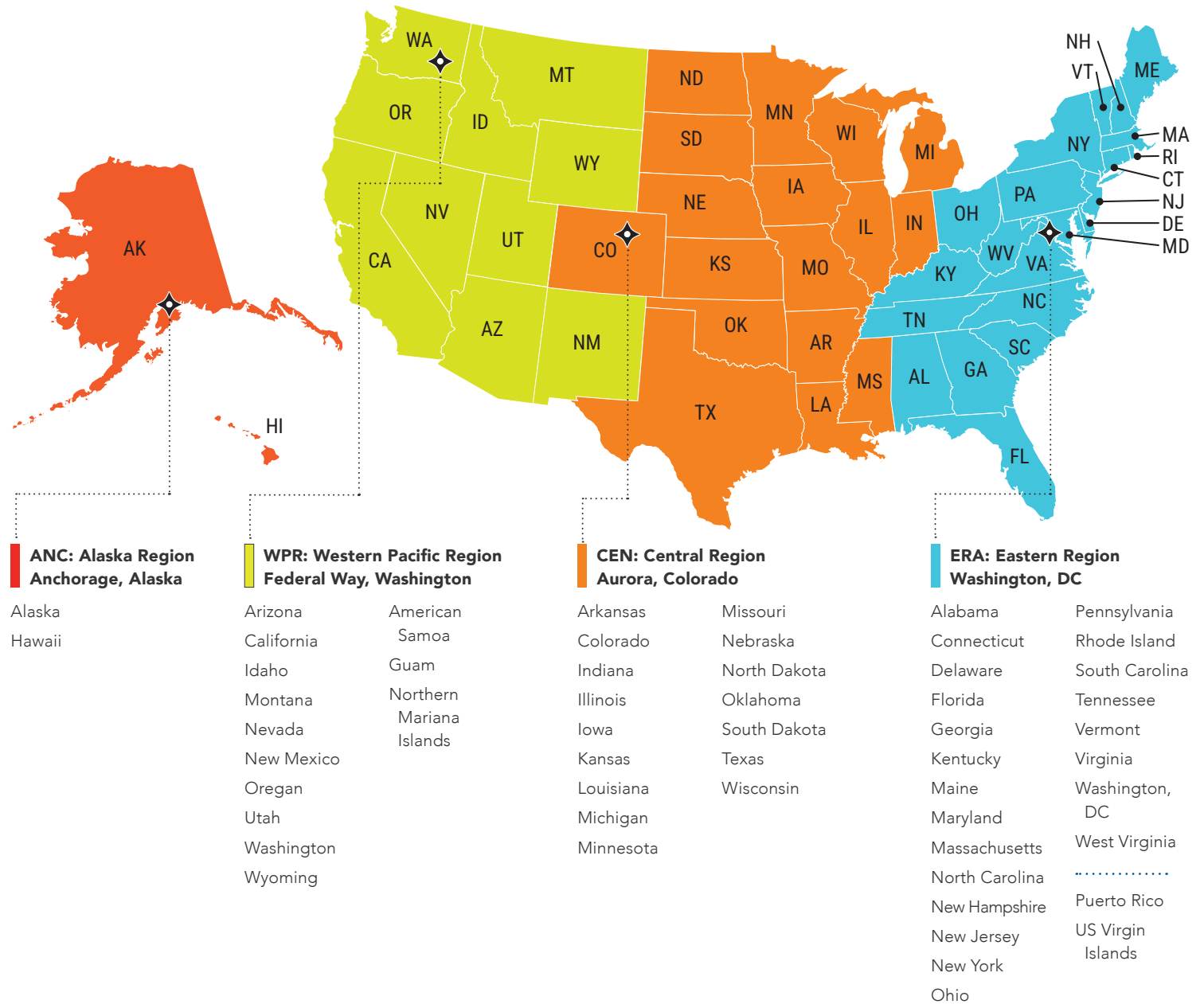


Figure 4. NTSB regions

Table 1, below, provides a snapshot of the agency’s activities over the past year³ and highlights key accomplishments of offices and divisions across the NTSB.

Table 1. 2023 NTSB Safety Statistics at a Glance

Safety Recommendations⁴		Research and Engineering/Laboratory	
Issued	65	Safety Research Products Completed	3
Closed in an Acceptable Status	163	Safety Data Analyses Completed	280
Urgent Closed in an Acceptable Status	1	Readouts of Vehicle Recorders and Other Electronic Devices Completed	433
Closed in an Unacceptable Status	33	Material Laboratory Exam Reports Completed	176
Urgent Closed in an Unacceptable Status	1	Vehicle Performance Reports and Animations Completed	58
		Medical Investigation Reports Completed	170
		Rapid Reports Completed ⁶	5
Reports and Products		Advocacy and Outreach Events⁷	
Board-Adopted Investigation Reports	16	Publications	10
Delegated Investigation Reports	1,303	Advocacy and Outreach Presentations and Events	390
Public Safety Hearings, Panels, Roundtables, Summits, and Webinars	90	Testimony or Legislative Support to State Legislative Committees	28
Safety Alerts and Videos	5		
Safety Actions ⁵	162		
Accident/Event Launches		Aviation Certificate Appeals	
Major Launches	6	Total Cases Received	229
Field or Limited Launches	223	Total Cases Closed	350
International Accident Launches	3	Emergency Cases Received	107
		Emergency Cases Closed	105
		Hearings Scheduled	58
		Hearings Held	11
Family Assistance			
Family Members and Victims Assisted	3,010		

³ This annual report reflects NTSB activities from January 1 through December 31, 2023.

⁴ In this report, each recommendation issued is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, recommendations closed are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/ No Response Received. Please note that recommendations closed in 2023 may have been issued in previous calendar years. 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.”

⁵ A safety action is a positive change within the transportation environment brought about by an NTSB investigation or study without our issuing a formal safety recommendation. Safety actions may be initiated either because of an NTSB investigation or independent of one.

⁶ If the NTSB decides to launch a Board member with the investigation team to the accident site as the on-scene spokesperson, the Safety Research Division (of the Office of Research and Engineering) and the Safety Recommendations Division (of the Office of Safety Recommendations and Communications) provide a 1- to 2-page summary of background information to support the investigation team during the initial stages of the launch. These “rapid reports” typically include publicly available information related to relevant safety data and statistics on similar crashes and crash trends; a summary of relevant NTSB investigations, studies, or other products; and a summary of relevant safety recommendations.

⁷ See Appendix A for additional details about NTSB advocacy and outreach.

MWL

MOST WANTED LIST

The NTSB's Most Wanted List of Transportation Safety Improvements Ends 1990-2023

The NTSB is committed to advocating for safety improvements across all sectors of transportation to save lives and reduce injuries. Staff use many communication tools to advocate at the local, state, and national levels. From 1990 to 2023, these tools included the Most Wanted List of Transportation Safety Improvements (MWL), which was retired at the end of 2023. Without a list, the NTSB is adopting a nimbler posture to be more responsive to issues when we can have the strongest impact. We will continue to advocate at the local, state, and national levels using all relevant communication tools (for example, social media, roundtables, and testimony, among others). In addition, we will provide robust resources and links on our website, www.nts.gov, focusing on modal safety priorities.

Since the list's creation in 1990, the NTSB has significantly improved safety in various MWL issue areas, including these:

- **Positive Train Control (PTC):** New regulations requiring the full implementation of PTC by all railroads (and subsequent 100 percent implementation) were enacted.
- **Fuel Tank Safety:** Our safety recommendations on fuel tank inserting systems were implemented, and the FAA's final rule related to the topic was enacted.
- **Occupant Protection:**
 - » Child passenger safety laws requiring booster seat use and requiring that children ride, properly restrained by a child car seat or seat belt, in the back seat were enacted.
 - » Crashworthiness improvements were implemented across all modes, including the adoption of crash-resistant fuel tanks in helicopters.
 - » Seat belt laws were enacted, requiring that all occupants in all vehicles equipped with safety belts use them.
- **Recreational Boating:** Alcohol-impaired boating laws, requirements for personal flotation devices, and requirements for boater education were implemented.

Additional areas of safety improvements include human fatigue, runway safety, alcohol and drug impairment, the shipment of hazardous materials, rail tank car safety, and pipeline leak detection and mitigation.

More about the history of the MWL and NTSB safety advocacy throughout the years can be found in the [MWL archives](#).

OFFICE OF AVIATION SAFETY

Table 2: Office of Aviation Safety Statistics

Recommendations Issued	8
Recommendations Closed in an Acceptable Status ⁸	29
Urgent Recommendations Closed in an Acceptable Status	1
Recommendations Closed in an Unacceptable Status	14
Urgent Recommendations Closed in an Unacceptable Status	1
Investigation Reports	1,267
Major Launches	1
Field Launches	166
International Accident Launches	2
Public Panel	1
Public Roundtables	2
Safety Summit	1
Safety Alerts	2
Safety Actions	161
Advocacy and Outreach	80

⁸ In this report, each recommendation issued is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, recommendations closed are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/ No Response Received.

The mission of the Office of Aviation Safety is to—

- Investigate all air carrier, commuter, and air taxi accidents and certain serious incidents; fatal and nonfatal general aviation accidents and serious incidents; uncrewed aircraft systems, advanced air mobility, 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 International Civil Aviation Organization (ICAO) agreements.
- Investigate safety issues that extend beyond a single accident to examine specific aviation safety problems from a broader perspective.

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

Investigation Reports⁹

From January 1, 2023, through December 31, 2023, the Office of Aviation Safety issued a total of 1,207 investigation reports; one of these involved safety issues that led to the issuance of eight safety recommendations.

Below are summaries of some of the aviation investigation reports completed during this period.



Figure 5. The de Havilland DHC-3 airplane landing on the water following an earlier flight.

SOURCE: NORTHWEST SEAPLANES, OPERATOR

Abrupt Loss of Pitch Control and Water Impact de Havilland DHC-3

Mutiny Bay, Washington • September 4, 2022

On September 4, 2022, about 3:09 p.m., a float-equipped de Havilland DHC-3 airplane operated by West Isle Air as a commercial passenger air service abruptly pitched down and impacted the water in Mutiny Bay, Washington.¹⁰ The pilot and nine passengers were fatally injured, and the airplane was destroyed.



Figure 6. The mangled left wing, winglet, and aileron of the de Havilland DHC-3, post crash.

We determined that the probable cause was the in-flight unthreading of the clamp nut from the horizontal stabilizer actuator barrel due to a missing lock ring, which resulted in the horizontal stabilizer moving to an extreme trailing edge-down position, rendering the airplane's pitch uncontrollable.

We identified the following safety issues in this investigation: (1) the need to ensure the presence of the lock ring in the horizontal stabilizer trim actuator assembly to prevent a loss of pitch control, (2) the need to install a secondary retention feature on the horizontal stabilizer trim actuator, (3) the potential hazard of installing a moisture seal (a component not approved by the airplane manufacturer) on the horizontal stabilizer trim actuator, and (4) the need for clear and concise guidance from the manufacturer regarding the horizontal stabilizer actuator inspection and maintenance procedures.

As a result of this investigation, we issued safety recommendations to the FAA, Viking Air, and Transport Canada, which is the regulator for the state of design and manufacture of the DHC-3.

Recommendations: 8 new

Report Date: September 29, 2023

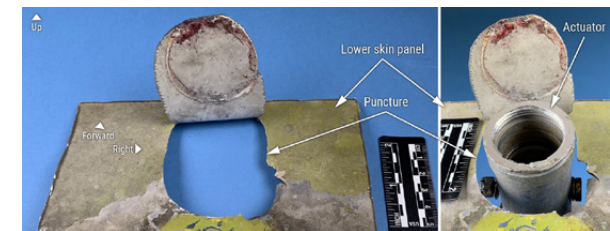


Figure 7. On the left is the lower skin panel, showing the puncture in the horizontal stabilizer. On the right is the barrel portion of the horizontal stabilizer trim actuator in the open end of the puncture.

⁹ Investigation reports are issued for accident or incident investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger-scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an 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."

¹⁰ All times stated are local time.

Runway Overrun During Takeoff, McDonnell Douglas DC-9-87

Brookshire, Texas • October 19, 2021

On October 19, 2021, about 10:00 a.m., a McDonnell Douglas DC-9-87, overran the departure end of runway 36 at Houston Executive Airport, Brookshire, Texas, after the flight crew executed a rejected takeoff. Of the 19 passengers and 4 crewmembers on board the airplane, 2 passengers received serious injuries and 1 passenger received a minor injury. A postcrash fire ensued, and the airplane was destroyed.

We determined that the probable cause was the jammed condition of both elevators, which had resulted from exposure to localized, dynamic high wind while the airplane was parked and had prevented the airplane from rotating during the takeoff roll. Also causal was the failure of Everts Air Cargo, the pilots' primary employer, to maintain awareness of Boeing-issued, required updates for its manuals, which resulted in the pilots' failing to receive the procedures and training that addressed the requirement to visually verify during the preflight checks that the elevators were not jammed.

We identified the following safety issues in this investigation: (1) the jammed elevators, which resulted from the airplane's exposure to high-wind conditions while parked and (2) the failure of the pilots' primary employer to maintain awareness of Boeing-issued, required updates for its manuals, which resulted in the pilots' failure to receive the procedures and training that addressed the requirement to visually verify during preflight checks that the elevators were not jammed.

Recommendations: None

Report Date: September 28, 2023



Figure 8. The Brookshire, Texas, accident airplane, shown in operational condition prior to the accident.

SOURCE: AIRCRAFT.COM

Rapid Right Roll and Ground Impact Bombardier CL-600-2B16

Truckee, California • July 26, 2021

On July 26, 2021, about 1:18 p.m., a Bombardier Challenger 605 was destroyed when it entered a rapid left roll and impacted terrain while on approach to Truckee-Tahoe Airport, Truckee, California. The captain, first officer, and four passengers were fatally injured. The airplane was operated as a Part 91 personal flight.

We determined that the probable cause was the first officer's improper decision to attempt to salvage an unstabilized approach by executing a steep left turn to realign the airplane with the runway centerline, and the captain's failure to intervene after recognizing the first officer's erroneous action, while both ignored stall protection system warnings, which resulted in a left-wing stall and an impact with terrain. Contributing to the accident was the first officer's improper deployment of the flight spoilers, which decreased the airplane's stall margin; the captain's improper setup of the circling approach; and the flight crew's self-induced pressure to perform and poor crew resource management, which degraded their decision-making.

We identified the following safety issues in this investigation: (1) the first officer's improper decision to salvage the unstabilized approach rather than go around and the captain's failure to intervene as pilot-in-command and (2) the flight crew's self-induced pressure to perform and poor crew resource management. Safety Alert - 084, "Circling Approaches: Know the Risks!" was issued in March 2023 to address these issues, which were also identified in other investigations (see Safety Alerts below for more information).

Recommendations: None

Report Date: August 10, 2023



Figure 9. The left wing, winglet, and aileron of the destroyed airplane. The plane caught fire in the accident, and the wreckage was scattered across a wooded area.

SOURCE: BOMBARDIER AIR SAFETY INVESTIGATION OFFICE

Engine Failure and Water Ditching, Boeing 737-275C

Honolulu, Hawaii • July 2, 2021

On July 2, 2021, about 1:45 a.m., Rhoades Aviation, doing business as TransAir flight 810, a B737-200 experienced a partial loss of power involving the right engine shortly after takeoff from Honolulu, Hawaii, and was subsequently ditched into Mamala Bay. The captain sustained serious injuries, the first officer sustained minor injuries, and the airplane was destroyed.

We determined that the probable cause was the flight crewmembers' misidentification of the damaged engine (after leveling off the airplane and reducing thrust) and their use of only the damaged engine for thrust during the remainder of the flight, resulting in an unintentional descent and forced ditching in the Pacific Ocean. Contributing to the accident were the flight crew's ineffective crew resource management, high workload, and stress.

We identified the following safety issues in this investigation: (1) the failure of two high-pressure turbine blades resulting in the right engine's loss of thrust, (2) the flight crew's misidentification of the affected engine and failure to verify their initial assessment, (3) stress-related attention tunneling, and (4) ineffective crew resource management.

Recommendations: None

Report Date: June 15, 2023

Midair Collision, Cirrus SR22, and Swearingen SA226TC

Englewood, Colorado, May 12, 2021

On May 12, 2021, at 10:23 a.m., a Cirrus SR22 airplane and a Swearingen SA226TC airplane were substantially damaged when they collided in flight while approaching to land at Centennial Airport, Englewood, Colorado. The pilot and passenger onboard the Cirrus were not injured, nor was the pilot onboard the Swearingen.

We determined that the probable cause was the Cirrus pilot's failure to maintain the final approach course for the assigned runway, which resulted in a collision with the Swearingen on its final approach to the parallel runway. Contributing to the accident were the failure of the controller to issue a traffic advisory to the Swearingen pilot regarding the location of the Cirrus and the Cirrus pilot's decision to fly a faster-than-recommended approach speed, which resulted in a larger turn radius and contributed to his overshoot of the final approach course.

We identified the following safety issues in this investigation: (1) the Cirrus pilot's use of a faster-than-recommended approach speed, which increased the airplane's radius of turn and misjudgment of the airplane's flightpath and (2) the approach sequence controller's failure to issue a traffic advisory to the Swearingen pilot regarding the location of the Cirrus and the potential conflict.

Recommendations: None

Report Date: March 29, 2023

Ongoing Significant Aviation Accident and Incident Investigations

As of December 31, 2023, the Office of Aviation Safety had 969 open domestic investigations. The following ongoing investigations involved significant safety issues. We are devoting significant resources to these investigations and anticipate producing a report upon the completion of each one.

Table 3: Ongoing Significant Aviation Accident and Incident Investigations

Location	Date	Description	Fatalities
*Austin, Texas	2/4/2023	Runway incursion of a Boeing 737	0
*Queens, New York	1/14/2023	Runway incursion and aborted takeoff of a Boeing 737	0
Dallas, Texas	11/12/2022	Midair collision of a B-17 and a P-63 during airshow	5
Amherstdale, West Virginia	6/22/2022	Collision with terrain with a Bell UH-1B	6
*Miami, Florida	6/21/2022	Landing gear collapse on a McDonnell Douglas MD-80	0
*Jolon, California	2/16/2022	Failure of Joby Aviation JAS4-2 experimental aircraft component during developmental flight test	0

* As of June 30, 2024, this investigation has been completed.



International Investigations

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

The international investigative process is critical to maintaining aviation safety in the United States and throughout the world. When an aircraft operated by—or designed, manufactured, or registered to—a US company has been involved in an accident in a foreign state, NTSB participation in that investigation enables the United States to ensure the airworthiness and operation of its aircraft operated here and 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 as a direct result of our participation in these foreign investigations.

Through December 31, 2023, the Office of Aviation Safety was notified of and assisted on 420 international investigations. Of these, investigators launched or traveled in support of 10 investigations. The following investigations required significant US involvement:

Ethiopian Airlines Uncontained Engine Failure

Addis Ababa, Ethiopia • November 7, 2023

On November 7, 2023, Ethiopian Airlines flight 500, a Boeing 787-9, experienced an uncontained failure of its left engine toward the end of climbout. The engine, a General Electric GEnx-1B, lost power and set off a fire alarm, prompting the flight crew to shut it down and return to Addis Ababa Bole International Airport, where they landed safely about 50 minutes after departure. As the US-accredited representative of the state of design and manufacture of the airframe and engines, NTSB staff traveled to support the Ethiopia Accident Investigation Bureau in its investigation.

Air Astana Uncontained Engine Failure

Almaty, Kazakhstan • September 17, 2023

On September 17, 2023, Air Astana flight 127, an Airbus A320-271N, experienced an uncontained failure of its right engine, a Pratt & Whitney 1127GA JM. At the top of climbout, the flight crew received an engine warning. They stopped the climb, declared an emergency, and returned to Almaty International Airport, where they landed without further incident. As the US-accredited representative of the state of design and manufacture of the engines, NTSB staff traveled to support Kazakhstan's Ministry of Transport in its investigation.

Air China Tail Pipe Fire

Singapore, Changi Airport • September 10, 2023

On September 10, 2023, the flight crew of Air China flight 403, an Airbus A321neo, received smoke warnings from the forward electronic bay, forward cargo hold, and forward lavatory while descending into Singapore's Changi Airport. The airplane landed safely. During evacuation, a tail-pipe fire coming from the left engine was observed. As the US-accredited representative of the state of design and manufacture of the engines, NTSB staff traveled to support Singapore's Transport Safety Investigation Bureau in its investigation.

Volaris Uncontained Engine Failure

Chihuahua, Mexico • September 3, 2023

On September 3, 2023, a Volaris flight operating an Airbus A320 experienced an uncontained failure of its left engine, a Pratt & Whitney 1127, during approach to the Chihuahua International Airport, Chihuahua, Mexico. The flight crew landed safely without further incident. As the US-accredited representative of the state of design and manufacture of the engines, NTSB staff traveled to support Mexico's Federal Civil Aviation Agency in its investigation.

Collision with Terrain Involving a Jet Valet Raytheon 390 Premier 1

Elmina, Malaysia • August 17, 2023

On August 17, 2023, a Jet Valet Raytheon 390 Premier 1 lost control and crashed on a road in a wooded area while on approach to Sultan Abul Aziz Shah Airport, Elmina, Malaysia. Both pilots and all six passengers were fatally injured, as were two people on the ground. As the US-accredited representative of the state of design and manufacture of the airframe and engine, NTSB staff traveled to support Malaysia's Air Accident Investigation Bureau in its investigation.

Collision with Terrain Involving Boeing Company 737-3H4

Fitzgerald River National Park,
Western Australia • February 6, 2023

On February 6, 2023, a Coulson Aviation Boeing 737-3H4 large air tanker crashed while conducting firefighting activities at Fitzgerald River National Park. Both pilots on board sustained minor injuries. As the US-accredited representative of the state of design

and manufacture of the airplane, NTSB staff traveled to support the Australian Transport Safety Bureau in its investigation.

IndiGo Engine Failure

Amritsar, India • February 5, 2023

On February 5, 2023, IndiGo flight 5926, an Airbus A320 271N, experienced a failure of its left engine, a Pratt & Whitney 1127GA, during its initial climb from Sri Guru Ram Das Ji International Airport near Amritsar, India. The airplane returned to the airport and landed safely. As the US-accredited representative of the state of design and manufacture of the engines, NTSB staff conducted a remote examination of engine components to support the India Aircraft Accident Investigation Bureau's investigation.

US Comments on Foreign Accident Reports

We completed comments on behalf of the United States on several international investigations in which the United States had significant involvement under Annex 13, including these:

Boeing 787-8, Hong Kong In-Flight Loss of Control

Hong Kong International Airport •
October 20, 2018

On October 20, 2018, an Air India Boeing 787-8 descended rapidly on approach to Hong Kong International Airport, triggering a ground proximity warning system alert on the airplane. The flight crew recovered airplane control about 200 feet above mean sea level about 2.6 nautical miles from the intended runway and landed the airplane uneventfully following a go-around and second approach. No injuries to the 197 passengers and 10 crewmembers on board were reported. The NTSB US-accredited representative provided comments on the draft final report in March 2023. The final report is pending.

Boeing 737, Flap Asymmetry During Approach

Banjarmasin, Indonesia, Sjamsudin Noor Airport •
August 14, 2022

On August 14, 2022, the flight crew of a Boeing 737 noticed an indication of a flap asymmetry during approach to Sjamsudin Noor Airport, Banjarmasin, Indonesia, and a left rolling tendency of the airplane. They performed a go-around and attempted to troubleshoot the issue, but it remained. The flight crew completed the non-normal landing checklist before deciding to land. Before touchdown, the

airplane rolled to the left and the left wingtip and engine cowling contacted the runway. No injuries to the four occupants on board were reported. The NTSB US-accredited representative provided comments on a draft report in February 2023. The final report is pending.

Boeing 737 MAX, Addis Ababa Crash

Ejere, Ethiopia, Addis Ababa Bole International Airport • March 10, 2019

On March 10, 2019, Ethiopian Airlines flight 302, a Boeing 737 MAX 8, crashed near Ejere, Ethiopia, shortly after takeoff from Addis Ababa Bole International Airport, Ethiopia. All 157 passengers and crew on board were fatally injured, and the airplane was destroyed.

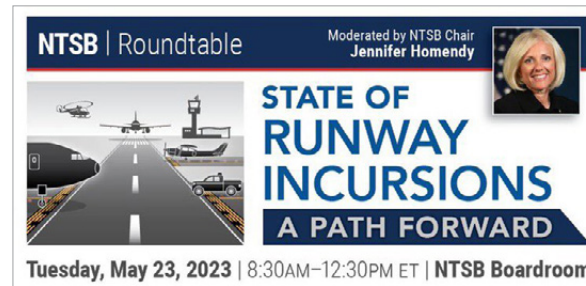
The Ethiopian Airplane Accident Investigation Bureau published its final report in December 2022; however, it had not appended the comments provided by the NTSB in May 2022, which we had requested, and which is ICAO Annex 13 protocol. Accordingly, we released the comments following the report's publication. Because the published report had also introduced new information not included in the draft we reviewed in May, we released additional comments in January 2023 that addressed the new information.

Public Roundtable

State of Runway Incursions: A Path Forward

May 23, 2023

Although the number of runway incursions—defined as the incorrect presence of an aircraft, vehicle, or person on a runway—has remained relatively stable over the past decade, we have seen a recent increase in the number of the most serious incursions. The NTSB opened investigations into six incursion events between January and May 2023. As a result, we hosted a roundtable discussion among safety experts from the aviation industry, labor, academia, and government on the danger of runway incursions in the United States and possible solutions to mitigate the problem.



Safety Summit

Navigating Mental Health in Aviation

December 6, 2023

Chair Jennifer Homendy brought together safety experts from the aviation industry, academia, the mental health profession, and government to examine the unintended consequences of the current system for evaluating mental fitness in the aviation workforce, and to explore ways that the United States can modernize its approach to mental health while managing risk in the national airspace. Panelists shared first-person accounts of how the current system has affected them, and mental health experts discussed concerns with the aviation industry's current approach to evaluating mental illness in pilots and air traffic controllers.



Public Webinar

NTSB Webinar: Implementing an SMS in Small to Midsized Aviation Operations

May 11, 2023

NTSB Board Member Michael Graham moderated a roundtable discussion with several small to midsized operators in various stages of safety management system (SMS) implementation to explore why they chose to implement an SMS, how they are incorporating the four SMS components (safety policy, safety risk management, safety assurance, safety promotion), the challenges they overcame, and the safety and economic benefits they are seeing.



Panel Discussion

NTSB Case Study & Panel Discussion - Identifying the Safety Focus through the Causal Factors

October 18, 2023

In Truckee, California, in 2021, a Challenger crashed while circling to land, resulting in six fatalities. This accident, which was the result of an unstabilized approach, self-induced pressure, poor crew resource management, and a lack of leadership, has captured the business jet industry's attention. NTSB Board Member Michael Graham hosted a panel that discussed key safety topics and factors that contributed to the accident.



Safety Alerts¹¹

Through December 31, 2023, the Office of Aviation Safety developed the following safety alerts for issuance by the Board:

NTSB Safety Alert 086

Mechanics: Ensure B-nuts Are Properly Secured!

This safety alert was derived from multiple NTSB investigations involving an improperly secured B-nut, which is a common term for the type of nut that provides the clamping force to create a reliable seal in lines installed on aircraft.

NTSB Safety Alert 084

Circling Approaches: Know the Risks!

This safety alert was derived from multiple NTSB investigations involving circling approaches and describes accident scenarios in which pilots planned for one approach then, during the final segment of the approach, switched to a circling approach, resulting in an unstabilized approach and loss of control.

Other Significant Achievements

- **Zero Open Investigations More than 2 Years Old.** Down from a high of 442 open investigations 2 years or older in February 2022, the Office of Aviation Safety ended fiscal year 2023 with no open investigations over 2 years old. This achievement was the culmination of the office's Cascade Project, which involved hiring two retired annuitants to address reduced staffing of report analysts, triaging the completion of investigation reports that were already in review, and prioritizing the completion of investigations for which investigative tasks were nearly finished.
- **Closure of Safety Recommendation A-19-10 (737 MAX).** In January 2023, Safety Recommendation A-19-10 was closed in an acceptable status following completion of the FAA's responsive action. This recommendation asked the FAA to require that Boeing (1) ensure that system safety assessments for the 737 MAX in which it assumed immediate and appropriate pilot corrective actions in response to uncommanded flight control inputs, from systems such as the Maneuvering Characteristics Augmentation System, consider the effect of all possible flight deck alerts and indications on pilot recognition and response; and (2) incorporate design enhancements (including flight deck alerts and indications), pilot procedures, and/or training requirements, where needed, to minimize the potential for and safety impact of pilot actions that are inconsistent with manufacturer assumptions.
- **Closure of Safety Recommendations A-14-114 through -118 (Lithium-Ion Batteries).** In March 2023, these five safety recommendations were closed in an acceptable status as a result of the FAA's responsive actions:
 - » Work with aviation industry experts to develop or modify design safety standards for large-format lithium-ion batteries to require that sources of excessive heating, including electrical contact resistance from components and connections, be identified, minimized, and documented as part of the design. The standards should include measures for identifying and minimizing potential sources of heating that consider the range of operating temperatures and the most extreme electrical currents that the battery could be expected to experience during repeated charge and discharge cycles. (A-14-114)
 - » Work with aviation industry experts to develop or modify existing safety standards related to the design of permanently installed lithium-ion batteries to require monitoring of individual cell temperature and voltage and recording of exceedances to prevent internal cell damage during operations under the most extreme operating temperatures and currents. (A-14-115)
 - » Once the guidance requested in Safety Recommendation A-14-115 has been issued, require type certification applicants to demonstrate that the battery monitoring

¹¹ Safety alerts are brief information sheets that pinpoint a particular safety issue. They are primarily used to alert the general aviation community, which may not otherwise be reached through safety recommendations, to safety issues identified during multiple investigations. Safety alerts provide information on the problem, examples of accidents, information about what pilots can do to avoid making the same mistakes, and references to enable 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.

system maintains each individual cell within safe temperature limits at the most extreme battery operating temperatures and the heaviest electrical current loads approved for operation. (A-14-116)

- » Work with lithium-ion industry experts to (1) conduct research into battery monitoring system technologies that could improve the recognition of conditions leading to thermal runaway, (2) develop active mitigation of such conditions to minimize damage, and (3) update design and safety standards accordingly. (A-14-117)
- » Work with industry experts to develop appropriate test methods for determining the initial point of self-heating in a lithium-ion cell to establish objective margins of thermal safety for future battery designs. (A-14-118)

- **Comments on FAA Notice of Proposed Rulemaking Concerning Safety Management Systems.** In March 2023, the NTSB submitted comments developed by the Office of Aviation Safety on the FAA's proposal to expand the applicability of Title 14 *Code of Federal Regulations* Part 5, Safety Management Systems, beyond Part 121 air carrier operators to include commuter and on-demand operators under Part 135 and all operators conducting air tours under Part 91. We commended the FAA's analytic approach to the rulemaking and noted that the proposed rule would generally improve aviation safety by expanding SMS requirements to other types of operators and service providers. We also

noted that work remained to include all revenue passenger-carrying operations under Part 91 and to improve guidance on the scalability of SMS.

- **Comments on Draft Advisory Circular 136-B048,** Supplemental Information for the Creation of Operating Procedures and Pilot Training Subjects Related to OpSpec/LOA B048. In September 2023, the NTSB submitted comments developed by the Office of Aviation Safety on the FAA's draft AC concerning Hawaii air tour safety. We noted positive aspects of the draft AC that we anticipate will raise the bar for safety of air tours in Hawaii, as well as areas of the AC that are partially or not at all responsive to 11 NTSB safety recommendations.
- **Aviation Report Timeliness Project – Initial Quality Review.** To continuously improve the timeliness and quality of regional aviation reports, the Office of Aviation Safety implemented an initial quality review as part of the report development process. A formalized peer review, the initial quality review is intended to help investigative staff identify and address early in the development process areas that do not adhere to report quality standards. It is also anticipated that acting as peer reviewers will improve investigative staff's familiarity with these report quality standards.

OFFICE OF HIGHWAY SAFETY

Table 4: Office of Highway Safety Statistics

Recommendations Issued	25
Recommendations Closed in an Acceptable Status ¹²	52
Recommendations Closed in an Unacceptable Status	3
Investigation Reports	11
Major Launches	4
Field Launches	9
Public Webinar	1
Safety Alert	1
Advocacy and Outreach	25

¹² In this report, each *recommendation issued* is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, *recommendations closed* are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/ No Response Received.

The Office of Highway Safety investigates crashes that have significant safety implications nationwide, highlight national safety issues, involve the loss of numerous lives, or generate high interest because of emerging technologies or the circumstance of the crash. Such investigations may focus on collapses of bridges spanning roadways or tunnel structures, mass casualties and injuries on public transportation vehicles (such as motorcoaches and school buses), and collisions at highway-railroad grade crossings.

This office also investigates crashes that involve new safety issues or technologies (such as automated vehicles and alternatively fueled vehicles), and develops reports based on trends emerging from NTSB investigations and from research and data that identify common risks or the underlying causes of crashes, injuries, and fatalities.

The NTSB is the only US organization that performs independent, comprehensive, and transparent multidisciplinary investigations to determine the probable causes of highway crashes, with the goal of making recommendations to prevent similar events and to reduce injuries and fatalities. Our investigations result in recommendations that provide policymakers with unbiased analysis and that, if

implemented, would reduce or eliminate the safety risks identified in the investigations.

The Office of Highway Safety comprises the Investigations Division and the Report Development Division. The Investigations Division is further divided into the Multidisciplinary Investigations Branch and the Special Investigations Branch. The Multidisciplinary Investigations Branch conducts major highway investigations through a multidisciplinary team comprising an investigator-in-charge and five other investigators with expertise in vehicle, highway, human performance, survival, and motor carrier factors. The Special Investigations Branch performs focused investigations by specific subject matter experts on targeted safety issues.



Figure 10. Office of Highway Safety all-hands meeting, September 2023.

Investigation Reports¹³

From January 1, 2023, through December 31, 2023, the Office of Highway Safety issued a total of 11 investigation reports; 4 of these reports involved safety issues that led to the issuance of 21 safety recommendations.

Below are summaries of some of the highway investigation reports completed during this period.

Multivehicle Crash in Icy Conditions on Interstate 35 West

Fort Worth, Texas • February 11, 2021

On February 11, 2021, about 6:00 a.m., a multivehicle crash occurred in the southbound toll lanes of Interstate 35 West (I-35W), in Fort Worth, Tarrant County, Texas.¹⁴ The crash sequence began on an elevated portion of the roadway near the exit to Northside Drive and ultimately involved 130 vehicles. In the days before the crash, the area had experienced 36 consecutive hours of below-freezing temperatures. In anticipation of the forecasted freezing rain and sleet, North Tarrant Express Mobility Partners Segment 3, which was responsible for operations and maintenance on the I-35W right-of-way at this location, pretreated the traffic lanes with a liquid brine solution about 44 hours before the multivehicle collision occurred. The crash event occurred when several vehicles in the southbound toll lanes slid on the elevated roadway and struck the concrete barriers beside the toll lanes. As approaching drivers encountered the vehicles

involved in these initial crashes, they were unable to stop on the icy roadway, leading to secondary crashes. As a result of the event, six people were fatally injured. Four of these were inside their vehicles; two were struck on the roadway after they had exited their vehicles.



Figure 11. Overhead view of Fort Worth, Texas, crash scene.

SOURCE: GOOGLE EARTH IMAGE ADAPTED BY NTSB.

¹³ Investigation reports are issued for investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an investigation. If the Board determines that a recommended course of action requires immediate attention to avoid imminent loss of life from a similar crash, the safety recommendation is designated "urgent."

¹⁴ All times stated are local time.

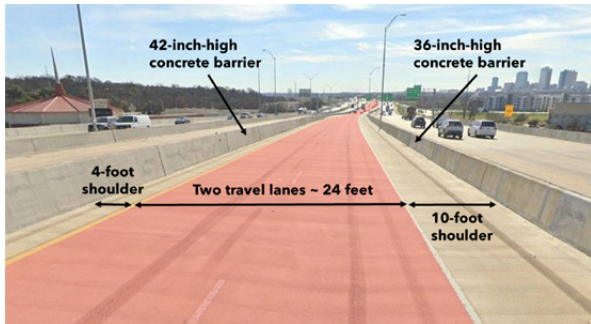


Figure 12. I-35W southbound toll lanes (highlighted in red) in area of crash site, looking south. Southbound general-use lanes are on the right, and northbound toll lanes are left of the 42-inch-high concrete barrier.

We determined that the probable cause of the multivehicle crash was ice accumulation on the surface of the elevated roadway, causing drivers to lose control of their vehicles, which then slid into road barriers and other vehicles. Contributing to the unsafe roadway condition was the failure of North Tarrant Express Mobility Partners Segments 3 to effectively monitor and address roadway conditions along I-35W during and after periods of freezing rain and mist. Contributing to the severity of the crash outcome was drivers traveling at speeds too fast for the winter weather conditions.

We identified the following safety issues during this investigation: (1) the inadequate methods used to monitor the condition of the roadway and elevated structures during inclement weather, (2) insufficient training for personnel responsible for snow and ice control regarding how to monitor moisture and icy conditions, and when to apply suitable roadway treatments, and (3) the need for technological countermeasures to help drivers and vehicles respond appropriately to inclement weather conditions.

As a result of this investigation, we issued safety recommendations to the state of Texas and reiterated recommendations to the DOT, the National Highway Traffic Safety Administration (NHTSA), the Federal Communications Commission, and the state of Texas.

Recommendations: 3 new, 5 reiterated
Report Date: February 27, 2023

**Multivehicle Collision Involving a Milk Tank
 Combination Vehicle and Stopped Traffic Queue**
 Phoenix, Arizona • June 9, 2021



Figure 13. Aerial view, right, of the area of the crash, with an inset, left, showing the position of the vehicles involved in the crash.

SOURCE: ADAPTED FROM GOOGLE EARTH

On the evening of June 9, 2021, about 10:07 p.m., a truck-tractor in combination with a tank-trailer hauling milk, operated by Arizona Milk Transport, was traveling eastbound on State Route 202 in Phoenix,

Arizona, when it crashed into a queue of passenger vehicles that were stopped because of a road closure. The truck driver did not slow down or steer away as he approached the traffic queue at a speed of 62-64 miles per hour. The combination vehicle struck and partially overrode the vehicle at the end of the queue, initiating a series of chain-reaction collisions that involved six other passenger vehicles. Following the initial impacts, the combination vehicle crossed the eastbound travel lanes, struck the concrete median barrier, and separated; the truck-tractor and one passenger vehicle were consumed by fire. Four passenger-vehicle occupants died, and 11 occupants were injured; the truck driver was uninjured.

We determined that the probable cause of the crash was the truck driver's failure to respond to the fully conspicuous traffic queue, likely as the result of fatigue. Contributing to the crash was Arizona Milk Transport's (1) poor oversight of its drivers, (2) lack of fatigue management program, and (3) failure to enforce its own policies, such as those regarding on-duty hours—all a consequence of its inadequate safety culture. Contributing to the severity of injuries to several passenger vehicle occupants was their lack of, or improper, lap/shoulder belt use.

We identified the following safety issues during this investigation: (1) the inadequate safety culture of the motor carrier, (2) the need to reduce the risk of fatigue for drivers operating under an agricultural hours-of-service exemption, (3) the need to improve the prioritization of messages displayed on dynamic message signs, (4) the need to increase the use of occupant restraints for all seating positions, and (5) the need to expedite deployment of collision avoidance technologies.



Figure 14. Eastbound view of three crash-involved vehicles showing their at-rest positions.

SOURCE: ARIZONA DEPARTMENT OF PUBLIC SAFETY

As a result of this investigation, we issued safety recommendations to the US DOT, the Arizona Department of Transportation, Arizona Milk Transport, the Commercial Vehicle Safety Alliance, the International Dairy Foods Association, the National Conference for Interstate Milk Shipments, and the International Milk Haulers Association, and reiterated recommendations to the US DOT, the Federal Communications Commission, NHTSA, and 38 states and the District of Columbia.

Recommendations: 9 new, 6 reiterated
Report Date: March 28, 2023

Improving the Identification, Prioritization, and Completion of Follow-up Actions on Bridges with Uncoated Weathering Steel Components

Pittsburgh, Pennsylvania • January 28, 2022

On January 28, 2022, about 6:40 a.m., the Fern Hollow Bridge, which carried Forbes Avenue over the north

side of Frick Park in Pittsburgh, Allegheny County, Pennsylvania, experienced a structural failure. As a result, the 447-foot-long bridge fell about 100 feet into the park below. At the time of the collapse, a 2013 New Flyer articulated bus, operated by the Port Authority of Allegheny County, and four passenger vehicles were on the bridge. A fifth passenger vehicle drove off the east bridge abutment following the collapse and came to rest on its roof on the ground below. As a result of the collapse, two vehicle occupants sustained serious injuries, two sustained minor injuries, four were uninjured, and the injury status of one is unknown.



Figure 15. View of the collapsed Fern Hollow Bridge from the east.

As of December 31, 2023, the collapse remained under investigation.¹⁵ However, we issued an interim report in which we identified one safety issue to address the need for bridge owners nationwide to ensure that documented follow-up actions have been performed on their bridges with uncoated weathering steel components.

As a result of our investigation, we issued a safety recommendation to the Federal Highway Administration in the report.

Recommendation: 1 new
Report Date: May 3, 2023

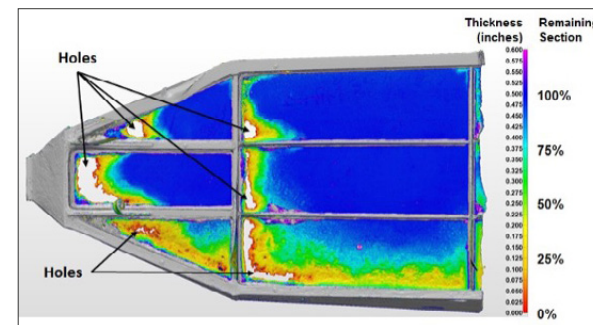


Figure 16. Three-dimensional laser scan of the remaining section on the bottom of the northwest leg of the Fern Hollow Bridge, post-collapse. Per the design plan, the nominal thickness of the leg web plate was 0.5 inches; the blue in the figure indicates areas of the leg web that met the design plan, and the yellow indicates areas that were about 25 percent of the nominal thickness.

¹⁵ The investigation of the Fern Hollow Bridge collapse was completed in 2024. Additional information, including probable cause and additional safety issues that were identified, is available on our website and will be included in our 2024 annual report to congress.

Multivehicle Crash at Signalized Intersection

North Las Vegas, Nevada • January 29, 2022

On Saturday, January 29, 2022, about 3:12 p.m., a 2018 Dodge Challenger passenger car was traveling northbound on North Commerce Street in North Las Vegas, Clark County, Nevada. The Dodge driver approached the traffic signal-controlled intersection with Cheyenne Avenue, reaching a maximum vehicle-recorded speed of 103 miles per hour. The Dodge driver entered the intersection on a red traffic signal (which had been red for at least 29 seconds) and struck the right side of a Toyota Sienna minivan traveling eastbound on Cheyenne Avenue. Four additional vehicles traveling on Cheyenne Avenue became involved in subsequent impacts. As a result of the crash, the driver and passenger of the Dodge and all seven occupants of the Toyota minivan died.



Figure 17. Relative positions and speeds of the Dodge and Toyota leading up to the North Las Vegas, Nevada, crash events.

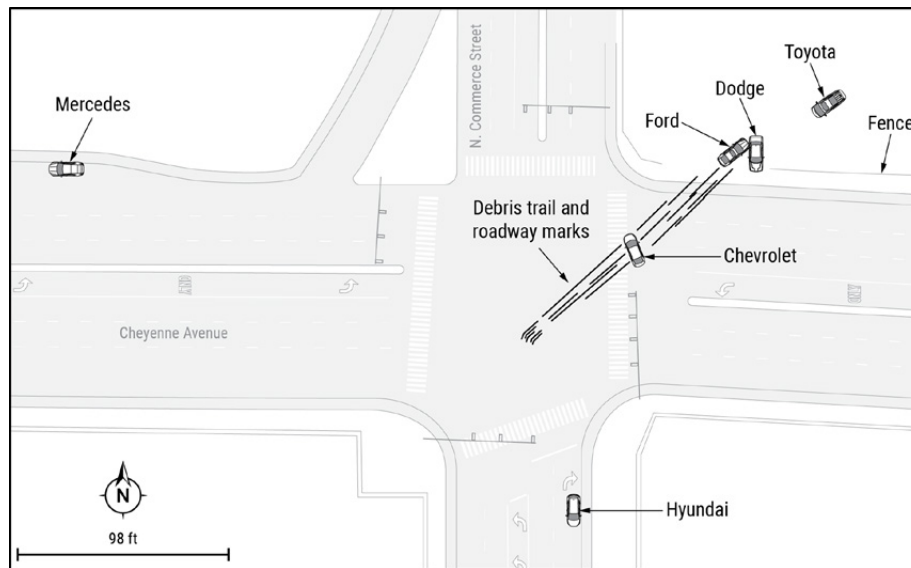


Figure 18. Diagram depicting the final resting position of each vehicle after the crash.

We determined that the probable cause of the crash was the Dodge driver's excessive speed and failure to obey traffic control devices. Contributing to the driver's behavior was his impairment from the effects of cocaine and phencyclidine and his disregard for safety and traffic laws. Also contributing to the driver's repeated disregard for safety and traffic laws despite numerous citations was the state of Nevada's failure to deter the driver's speeding recidivism due to systemic deficiencies, including routine plea agreements that alter or drop violations, inaccurate driver records, failure to accurately track citations, and delays in reporting convictions.

We identified the following safety issues during this investigation: (1) the need to prevent drug-impaired driving, (2) the need for technology to prevent excessive speed, and (3) the need for countermeasures targeted at repeat speeding offenders.

As a result of this investigation, we issued safety recommendations to NHTSA, the 50 states, the Commonwealth of Puerto Rico, the District of Columbia, the Insurance Institute for Highway Safety, and passenger vehicle manufacturers. We also reiterated a safety recommendation to NHTSA.

Recommendations: 8 new, 1 reiterated
Report Date: November 14, 2023

Ongoing Significant Highway Crash Investigations

As of December 31, 2023, the Office of Highway Safety had 20 open domestic investigations. The following ongoing investigations involved significant safety issues. We are devoting significant resources to these investigations and anticipate producing a report upon the completion of each one.

Table 5: Ongoing Significant Highway Investigations

Location	Date	Description	Fatalities
Etna, Ohio	11/14/2023	Multivehicle collision and postcrash fire, involving motorcoach transporting students	7
Teutopolis, Illinois	9/29/2023	Roadway departure crash and subsequent release of anhydrous ammonia from cargo tank combination vehicle	5
Wawayanda, New York	9/21/2023	Motorcoach transporting students roadway departure and overturn	2
Highland, Illinois	7/12/2023	Crash between motorcoach and combination vehicles parked along rest area ramp	3
Philadelphia, Pennsylvania	6/11/2023	Combination vehicle overturn, fire, and collapse of Interstate 95 overpass	1
Millersburg, Oregon	5/18/2023	Crash involving a combination vehicle departing the roadway and colliding with a parked van and second combination vehicle	7
Excelsior Township, Wisconsin	5/12/2023	Vehicle collision with stopped school bus and student pedestrian	1
Woodlawn, Maryland	3/22/2023	Vehicle collision with workers in a highway work zone	6
Goodyear, Arizona	2/25/2023	Crash between a pickup truck and a group of bicyclists	2
Delray Beach, Florida	2/8/2023	Grade-crossing crash between sport utility vehicle and intercity passenger train	2
Louisville, New York	1/28/2023	Cross-over crash between a medium size bus and truck	6

* As of June 30, 2024, this investigation has been completed.

Location	Date	Description	Fatalities
Williamsburg, Virginia	12/16/2022	Rear-end collision between a combination vehicle and a bus	3
Hamden, Connecticut*	7/23/2022	Battery electric bus fire	0
Dermott, Arkansas*	6/6/2022	Crash between a medium-size bus and a combination vehicle	5
Tishomingo, Oklahoma*	3/22/2022	Crash between a passenger car and a combination vehicle at intersection	6
Andrews, Texas*	3/15/2022	Head-on crash between a pickup truck and a transit van	9
Pittsburgh, Pennsylvania*	1/28/2022	Collapse of the Fern Hollow Bridge	0

* As of June 30, 2024, this investigation has been completed.

Public Webinar

Seeking Solutions to Eliminate Distracted Driving

April 26, 2023

The purpose of this webinar was to focus attention on the human and economic costs of distracted driving, which contributes to more than 3,000 deaths each year in the United States and cost \$98.2 billion in economic losses in 2019. Sessions included discussions about recent National Distracted Driving Coalition reports, which examined distracted driving prevalence and available technological interventions. Panelists also discussed the next research steps.



Safety Alert

Through December 31, 2023, the Office of Highway Safety developed one safety alert for issuance by the Board.

NTSB Safety Alert 085 Child Passenger Safety

In the Phoenix, Arizona, multivehicle crash described above, the use of a lap/shoulder belt without an appropriate child safety restraint system contributed to the injuries of the child occupant. This safety alert provided parents and caregivers information about the effectiveness of child safety restraints, information to ensure they are using these restraints correctly, and links to federal agencies and transportation safety advocates who can provide more information.

Other Significant Achievements

L4 Automated Driving Leaders Meeting¹⁶ May 24, 2023

The purpose of this meeting was to share NTSB investigative procedures and processes along with case studies to help automated vehicle developers understand an NTSB investigation and prepare for future automated driving system deployment. NHTSA and the Federal Motor Carrier Safety Administration (FMCSA) briefly shared information about their investigations, as well.

Investments in Technology

Three-Dimensional Laser Scanners

In collaboration with the Office of Research and Engineering, we upgraded our 10-year-old laser

scanning tools with two new three-dimensional laser scanners to improve the documentation of factual evidence and to efficiently analyze and explain the circumstances of a crash. The new tools will improve graphic simulation and animation techniques to reconstruct, quantify, and illustrate crash sequences.

Reconstruction Software

We purchased new reconstruction software to simulate motor vehicle crashes, including pedestrian crashes, based on physics and dynamic motion, in a three-dimensional environment, including the integration of airbag control module data. The software can also provide scale diagrams, three-dimensional models, and terrain environments, including seamless integration of point cloud data from the three-dimensional laser scanners and drone data, improving the efficiency of the reconstruction process.

Regulatory Correspondence

We provided feedback and guidance on nine regulatory efforts, including rulemaking related to light- and heavy-vehicle automatic emergency braking, NHTSA's New Car Assessment Program, trailer and semitrailer side underride guards, the FMCSA's carrier safety management system, an integration plan for automated driving systems for commercial motor vehicles and human factors considerations, and the DOT's request for enhancing the safety of vulnerable road users at intersections.

¹⁶ "L4" is an abbreviation for "Level 4," (high driving automation), one of the six levels of driving automation systems for motor vehicles. These levels range from Level 0 (no driving automation) to Level 5 (full driving automation).

OFFICE OF MARINE SAFETY

Table 6: Office of Marine Safety Statistics

Recommendations Issued	5
Recommendations Closed in an Acceptable Status ¹⁷	30
Recommendations Closed in an Unacceptable Status	13
Investigation Reports	30
Field Launches	27
International Accident Launches	1
Safety Alerts	2
Journal Publications	1
Advocacy and Outreach	24

¹⁷ In this report, each *recommendation issued* is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, *recommendations closed* are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/No Response Received.

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

The US Coast Guard conducts preliminary investigations of all marine accidents and notifies the NTSB when an event 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 US Coast Guard and concurred with by the NTSB chair, to life, property, or the environment by hazardous materials.

The office is also responsible for the overall management of the NTSB’s international marine safety program, under which the office investigates major marine casualties involving foreign-flagged vessels in US territorial waters and those involving US-flagged vessels anywhere in the world. Under the International Maritime Organization (IMO) Code of International Standards and Recommended Practices for

a Safety Investigation into a Marine Casualty or Marine Incident, the office also participates with the US Coast Guard as a substantially interested State in investigations of serious marine casualties involving foreign-flagged vessels in international waters. The Office of Marine Safety also reviews US administration position papers related to marine investigations and participates in select IMO subcommittee meetings.

The office coordinates with other US and foreign agencies to ensure consistency with IMO conventions. We also cooperate with other accident investigation organizations worldwide at annual meetings held both virtually and in person, such as the Marine Accident Investigators' International Forum (MAIIF), which has status as a nongovernmental organization with IMO, Europe MAIIF, and MAIIF Americas.¹⁸

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 events from occurring in the future. The thoroughness and independence of these investigations maintain public confidence in marine transportation systems and provide policymakers with unbiased analysis.

The Office of Marine Safety comprises the Major Investigations Division and the Product Development Division.

¹⁸ MAIIF tracks developments related to marine casualty investigations and prevention.

¹⁹ Investigation reports are issued for accident investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an 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."

²⁰ All times stated are local time.

Investigation Reports¹⁹

From January 1, 2023, through December 31, 2023, the Office of Marine Safety issued 30 marine investigation reports; 2 of these reports involved safety issues that led to the issuance of 5 new safety recommendations.

Below are summaries of some of the marine investigation reports completed during this period.

Engine Room Fire Aboard Tank Vessel *Endo Breeze*

Linden, New Jersey • April 29, 2022



Figure 19. The *Endo Breeze* underway after the casualty.

SOURCE: MARTIN KLINGSICK @ SHIPSPOTTING.COM

On April 29, 2022, about 7:13 p.m., a fire started in the engine room of the chemical tank ship *Endo Breeze* while the vessel was transiting outbound from Linden, New Jersey, through the Raritan Bay West Reach channel, to Bay Ridge Anchorage.²⁰ The crew

extinguished the fire using the engine room's fixed carbon dioxide fire extinguishing system. No pollution or injuries were reported. Damage to the vessel was estimated at \$1.2 million.



Figure 20. The fractured banjo tube from the *Endo Breeze*.
SOURCE: QC METALLURGICAL, INC.

We determined that the probable cause of the engine room fire aboard the chemical tank ship *Endo Breeze* was a main engine fuel injector pump replacement that was not conducted in accordance with manufacturer procedures, which resulted in a high-pressure fuel spray that ignited off the engine exhaust components.

We identified the following safety issues during this investigation: (1) the need to follow manufacturer assembly procedures and review manufacturer manuals and guidance on correct maintenance procedures, and (2) the need for operators to provide mariners with realistic scenario-based training, including training that covers engine room emergencies (including procedures for effectively

shutting down machinery, fuel oil, lube oil, and ventilation systems, and boundary monitoring.)

Recommendations: None

Report Date: November 16, 2023

Fire Aboard Tank Vessel *S-Trust*

Baton Rouge, Louisiana • November 13, 2022



Figure 21. Photos from the bridge closed-circuit camera showing (1) a second explosion, (2) an object propelled into the air (circled in red), and (3) the object, still on fire, landing on the floor (circled in red).

SOURCE: STALWART MANAGEMENT LTD

On November 13, 2022, about 3:30 p.m., a fire started on the bridge of the oil tanker *S-Trust* while the vessel was docked at the Genesis Port Allen Terminal in Baton Rouge, Louisiana. About 3:50 p.m., fire teams from the vessel's crew extinguished the fire. No pollution or injuries were reported. The damage to the vessel was estimated at \$3 million.

We determined that the probable cause of the fire on the bridge of the *S-Trust* was the thermal runaway of one of the cells in a lithium-ion battery for a ultra high frequency handheld radio.

We identified the following safety issue during this investigation: the cell of a lithium-ion battery, which was being charged unsupervised, likely experienced a

thermal runaway, a chemical reaction that can cause a cell to ignite and explode.

Recommendations: None

Report Date: October 25, 2023

Engine Room Fire Aboard Passenger Vessel *Spirit of Norfolk*

Norfolk, Virginia • June 7, 2022

On June 7, 2022, about 12:04 p.m., the US Coast Guard received a report of an engine room fire aboard the passenger vessel *Spirit of Norfolk* while it was underway on the Elizabeth River near Naval Station Norfolk, in Norfolk, Virginia. The vessel was on a 2-hour sightseeing cruise with 108 persons on board. The crew determined they could not enter the smoke-filled engine room to fight the fire, the vessel lost propulsion, and the passengers and crew evacuated to one of the Good Samaritan vessels on scene. The *Spirit of Norfolk* was towed to a US Navy pier. The fire spread throughout the vessel before being extinguished 4 days later. No pollution or injuries were reported.



Figure 22. Exterior damage to the *Spirit of Norfolk*, starboard side

We determined that the probable cause of the fire on the *Spirit of Norfolk* was likely the ignition of combustible material stored near the exhaust piping from the operating port generator. Contributing to the severity of the fire was the lack of a fire detection system and fixed fire extinguishing system in the engine room. Also contributing to the severity were ineffective communications between the unified command and firefighting teams that led to the fire attack team's opening the engine room door, allowing the fire to spread.

We identified the following safety issues during this investigation: (1) the storage of combustible materials near the exhaust pipe of the operating port generator; (2) the lack of a fire detection system in the engine room; (3) the lack of an engine room fixed gas fire extinguishing system, including ventilation closures; (4) the inability of the fire attack team to close the engine room door; and (5) ineffective communication between the firefighting teams and the unified command.

As a result of this investigation, we issued safety recommendations to the US Coast Guard.

Recommendations: 3 new

Report Date: September 29, 2023

Contact of Passenger Vessel *Cathlamet* with Ferry Terminal Dolphin²¹

Fauntleroy, Washington • July 28, 2022

On July 28, 2022, about 8:14 a.m., the passenger and car ferry *Cathlamet* had crossed Puget Sound and was approaching the Fauntleroy Ferry Terminal in

²¹ A dolphin is a group of pilings (wood or metal) arrayed together with a metal framing around a cement cap and a wooden rub rail, serving as a buffer to a vessel approaching a dock.



Figure 23. The damaged *Cathlamet* after the contact with the dolphin.

Fauntleroy, Washington, with 94 persons on board when the vessel struck a ferry terminal dolphin. One minor injury was reported. The damage to the vessel was estimated at \$10 million, and the dolphin damage estimate was \$300,000.

We determined that the probable cause of the contact of the passenger vessel *Cathlamet* with the dolphin at the Fauntleroy Ferry Terminal was the master's incapacitation, likely due to a microsleep, while the vessel was docking, and the quartermaster's not actively monitoring the approach to the ferry terminal and intervening before the contact.

We identified the following safety issues during this investigation: (1) the fatigue of the master on watch (microsleep), (2) the presence of unqualified personnel at the helm and navigating the vessel during docking, (3) the need for operators to sustain a high level of vigilance to prevent complacency, which occurs when operators become desensitized to the inherent risk

of a repeated task, and (4) the need for companies to train operators on the importance of following procedures.

Recommendations: None
Report Date: September 27, 2023

Collision between Cargo Ship *Damgracht* and Cargo Ship *AP Revelin*

Port Arthur, Texas • August 21, 2022



Figure 24. Damaged stern area of the *AP Revelin* after the collision.

On August 21, 2022, about 10:45 a.m., the cargo ship *Damgracht* was inbound in the Sabine Pass Outer Bar Channel en route to Beaumont, Texas, and the cargo ship *AP Revelin* was outbound when the two vessels collided near Port Arthur, Texas. No pollution or injuries were reported. Damage to the *AP Revelin* was estimated at \$3.4 million. No costs were reported for the damage sustained by the *Damgracht*.



Figure 25. Port bow of the *Damgracht* after the collision, with damage circled in white.

We determined that the probable cause of the collision between the cargo vessel *Damgracht* and the cargo vessel *AP Revelin* was the *Damgracht's* loss of propulsion caused by an automatic shutdown of the main engine due to a false alarm, likely triggered by water vapor sensed by the oil mist detector shortly after engine maintenance was completed to replace a failed cylinder head gasket during high humidity conditions.

We identified the following safety issue during this investigation: because of a failed gasket, cooling water likely leaked into and contaminated the lube oil; this, added to the ambient air conditions (high humidity) that the engine was exposed to during repairs, likely allowed higher-than-normal levels of water to enter the crankcase.

Recommendations: None
Report Date: August 1, 2023

Collision Between US Coast Guard Cutter *Winslow Griesser* and Center-console Boat *Desakata*

Near Dorado, Puerto Rico • August 8, 2022

On August 8, 2022, about 2:17 p.m., the Coast Guard cutter *Winslow Griesser* (WPC-1116) and the center-console boat *Desakata* collided about 4 miles off the northern coast of Puerto Rico. The cutter, with a crew of 21, was transiting westbound along the coast, and the boat was transiting northbound while trolling (fishing). One of the two *Desakata* crewmembers was seriously injured; the other was fatally injured. None of the *Winslow Griesser* crewmembers was injured, and no pollution was reported. The *Desakata*, valued at \$58,800, was a total loss.



Figure 26. The *Desakata*'s bow section adrift immediately after the collision.

SOURCE: US COAST GUARD

We determined that the probable cause of the collision between the Coast Guard cutter *Winslow Griesser* and the center-console boat *Desakata* was the failure by both vessels' crews to maintain a proper lookout. Contributing to the

casualty was the *Winslow Griesser* commanding officer and officer of the deck's not taking sufficient measures to increase situational awareness while transiting at a high speed.

We identified the following safety issues during this investigation: (1) the inadequate lookout on both vessels given the operating conditions and (2) the difficulty in detecting small vessels by radar.

As a result of this investigation, we issued safety recommendations to the US Coast Guard.

Recommendations: 2 new

Report Date: August 1, 2023

Breakaway of Moored Mobile Offshore Drilling Unit *VALARIS DS-16* and Subsequent Collision with Cargo Vessel *Akti*

Pascagoula, Mississippi • March 12, 2022

On March 12, 2022, about 12:20 a.m., the mobile offshore drilling unit *VALARIS DS-16* was in layup status at the ST Engineering Halter Marine and Offshore Shipyard in Pascagoula, Mississippi, when it broke away from the dock, drifted across the Bayou Casotte channel, and collided with the bulk cargo vessel *Akti* moored at the Chevron Refinery dock no. 6. No pollution or injuries were reported. The total damage resulting from the breakaway was estimated at \$5 million.

We determined that the probable cause of the breakaway of the *VALARIS DS-16* from the ST Engineering Halter Marine and Offshore Shipyard dock, and the subsequent collision with the cargo vessel *Akti*, was the failure of one of the shipyard's mooring bollards—which had been modified to

increase its height to accommodate more lines—used to secure the *VALARIS DS-16*'s bow mooring lines to a pier, during a cold front with strong winds.

We identified the following safety issues during this investigation: (1) the modifications made to the bollard to increase height to accommodate more lines likely rendered the bollard incapable of sustaining the working load of its original design; and (2) the lack of recorded pull tests that could confirm the modified bollard maintained its original safe working load.



Figure 27. *VALARIS DS-16* moored at STEHMO Shipyard at an unknown date before the casualty, with lines secured to bollard 6 (before lines were adjusted for the March 12 strong winds).

SOURCE: *VALARIS DS-16* CAPTAIN

Recommendations: None

Report Date: March 7, 2023

Ongoing Significant Marine Investigations

As of December 31, 2023, the Office of Marine Safety had 54 open investigations. The following ongoing investigations involved significant safety issues. We are devoting significant resources to these investigations and anticipate producing a report upon the completion of each one.

Table 7: Ongoing Investigations

Location	Date	Description	Fatalities
Dutch Harbor, Alaska	12/27/2023	Fire aboard cargo vessel <i>Genius Star XI</i> (Panama)	0
Norco, Louisiana	12/10/2023	Contact of towing vessel <i>William E. Strait</i> (US) with two uninspected barges and a boat lift	0
Ingleside, Texas	11/14/2023	Contact of crude carrier <i>Cosflourish Lake</i> (HK) with mooring dolphins at South Texas Gateway Terminal	0
Quincy, Oregon	11/12/2023	Contact of towing vessel <i>Cindy B</i> (US) with Beaver Dock at Port Westward Industrial Park	0
Harpwell, Maine	11/05/2023	Fire aboard commercial fishing vessel <i>Whiskey Business</i> (US)	0
Portland, Maine	10/18/2023	Fire aboard passenger vessel <i>Ocean Navigator</i> (BS)	0
Tacoma, Washington	10/12/2023	Contact of towing vessel <i>Olympic Scout</i> (US) with the Hylebos Waterway Bridge	0
Stain Rose, Louisiana	9/12/2023	Contact of towing vessel <i>John 3:16</i> (US) with International-Matex Tank Terminals Terminal Dock	0
Houston, Texas	8/26/2023	Collision between bulk carrier <i>BBC Africa</i> (AG) and moored bulk carrier <i>Common Faith</i> (GR)	0
Myrtle Beach, South Carolina	8/08/2023	Sinking of towing vessel <i>Jacqueline A</i> (US)	0
Thebes, Illinois	7/29/2023	Grounding of towing vessel <i>City of Louisville</i> (US)	0

* As of June 30, 2024, this investigation has been completed.

Location	Date	Description	Fatalities
Newark, New Jersey	7/5/2023	Fire aboard roll-on roll-off containership <i>Grande Costa D'Avorio</i> (IT)	2
New Orleans, Louisiana	7/4/2023	Contact of <i>Kitty</i> (US) tow with Algiers Lock	0
New Orleans, Louisiana*	6/25/2023	Flooding and partial sinking of towing vessel <i>Joanne Marie</i> (US)	0
Atlantic Ocean, 900 nautical miles east of Cape Cod, Massachusetts	6/22/2023	Loss of submersible <i>Titan</i> (US)	5
San Juan, Puerto Rico	6/7/2023	Contact of deck barge <i>San Juan-Jax Bridge</i> (US) with San Juan Harbor pier	0
Kodiak, Alaska*	5/25/2023	Grounding of deck barge <i>JUNGJUK</i> (US) on submerged rock	0
Chalmette, Louisiana	4/25/2023	Contact of <i>Ovide J</i> tow (US) with Chalmette Refinery dock	0
Natchez, Mississippi*	4/23/2023	Contact of <i>Susan K</i> tow (US) with Natchez-Vidalia Bridge	0
Port Dolomite, Michigan	4/21/2023	Grounding of bulk cargo vessel <i>John L Boland</i> (US)	0
Delray Beach, Florida*	4/12/2023	Fire aboard passenger vessel <i>Lady Delray</i> (US)	0
Tacoma, Washington*	4/8/2023	Fire aboard commercial fishing vessel <i>Kodiak Enterprise</i> (US)	0
Louisville, Kentucky*	3/28/2023	Contact of <i>Queen City</i> (US) tow with the <i>Vane Dike</i>	0
Convent, Louisiana	3/27/2023	Breakaway of bulk carrier <i>Sirocco</i> (PA) and subsequent collision with moored barge	0
Geismar, Louisiana	3/26/2023	Flooding and partial sinking of towing vessel <i>Uncle Blue</i> (US)	0

* As of June 30, 2024, this investigation has been completed.

Location	Date	Description	Fatalities
Boston, Massachusetts	3/25/2023	Fire aboard small passenger vessel <i>Spirit of Boston</i> (US)	0
Barataria, Louisiana	2/17/2023	Fire aboard towing vessel <i>Desperado</i> (US)	0
Ingleside, Texas*	1/22/2023	Collision between tugboat <i>Mark E. Kuebler</i> (US) and tanker <i>Nisalah</i> (SA)	0
Meraux, Louisiana*	1/16/2023	Capsizing of dredge vessel <i>WB Wood</i> (US)	0
Homer, Alaska*	1/19/2023	Fire on small passenger vessel <i>Qualifier 105</i> (US)	0
Sault Ste. Marie, Ontario, Canada	1/7/2023	Grounding of bulk carrier <i>American Mariner</i> (US)	0
New York, New York	12/22/2022	Engine room fire aboard passenger ferry <i>Sandy Ground</i> (US)	0
Naval Weapons Station, Charleston, South Carolina*	9/5/2022	Contact of tank vessel <i>Bow Triumph</i> (NO) with pier	0
Pacific Ocean, off Oregon coast*	8/11/2022	Loss of propulsion aboard containership <i>Maunalei</i> (US)	0
Huntington Beach, California*	10/1/2021	Anchor strike of underwater pipeline and eventual crude oil release	0

* As of June 30, 2024, this investigation has been completed.

Support for Foreign Investigations

January 1, 2023, through December 31, 2023, the Office of Marine Safety participated with the US Coast Guard as a substantially interested State in one ongoing investigation of a serious marine casualty involving a foreign-flagged vessel in international water.

Table 8: Support to Foreign Marine Investigations

Location	Date	Description	Fatalities
Atlantic Ocean, near Drake Passage, southeast of Cape Horn, Argentina*	11/29/2022	Weather-related damage to passenger vessel <i>Viking Polaris</i> (NO)	0

* As of June 30, 2024, this investigation has been completed.

Investigative Hearing

US Coast Guard Investigative Hearing into Engine Room Fire on the Small Passenger Vessel *Spirit of Norfolk*, Marine Board of Investigation

January 26 to February 2, 2023

From January 26 to February 2, 2023, the US Coast Guard conducted a Marine Board of Investigation hearing regarding the engine room fire aboard the small passenger vessel *Spirit of Norfolk* (US). The fire broke out while the vessel was on a 2-hour sightseeing cruise on the Elizabeth River near Naval Station Norfolk, Virginia, with 108 persons on board. The crew determined they could not enter the smoke-filled engine room to fight the fire, the vessel lost propulsion, the passengers and crew evacuated to one of the Good Samaritan vessels on scene, and

the *Spirit of Norfolk* was towed to a US Navy pier. The fire spread throughout the vessel before being extinguished 4 days later.

Two members of the NTSB's Office of Marine Safety participated with the Coast Guard in questioning witnesses. During the hearing, Coast Guard and NTSB investigators heard from 23 witnesses who provided testimony into pre-accident historical events, regulatory compliance, crewmember duties and qualifications, mechanical systems, emergency response, and Coast Guard oversight.

Safety Alerts

Through December 31, 2023, the Office of Marine Safety developed the following safety alerts for issuance by the Board:

NTSB Safety Alert 089

Personal Locator Devices: Improve Your Chance of Rescue

During an emergency at sea, a mariner's chances of survival decrease if there is not a way to quickly and accurately identify their location to search-and-rescue responders. Although many commercial vessels are required to carry emergency position-indicating radio beacons, this equipment does not provide the precise location of all individuals who may be in the water and drifting away from the vessel's position.

Although personal locator devices, such as personal locator beacons or satellite emergency notification devices, are affordable and can accurately pinpoint a person's location, the use of these devices is currently not mandated. The NTSB has investigated several casualties in which crewmembers had to abandon a vessel without a means to communicate their individual locations to search-and-rescue assets.

NTSB Safety Alert 087

Reducing Collision Risk by Improving Small Vessel Detectability

The NTSB investigated a casualty in which two vessels—a 23-foot-long center-console boat with a fiberglass hull and a 154-foot-long US Coast Guard cutter—collided because neither crew saw the other vessel approaching, either visually or by electronic means. Had the fiberglass boat been equipped with a radar reflector, it may have appeared on the cutter's radar, providing the cutter's crew an opportunity to detect the boat. Similarly, had the boat been equipped with an automatic identification system transponder, the cutter's crew may have been aware of the boat.

Other Significant Achievements

Responses to Notices of Proposed Rulemaking

- Provided NTSB comments on the US Coast Guard's proposed rulemaking regarding amphibious passenger vessels.
- Provided NTSB comments on the DOT's proposed data collection SafeMTS—Voluntary Near-Miss Reporting and Analysis System.

Safer Seas Digest 2022: Annual Publication

Our *Safer Seas Digest*, which celebrated its 10th year in publication, comprises concise summaries of the previous year's casualty investigations and represents the NTSB's continuing commitment to sharing the lessons that we learn through our marine investigations to inspire safety improvements. The safety issues examined in the 2022 edition (published in 2023) included the following:

- Containing engine room fires
- Importance of personal locator technology
- Vessel stability
- Fatigue
- Fire prevention
- Proper installation, operation, and maintenance of electrical equipment
- Sound navigation practice
- Response to loss of steering and propulsion
- Effective communication
- Mooring system arrangements
- Engine repairs
- Hull condition



OFFICE OF RAILROAD, PIPELINE AND HAZARDOUS MATERIALS INVESTIGATIONS

Table 9: Office of Office of Railroad, Pipeline and Hazardous Materials Investigations Statistics

Recommendations Issued	27
Recommendations Closed in an Acceptable Status ²²	52
Recommendations Closed in an Unacceptable Status	3
Investigation Reports	9
Major Launches	1
Field Launches	21
Public Hearing	1
Safety Actions	1
Advocacy and Outreach	23

²² In this report, each recommendation issued is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, recommendations closed are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/ No Response Received.

The Office of Railroad, Pipeline and Hazardous Materials Investigations investigates accidents involving railroads, pipelines, and hazardous materials, and evaluates the associated emergency response. Based on the findings of these investigations, the NTSB may issue safety recommendations to federal and state regulatory agencies; safety standards organizations, unions, and industry; carriers and pipeline operators; equipment and container manufacturers; producers and shippers of hazardous materials; and emergency response organizations. The office may also issue safety alerts to industry.

The Office of Railroad, Pipeline and Hazardous Materials Investigations comprises four divisions: Railroad, Pipeline and Hazardous Materials, System Safety, and Report Development.

Consistent with the NTSB’s strategic goal of improving processes and products, the office identifies ways to enhance the effectiveness and efficiency of its investigative activities and products. In 2023, to improve efficiency and effectiveness, the office initiated a reorganization, and established four new branches in its Railroad Division and two new branches in its Pipeline and Hazardous Materials Division. To ensure that experienced investigators were assigned to the new branches, the office executed an internal realignment of staff.

Railroad Investigation Reports²³

From January 1, 2023, through December 31, 2023, the Office of Railroad, Pipeline and Hazardous Materials Investigations issued a total of 16 railroad investigation reports; 5 of these reports involved safety issues that led to the issuance of 22 new and 5 reiterated safety recommendations.

Below are summaries of the railroad investigation reports completed during this period.

Derailment of Washington Metropolitan Area Transit Authority Train near Rosslyn Station

Arlington, Virginia • October 12, 2021

On October 12, 2021, about 4:49 p.m., Washington Metropolitan Area Transit Authority train 407, consisting of 8 railcars and carrying 187 passengers and the operator, derailed while traveling from Rosslyn Station toward Arlington Cemetery Station on the Blue Line in Arlington, Virginia.²⁴ The derailment occurred in a tunnel south of the Rosslyn Station platform. All railcars remained upright and in-line. The passengers and operator were evacuated to Arlington Cemetery Station. No injuries were reported; one passenger was transported to the hospital, treated, and released.

We determined that the probable cause of the derailment was an out-of-specification wheelset that caused a wheel to depart the rail at a turnout; the wheelset was out of specification because its design

allowed the wheels to migrate outward and eventually exceed the maximum permitted back-to-back measurement.

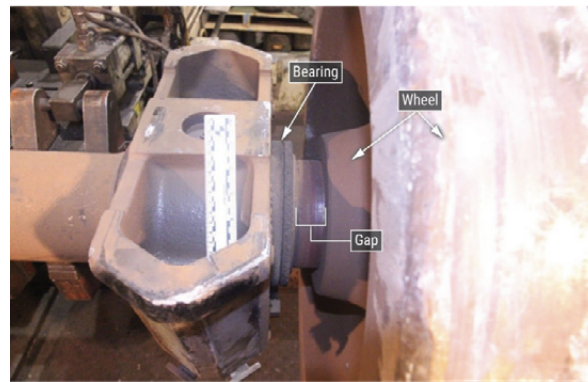


Figure 28. Closeup photo of the gap between the right-side wheel and bearing on wheelset number 4.

We identified the following safety issues in this report: (1) poor wheelset design and (2) the lack of trend analysis.

As a result of this investigation, we issued safety recommendations to the Washington Metropolitan Area Transit Authority and the Washington Metrorail Safety Commission.

Recommendations: 2 new
Report Date: December 12, 2023

Norfolk Southern Railway Contract Roadway Worker Fatality

Reed, Pennsylvania • December 8, 2022

On December 8, 2021, about 11:20 a.m., a National Salvage and Service Corporation worker who was part of a Norfolk Southern Railway (NS) work gang was struck and killed by a roadway maintenance machine (RMM) on a main track in Reed, Pennsylvania. Three RMMs, or spikers, were driving railroad spikes into crossties when the middle spiker (Spiker 2) reversed direction. The operator reported that he blew the spiker's horn and looked in the mirror before reversing but did not see the National Salvage contract worker standing behind the spiker.

We determined that the probable cause of the accident was the inability of the spiker operator to see the contract worker behind the spiker and the contract worker's not being alerted by the spiker's nonfunctional horn and change-of-direction alarms. Contributing to the accident was (1) NS's preshift inspection that did not check the audibility of the spiker's alerts above ambient noise, (2) Nordco Inc. allowing the spikers to leave the factory without ensuring the change-of-direction alarm was working, and (3) insufficient standoff distance chosen by NS that did not provide adequate visibility behind the spiker.

We identified the following safety issues in this report: (1) inaudible warning devices, (2) inadequate

²³ Investigation reports are issued for accident investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an 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."

²⁴ All times stated are local time.

inspections of roadway maintenance machine horns and change-of-direction alarms, and (3) inadequate protection provided by the requirement for 25-foot separation between workers and roadway maintenance machines.

As a result of this investigation, we issued safety recommendations to the Federal Railroad Administration (FRA), Class I Railroads, NS, and the American Short Line and Regional Railroad Association.

Recommendations: 6 new
Report Date: November 14, 2023

Watco Dock and Rail, L.L.C. Employee Fatality Houston, Texas • October 29, 2021

On October 29, 2021, about 4:02 a.m., a conductor was killed when his train collided with a combination vehicle at a private highway-railroad grade crossing in Houston, Texas.

We identified the following safety issue in this report: the need to prohibit railroad employees from riding shoving movements through highway-railroad grade crossings equipped with only flashing lights or passive warning devices and without ground protection.

As a result of this investigation, we issued safety recommendations to the FRA, the General Code of Operating Rules Committee, the Northeast Operating Rules Advisory Committee, Canadian National Railway, the Norfolk Southern Corporation, and the American Short Line and Regional Railroad Association.

Recommendations: 3 new
Report Date: October 4, 2023



Figure 29. Overhead view of the highway-rail grade crossing in Houston, Texas, where a conductor was killed.

Investigation Report: Positive Train Control 2.0

The Rail Safety Improvement Act of 2008 requires Class I railroads and each “entity providing regularly scheduled intercity or commuter rail passenger transportation” to develop, submit, and carry out a plan for implementing PTC, and railroads have since deployed PTC systems compliant with the law and FRA regulations.

In this report, we examined current PTC and PTC-related technologies and regulations. The report included work already performed across existing NTSB accident investigations, additional information from interviews, and public sources to provide a clear, accurate representation of the current state of PTC. The report considered PTC’s capabilities, limitations, safety goals, and safety performance.

We identified the following safety issues in this report: (1) restricted speed operations, (2) end-of-track collisions, (3) switching mode, and (4) work zone protection on active tracks. The report noted promising but not yet mature technologies that may improve PTC’s safety performance and considered the role regulations may play in expanding and realizing PTC’s potential to further advance rail safety.

As a result of this report, we issued safety recommendations to the FRA.

Recommendations: 5 new
Report Date: September 28, 2023

Derailment of Amtrak Passenger Train 7 on BNSF Railway Track

Joplin, Montana • September 25, 2021



Figure 30. Aerial view of the derailed Amtrak passenger train at the accident scene in Joplin, Montana.

SOURCE: BILLINGS GAZETTE

On September 25, 2021, at 3:56 p.m., Amtrak's Passenger Train 7, the Empire Builder, carrying 165 passengers and crewmembers on track owned and maintained by BNSF Railway, derailed near Joplin, Montana. Three passengers were killed and 49 people were injured. The train consisted of 2 locomotives and 10 railcars, 8 of which derailed.

We determined that the probable cause of the derailment was the combination of worn rail, vertical track deflection at a four-bolt rail joint, subgrade instability, and track misalignment. Contributing to the severity of the injuries were the occupant protections that did not restrain passengers in the overturn event and the failure of the window retention systems.

We identified the following safety issues in this report: (1) a combination of track conditions that, when combined, caused the train to derail, (2) the limitations of track inspection practices, (3) the retention of passenger windows in railcar overturn events, and (4) the adequacy of compartmentalization in railcar overturn events.

As a result of this investigation, we issued safety recommendations to the FRA; BNSF Railway; all Class I and Intercity Railroads operating on main tracks, including Amtrak; and the Alaska Railroad.

We also reiterated safety recommendations to the FRA.

Recommendations: 6 new, 5 reiterated

Report Date: July 5, 2023

Ongoing Significant Railroad Investigations

As of December 31, 2023, the Office of Railroad, Pipeline and Hazardous Materials Investigations had 14 ongoing railroad investigations. The following ongoing investigations involved significant safety issues. We are devoting significant resources to these investigations and anticipate producing a report upon the completion of each one.

Table 10: Ongoing Significant Railroad Investigations

Location	Date	Description	Fatalities
Manhattan, New York	11/29/2023	Fatality of NYC transit employee	1
Pueblo West, Colorado	10/15/2023	Derailment with bridge strike, BNSF Railway	1
Walbridge, Ohio	9/17/2023	Fatality of CSX Transportation employee	1
Cumberland, Maryland	8/7/2023	Fatality of CSX Transportation conductor trainee	1
Great Barrington, Massachusetts	8/4/2023	Fatality of railroad employee	1
Baltimore, Maryland	6/27/2023	Fatality of CSX Transportation conductor trainee	1
Cleveland, Ohio	3/7/2023	Fatality of Norfolk Southern conductor	1
*East Palestine, Ohio	2/4/2023	Derailment of Norfolk Southern Railway train, with subsequent hazardous material release and fires	0
Bessemer, Alabama	12/13/2022	Fatality of Norfolk Southern conductor	1
Beaumont, Texas	10/28/2022	Fatality of PSC conductor	1
Camden, New Jersey	10/14/2022	Fatalities of Port Authority Transit Corporation contractors	2

* As of June 30, 2024, this investigation has been completed.

Location	Date	Description	Fatalities
Imperial County, California	9/8/2022	Collision of Union Pacific Railroad train with railcars stored in a siding	2
El Paso, Texas	8/29/2022	Fatality of Union Pacific conductor	1
San Bruno, California	3/10/2022	Collision between commuter train and stationary rail vehicles resulting in passenger injuries	0

* As of June 30, 2024, this investigation has been completed.

Pipeline Investigation Reports²⁵

From January 1, 2023, through December 31, 2023, the Office of Office of Railroad, Pipeline and Hazardous Materials Investigations issued a total of 2 pipeline investigation reports; neither involved safety issues that led to the issuance of safety recommendations.

Below are summaries of the pipeline investigation reports completed during this period.

Marathon Pipe Line LLC Pipeline Rupture and Crude Oil Release

Edwardsville, Illinois • March 11, 2022

On March 11, 2022, at 8:15 a.m., a 22-inch diameter crude oil pipeline operated by Marathon Pipe Line LLC ruptured at a girth weld in Edwardsville, Illinois, resulting in the release of about 3,500 barrels of crude oil, some of which entered Cahokia Creek.²⁶

The rupture occurred at milepost 6.2 on the Woodpat

pipeline, and no injuries or fatalities occurred as a result of the rupture.

We determined that the probable cause of the crude oil pipeline rupture was an overstress fracture of a girth weld from external loads caused by slope instability that had been only partially mitigated by Marathon before the accident.

We identified the following safety issue in this investigation: the need to completely mitigate the impact of external loads on pipelines.

Recommendations: None
Report Date: December 18, 2023



Figure 31. The ruptured Woodpat pipeline, following the release of crude oil into Cahokia Creek, a tributary of the Mississippi River, in Edwardsville, Illinois.

SOURCE: MARATHON PIPE LINE LLC

²⁵ Investigation reports are issued for accident investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an 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."

²⁶ Time stated is local time.

Kinder Morgan Natural Gas-Fueled Explosion

Coolidge, Arizona • August 15, 2021

On August 15, 2021, about 5:29 a.m., a 30-inch-diameter natural gas transmission pipeline owned and operated by Kinder Morgan, Inc. ruptured in a rural area of Coolidge, Arizona. The rupture resulted in the release of natural gas vapor that ignited and exploded. The explosion and gas-fed fire destroyed a farmhouse about 451 feet away, killing two of the three occupants and seriously injuring the other.

We determined that the probable cause of the accident was tented tape wrap leading to stress corrosion cracking, a fracture at a longitudinal seam weld, and subsequent rupture of the pipe. Contributing to the rupture was Kinder Morgan's failure to record the correct coating type used for this segment of pipeline, leading to a risk assessment that did not fully identify the risk of stress corrosion cracking.

We identified the following safety issue in this investigation: the failure to identify the risk of stress corrosion cracking because of the incorrectly recorded coating type.

As a result of the accident, the Pipeline and Hazardous Materials Safety Administration (PHMSA) issued a corrective action order to Kinder Morgan that required El Paso Natural Gas Company, LLC (El Paso) to isolate, or shut down, the 38.6-mile segment of Line 2000 from main line valve 37 to main line valve 39; to reduce the operating pressure of Line 2000; to conduct a leakage survey and to review prior in-line inspections on Line 2000; to verify the records that established the maximum allowable operating pressure for Line 2000; and to develop a plan, approved by PHMSA, to resume operation of the isolated pipeline segment.



Figure 32. The ruptured Kinder Morgan pipeline resulted in a gas-fueled explosion in Coolidge, Arizona.

SOURCE: COOLIDGE FIRE DEPARTMENT

Kinder Morgan corrected the Line 2000 coating data. It also tested the section of Line 2000 that ruptured and replaced several areas of pipe.

Recommendations: None
Report Date: April 27, 2023

Ongoing Significant Pipeline Investigations

As of December 31, 2023, the Office of Railroad, Pipeline and Hazardous Materials Investigations had two ongoing pipeline investigations. Both involved significant safety issues. We are devoting significant resources to these investigations and anticipate producing a report upon the completion of each one.

Table 11: Ongoing Significant Pipeline Investigations

Location	Date	Description	Fatalities
Gulf of Mexico	11/16/2023	Spill of an unknown quantity of crude oil from a hazardous liquids pipeline in the Gulf of Mexico	0
West Reading, Pennsylvania	3/24/2023	Explosion of natural gas at a candy factory, resulting in injuries and fatalities, resident evacuation and displacement, and significant structural damage	7

Hazardous Materials Investigation Reports²⁷

From January 1, 2023, through December 31, 2023, the Office of Office of Railroad, Pipeline and Hazardous Materials Investigations issued one hazardous materials investigation report; this report involved safety issues that led to the issuance of 7 safety recommendations.

Following is a summary of the hazardous materials investigation report completed during this period.

BNSF Railway Company Derailment and Pool Fire Involving DOT-117J Tank Cars

Oklaunion, Texas • January 8, 2022

On January 8, 2022, about 9:49 a.m., an eastbound BNSF Railway Company train derailed 37 tank cars at milepost 156.2 on the BNSF Railway Company Red River Division in Oklaunion, Texas.²⁸ The train had 2 crewmembers on board and was composed of 2 head-end locomotives, 1 distributed power locomotive at the rear of the train, 2 buffer railcars, and 96 tank cars carrying denatured ethanol, a flammable liquid. The BNSF Railway Company estimated that 601,819 gallons of denatured ethanol released from 28 of the 37 derailed tank cars. The ethanol ignited and

burned uncontrolled for about 4 hours, resulting in a pool fire. No injuries or evacuations were reported.

Because this was a hazardous materials investigation focused on the performance of the DOT-117J tank cars, the NTSB did not determine the probable cause of the derailment.

We identified the following safety issues during this investigation: (1) the lack of thermal performance standards for gaskets used in tank cars in flammable liquid service, (2) the inappropriate application of pressure tank car thermal protection standards to nonpressure tank cars, and (3) the lack of rejection criteria for oversized welds during tank car fabrication.

²⁷ Investigation reports are issued for accident investigations and may contain a determination of probable cause and/or safety recommendations, depending upon the scope of the investigation and the safety issues identified. For select, larger scale investigations, the office launches an investigation team and presents a comprehensive investigation report to the Board. Investigations that are limited in scope have the primary purpose of determining probable cause, and the report may be issued by the office director under delegated authority or may be adopted by the Board. A report containing only safety recommendations can be issued at any time during an 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."

²⁸ Time stated is local time.

As a result of this investigation, we issued safety recommendations to the FRA, PHMSA, and the Association of American Railroads.

Recommendations: 7 new
Report Date: September 27, 2023



Figure 33. Aerial view of the derailed train and pool fire at the accident scene in Oklaunion, Texas.
SOURCE: BNSF RAILWAY COMPANY

Investigative Hearing

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

Norfolk Southern Railway Train Derailment with Subsequent Hazardous Material Release and Fires June 22-23, 2023

From June 22-23, 2023, the NTSB held a public investigative hearing in East Palestine, Ohio. During the hearing, the NTSB gathered sworn testimony from 27 witnesses about the February 3, 2023, NS train derailment with subsequent hazardous material release and fires. The hearing was a fact-finding step in the NTSB's safety investigation, and the testimony gathered at the hearing will become part of the public record of the investigation.

The hearing focused on the following safety issues: (1) hazard communications and emergency responder preparedness for the initial emergency response; (2) circumstances that led to the decision to vent and burn five vinyl chloride tank cars; (3) freight car bearing failure modes and wayside detection systems; and (4) tank car derailment damage, crashworthiness, and hazardous materials package information.

Parties to the investigative hearing included the FRA; PHMSA; NS; Trinity Rail Management Leasing Services; Oxy Vinyls, LP; Brotherhood of Locomotive Engineers and Trainmen; International Association of Sheet Metal, Air, Rail and Transportation Workers; Transportation Communications Union/IAM; Brotherhood of Railroad Signalmen; International Association of Fire Fighters; and the Village of East Palestine.



Figure 34. NTSB Chair Homendy, Board members, investigators and staff at the East Palestine, Ohio investigative hearing held in the East Palestine High School auditorium.

Other Significant Achievements

Responses to Notices of Proposed Rulemaking

- Provided NTSB comments on the FRA's proposed rulemaking, Emergency Escape Breathing Apparatus Standards.
- Provided NTSB comments on the Federal Transit Administration's notice of availability of the proposed National Public Transportation Safety Plan.
- Provided NTSB comments on PHMSA's proposed rulemaking for Hazardous Materials: FAST Act Requirements for Real-Time Train Consist Information.
- Provided NTSB comments on PHMSA's advanced notice of proposed rulemaking for Hazardous Materials: Modernizing Regulations to Improve Safety and Efficiency.
- Provided NTSB comments on PHMSA's proposed rulemaking Pipeline Safety: Gas Pipeline Leak Detection and Repair.
- Provided NTSB comments on PHMSA's proposed rulemaking Pipeline Safety: Safety of Gas Distribution Pipelines and Other Pipeline Safety Initiatives.

Safety Action

- **Edwardsville, Illinois**
Marathon reevaluated its integrity management program and revised its geohazard program. Additionally, in coordination with the NTSB and PHMSA, Marathon led an operator-to-operator information sharing webinar for approximately 900 attendees that addressed details of the response to the pipeline rupture and crude oil release and the initial lessons learned.

OFFICE OF RESEARCH AND ENGINEERING

Table 12: Office of Research and Engineering Safety Statistics

Safety Research Products Completed	3
Safety Data Analyses Completed	280
Readouts of Vehicle Recorders and Other Electronic Devices Completed	433
Materials Laboratory Exam Reports Completed	176
Vehicle Performance Reports and Animations Completed	58
Medical Investigation Reports Completed	170
Rapid Reports Completed ²⁹	5
Public Webinar	1
Journal Publications	9
Advocacy and Outreach	73

²⁹ If the NTSB decides to launch a Board member as the on-scene spokesperson with an investigation team to the accident site, the Safety Research Division (of the Office of Research and Engineering) and the Safety Recommendations Division (of the Office of Safety Recommendations and Communications) provide a 1- to 2 page summary of background information to support the investigation team during the initial stages of the launch. These "rapid reports" typically include publicly available information related to relevant safety data and statistics on similar crashes and crash trends; a summary of relevant NTSB investigations, studies, or other products; and a summary of relevant safety recommendations.

The Office of Research and Engineering is an investigative office providing scientific and technical expertise for NTSB accident investigations in all modes of transportation. The office, comprising four divisions and one program area, conducts safety research, generates periodic statistical reviews of aviation accidents, conducts readouts of vehicle recorders and other electronic devices, conducts materials failure analysis and fire investigations, determines vehicle performance, develops animations, 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 researchers, data analysts, and statisticians 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; assists in

the development of safety recommendations; and publishes annual statistical reviews for the NTSB, Congress, and the public.

In 2023, the division completed two safety research assessments. These assessments were developed to determine whether research could be conducted on the relationship between bus rapid transit system implementation and overall traffic safety, and the efficacy of impaired driver detection technologies and strategies for their deployment in the United States.

In addition, division staff published the agency's official annual review of aviation accident statistics, developed an interactive public dashboard from the US census of civil aviation accidents, completed the agency's response to an advance notice of proposed rulemaking on large truck side underride guards, and completed five rapid reports and 280 data, geospatial, and statistical analysis requests to support accident investigations in aviation, highway, marine, rail, and pipeline.

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.

In 2023, the division completed 176 reports for 134 investigations, launched to 6 accident sites, and supported numerous NTSB reports and recommendations. In one example, the division



Figure 35. Michael Meadows, materials engineer in the Materials Laboratory Division, uses a plasma torch to cut samples from a section of cracked pipe.

supported the investigation of a marine accident involving the rupture of a crude oil pipeline off the coast of Huntington Beach, California. Staff assisted with the evidence recovery stage and determined the metallurgical cause of the rupture. The division also provided materials and metallurgical expertise to the investigation of a natural gas-fueled explosion and fire at the R.M. Palmer Company in West Reading, Pennsylvania, by evaluating the failed service tee components. In a third example, the division supported the investigation of an NS train derailment with subsequent hazardous material release in East Palestine, Ohio, by determining the failure mode of a wheelset with a burned-off axle, and participated in an investigative hearing on the accident.



Figure 36. Edward Komarnicki, laboratory technician, and Frank Zakar, materials engineer, both in the Materials Laboratory Division, examine a portion of the horizontal stabilizer from the wreckage of a de Havilland DHC-3.

Vehicle Recorder Division

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

In 2023, division staff received 541 devices; completed reports, transcripts, and studies for 433 devices to support aviation, railroad, marine, and highway investigations; and launched to support 6 investigations. Of the recorders received, 41 were from foreign accidents and 3 were from US military or other federal agency investigations. Staff downloaded and analyzed FDRs and cockpit voice recorders from multiple runway incursions, including an event at JFK International Airport involving an American Airlines Boeing 777 and a Delta Airlines Boeing 737, an event at Boston Logan International Airport involving a JetBlue Embraer 190 and a privately operated LearJet, and an event at Austin-Bergstrom International Airport involving a FedEx Boeing 767 and a Southwest Airlines Boeing 737. Staff also evaluated video and information from an event data

recorder for the East Palestine, Ohio, derailment of an NS freight train and video data from a school bus fatality in Excelsior Township, Wisconsin.



Figure 37. Michael Portman, senior aerospace engineer in the Vehicle Recorder Division, examines a portion of wreckage from a Piper PA-32 Cherokee that crashed in Micanopy, Florida, on November 14, 2023.

Vehicle Performance Division

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

animations of accident scenarios, evaluate occupant injury mechanisms, and participate in and direct research into special projects as required.

In 2023, division staff completed 58 products in support of investigations, including aircraft and surface vehicle performance studies, video/photograph studies, animations, and video compilations. We completed an animation for the March 2023 Board meeting covering a 2021 multivehicle crash in Phoenix, Arizona.

Program Area – Medical Investigations

NTSB medical officers evaluate the medical aspects of investigations, including medical fitness, pathology, toxicology, and injury causation. Examples of medical issues addressed include operator incapacitation, injury prevention, vision deficiency, hypoxia, obstructive sleep apnea, carbon monoxide poisoning, mental health conditions, and impairment from the effects of medications and illicit drugs.

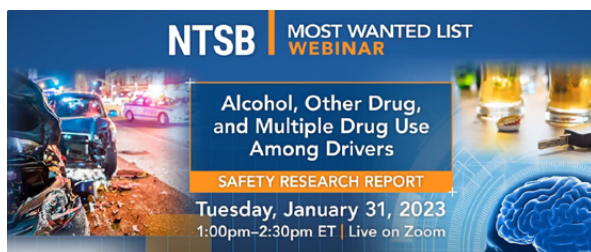
In 2023, the agency's physicians participated in more than 130 investigations and completed 170 reports for all transportation modes combined. This included evaluating and addressing medical issues through formal factual and analytical reports, safety recommendations, coordination with other agencies, and formal presentations to the Board and external audiences.

Public Webinar

Alcohol, Other Drug, and Multiple Drug Use Among Drivers Safety Research Report

January 31, 2023

On January 31, 2023, Board Member Tom Chapman moderated a webinar with safety research report authors Dr. Jana Price and Dr. Ryan Smith. The discussion focused on key research findings on the crash risk associated with various drugs, including alcohol, and the prevalence of their use among drivers, as well as important countermeasures to reduce impairment-related crashes in the United States.



Other Significant Achievements

- Provided NTSB response to NHTSA's advanced notice of proposed rulemaking, Side Underride Guards and Draft Model Minimum Uniform Crash Criteria Guideline, Sixth Edition.
- Provided NTSB comments on the FMCSA's Agency Information Collection Activities; Renewal of an Approved Information Collection: 391.41 Commercial Motor Vehicle Driver Medication Form.
- K. Wilson and J. Price. "Fatigue-related Consequences in Aviation," in *The Handbook of Fatigue Management in Transportation: Waking Up to the Challenge*. Boca Raton, Florida: CRC Press (2023).
- M. Budinski and E. Mueller. "Microscale Fracture Surface Morphologies," in *American Society for Materials Handbook, Volume 12, Fractography*. Metals Park, OH: ASM International (book chapter in press/2023).
- M. Fox. "Recent NTSB Investigations of Fatigue Fractures in Aviation." *Bi-annual International Committee for Aeronautical Fatigue and Structural Integrity US National Review* (2023).
- M. Fox. "Fan Blade Fatigue Fractures in CFM56-7B Engines." *Journal of Failure Analysis and Prevention* (2023).
- J. O'Callaghan. "The Role of Flight Simulation in Accident Investigation, Part 2." *ISASI Forum* (2023).
- F. Zakar. "Multiple-site Fatigue Cracking on the Fuselage of a Southwest Airlines Airplane." *Journal of Failure Analysis and Prevention* (2023).

OFFICE OF SAFETY RECOMMENDATIONS AND COMMUNICATIONS

Table 13: Office of Safety Recommendations and Communication Statistics

Recommendations Closed in an Acceptable Status ³⁰	163
Recommendations Closed in an Unacceptable Status	33
Urgent Recommendations Closed in an Acceptable Status	1
Urgent Recommendations Closed in an Unacceptable Status	1
Testimony or Legislative Support to State Legislative Committees	28
Webinars and Virtual Meetings	83
Media Mentions (Print, Broadcast, and Online)	461,300
Advocacy and Outreach	107

³⁰ In this report, each recommendation issued is reported as one recommendation, regardless of the number of recipients. Because some recommendations are issued to more than one recipient, however, recommendations closed are reported by the number of recipients for whom a recommendation was closed during the year. Recommendations closed in an acceptable status include those classified Closed—Acceptable Action, Closed—Acceptable Alternate Action, and Closed—Exceeds Recommended Action. Recommendations closed in an unacceptable status include those classified Closed—Unacceptable Action and Closed—Unacceptable Action/ No Response Received.

The Office of Safety Recommendations and Communications publicly releases information on NTSB investigations, activities, and safety recommendations across multiple communication channels. The office engages a range of stakeholders, including safety recommendation recipients; members of the transportation industry; transportation workers; federal, state, and local government officials; transportation safety advocates; and the public.

Our work spans an investigation’s lifecycle, providing the transparency that supports the NTSB’s independence while building public trust and support for our mission. Following an investigation, office staff focus on advocating for and monitoring safety recommendation implementation. The office comprises five divisions: Safety Recommendations, Media Relations, Government and Industry Affairs, Safety Advocacy, and Digital Services.

Safety Recommendations Division

NTSB safety recommendations address specific issues uncovered during investigations and specify actions to help prevent similar accidents and crashes from occurring in the future. These safety recommendations are the agency’s most important products because they alert government, industry, and the public to the critical changes that are needed to prevent transportation accidents and crashes, reduce injuries, and save lives.

The NTSB issues recommendations to the organizations best able to take corrective action, such as the US DOT and its modal administrations, the US Coast Guard, other federal and state agencies, manufacturers, operators, labor unions, and industry and trade organizations.

The Safety Recommendations Division helps investigative offices craft recommendations that will encourage recipients to take the corrective action needed.

Once the Board issues a recommendation, this division handles the ongoing correspondence between the agency and each recipient, tracking and analyzing the recipient’s responses and determining a classification—Acceptable or Unacceptable—for the Board members to consider. We monitor the progress of action to implement each recommendation until it is closed (which usually takes several years), maintain a database of all recommendations, compile monthly statistics, and respond to data queries from other offices.

In 2023, 163 open recommendations were closed in an acceptable status; 53 of these had been issued to

DOT modal agencies or the US Coast Guard (see Table 14).³¹ The number of open recommendations that are closed each year fluctuates for various reasons. Over the last 5 years (2019 through 2023), the number of recommendations closed in an acceptable status has averaged 199 per year.

During 2023, we contacted recommendation recipients who had not updated the NTSB on their actions for some time. In some cases, the recipient had completed the recommended action but had not informed us.

Also in 2023, the NTSB referenced related open safety recommendations in our responses to several notices in the *Federal Register* issued by the DOT and other federal agencies.

Table 15 provides a summary of these actions.

Table 14: Safety Recommendations Issued to the DOT, Modal Agencies, and the US Coast Guard Closed in 2023

Agency	Safety Recommendations Closed in an <i>Acceptable</i> Status	Safety Recommendations Closed in an <i>Unacceptable</i> Status
Federal Aviation Administration	28	13
Federal Highway Administration	1	0
Federal Transit Administration	0	2
National Highway Traffic Safety Administration	2	0
US Coast Guard	22	10

³¹ Thirty-three safety recommendations were closed in an Unacceptable status in 2023; of these, 25 (see Table 14, above) were issued to DOT modal agencies or the US Coast Guard.

Table 15: Open Safety Recommendations Referenced in NTSB Responses to *Federal Register* Notices from Federal Agencies in 2023

Agency	Federal Register Notices	Open Safety Recommendations Referenced
Department of Transportation, Bureau of Transportation Statistics	1	1
Federal Aviation Administration	7	32
Federal Motor Carrier Safety Administration	4	26
Federal Railroad Administration	1	0
Federal Transit Administration	2	28
National Highway Traffic Safety Administration	6	51
Pipeline and Hazardous Materials Safety Administration	4	19
US Coast Guard	1	3

Media Relations Division

Table 16: NTSB Media Products

Media Product	Total
News releases and media advisories	83
Tweets	721

The Media Relations Division is responsible for providing accurate and timely information on the NTSB’s activities to the media and public.

This division provides information about accident, crash, and incident investigations and coordinates the release of reports, safety studies, safety recommendations, safety alerts, and other agency investigative products. We provide counsel to senior leaders, respond to media inquiries, arrange media interviews of agency personnel, and serve as the on-scene public affairs contact, supporting Board members during major accident investigations. The division also supports deployed regional investigators and investigators-in-charge and provides media training to agency leaders and senior investigators.

Media Relations staff launched on every 2023 major investigation, including the derailment of an NS train and hazardous material release and fires in East Palestine, Ohio; the collision of a Chicago Transit Authority train with snow-removal equipment in Chicago; the crash of a medical transport airplane in Stagecoach, Nevada; and the collision of a Greyhound motor coach with trucks parked on a highway shoulder in Highland, Illinois.

In addition, we provided remote media relations support for every NTSB investigation and conducted 13 virtual and in-person media relations training sessions for transportation industry and agency staff.

We also helped the NTSB garner more than 461,300 print, broadcast, and online news mentions.



Figure 38. Jennifer Gabris (left) and Keith Holloway (right), public affairs specialists in the Media Relations Division, conduct media training with the Office of Highway Safety.

Government and Industry Affairs Division

The Government and Industry Affairs Division is the NTSB's primary liaison with Congress, the White House, the Government Accountability Office, other federal agencies, and state and local governments. This division informs Congress, governors, and state legislatures about NTSB activities, including launches, investigations, Board meetings, and the issuance and current implementation status of safety recommendations. We also manage inquiries from federal, state, and local governments. In addition, we communicate with the transportation industry about agency initiatives and work with the Safety Advocacy Division to support programs and legislation consistent with NTSB safety recommendations and to monitor relevant state legislative activity. Staff supported launches on scene and from headquarters and responded to hundreds of requests for information in each mode of transportation.

We initiated agency outreach to congressional, state, and local officials who expressed an interest in improving transportation safety and provided them with technical assistance as they drafted legislation. We also helped develop the Board's reauthorization proposal and coordinated Board members' testimony before Congress regarding aviation safety; the train derailment in East Palestine, Ohio; and runway incursions. In addition, staff supported Board member and senior official testimonies and legislative advocacy efforts before state legislatures in California, Connecticut, Hawaii, Maryland, Massachusetts, Missouri, Nebraska, New Hampshire, New York, North Carolina, Oregon, South Carolina, Tennessee, and Washington.



Figure 39. Sophia Peerzada, transportation safety specialist in the Safety Advocacy Division (left) and Tara Lyestra-Ackerman, government and industry affairs specialist, in the Government and Industry Affairs Division greeted attendees at the Aviation Safety Summit.



Safety Advocacy Division

The Safety Advocacy Division leads the agency's advocacy efforts and promotes the implementation of safety recommendations. This division relays safety messages and lessons learned from NTSB investigations through print, digital, and social media channels, and delivers presentations at national conferences and meetings with state and local lawmakers and other stakeholders.

The MWL was the agency's primary advocacy tool until its retirement on December 31, 2023, and the division led the list's development, working with Board members, representatives from the Office of Research and Engineering, and modal office directors to identify safety items to include on the list. We developed a more flexible safety advocacy approach, however, throughout 2023 as new safety issues emerged, to enable the agency to continue to advocate at the local, state, and national levels through such avenues as social media, roundtables, and state and federal testimony, and to provide robust resources on our website that are focused on modal safety priorities.

The division helped develop, execute, and promote several advocacy and outreach initiatives related to critical safety recommendations. We continued to stay engaged and relevant on trending and emerging safety issues by identifying and promoting speaking opportunities for Board members and modal office staff at national conferences and industry meetings, such as the World Traffic Safety Symposium, V2X (vehicle-to-everything), Air Charter Safety Foundation, Women in Aviation International Conference, and the Lifesavers Conference on Roadway Safety. We also spoke at, exhibited, and attended the International Association



Figure 40. NTSB team members in attendance at the annual Lifesavers Conference on Roadway Safety (from left: Ellen Lee, Stephanie Shaw, Rafael Marshall, Sophia Peerzada, Anthony Lam, Ryan Smith and Leah Walton from the Offices of Highway Safety; Railroad, Pipeline and Hazardous Materials; Safety Advocacy Division; Office of Research and Engineering).

of Chiefs of Police Conference, American Association of Motor Vehicles Conference, and Runway Incursion Roundtable. We prepared legislative testimony related to NTSB safety priorities, briefed state representatives on highway safety issues, and developed and hosted a series of webinars designed to [reach underserved communities](#).

The division continued to use its suite of assets, such as social and digital platforms, to amplify the NTSB's safety messages and share information related to the NTSB's advocacy work, MWL, investigative outcomes, and lessons learned with stakeholders and agency staff. We hosted virtual

and in-person meetings to relay information to stakeholders and posted social media messages on the NTSB blog, X, Facebook, LinkedIn, Instagram, and YouTube.

Table 17: Safety Advocacy Division Social Media Followers and Subscribers

Communication Product	Total
X followers	170,205
Instagram followers	13,700
LinkedIn followers	33,543
E-mail subscribers	8,769
Facebook subscribers	58,807

Table 18: Safety Advocacy Division Products and Events

Advocacy Activity	Total
Behind-the-Scene @NTSB podcasts	2
YouTube videos	20
Webinars and virtual meetings	83
Safety Compass blogs	10
Events (conference exhibits, advocacy events, presentations, roundtables, coalition meetings, testimony, and workshops)	107

Digital Services Division

The Digital Services Division supports the NTSB’s internal and external strategic communications goals. This division manages agency communications on ntsb.gov and designs and develops graphics and audiovisual products that optimize the agency’s ability to communicate investigation findings and safety messages and to facilitate employee engagement. We also establish visual style and branding standards for the agency and advise internal stakeholders on how to best use visual information to enhance their products.

In 2023, we completed a comprehensive revision of the NTSB branding and style guidelines, updating style elements to a contemporary design and standardizing the design of NTSB products. Several items have been updated, notably the accident investigation report template, and division staff are working with other offices to progressively update their materials.

The division continues to work closely with the Office of the Chief Information Officer and data team to improve our data systems, providing user interface design feedback to the development team and assisting with user testing and feedback.

We worked with the Office of General Counsel to complete our submission for Office of Management and Budget fast-track approval for user feedback, which will enhance the agency’s ability to collect and act on customer feedback and continue to improve our customer experience. We also completed a customer experience benchmarking report and made several recommendations to improve and expand customer experience capabilities and responsiveness.



OFFICE OF ADMINISTRATIVE LAW JUDGES

Table 19: Office of Administrative Law Judges Safety Statistics

Total Cases Received	229
Total Cases Closed	350
Emergency Cases Received	107
Emergency Cases Closed	105
Hearings Scheduled	58
Hearings Held ³²	11
Advocacy and Outreach	2

³² Note that the effort required to prepare for all scheduled hearings is substantial and, although a case may be settled before a scheduled hearing, the work involved in reaching that outcome should not be underestimated.

The NTSB serves as the court of appeals for pilots, aircraft mechanics, air traffic controllers, air carriers, repair facilities, and any other individual or entity against whom the FAA has taken a certificate action, and for mariners against whom the US Coast Guard has taken a certificate action.

The judges within the agency's Office of Administrative Law Judges hear and consider the cases of, and issue initial decisions on, administrative appeals of FAA aviation enforcement actions. Under the Equal Access to Justice Act, the judges also adjudicate claims from certificate holders for legal fees and expenses incurred in defending against FAA certificate actions and adjudicate appeals from civil penalty actions assessed against any individual by the FAA. The certificate holder, the person being assessed, or the FAA may appeal an administrative law judge's decision. The Board's review of such an appeal is based on the record of the proceeding, which includes the transcript of the hearing testimony, exhibits, the judge's decision, and appeal briefs submitted by the parties. Marine certificate actions are heard first by Coast Guard administrative law judges and may be appealed to the vice commandant of the Coast Guard. The vice commandant's ruling may then be appealed to the NTSB. The same appellate process is followed for marine certificate actions as that for aviation certificate actions.

We currently have two judges assigned to headquarters in Washington, DC. Another is assigned to the circuit that includes Denver, Colorado, and one is assigned to the circuit that includes San Antonio, Texas. Judges have the option of holding live or virtual hearings.



Figure 41. The NTSB administrative law judges, from left: Chief Judge Stephen Woody, Judge Stu Couch, Judge Darrell Fun, Judge Alisa Tapia.

TRANSPORTATION DISASTER ASSISTANCE

Table 20: Transportation Disaster Assistance Statistics

Family Members and Victims Assisted	3,010
Agencies/Organizations Supported	403
Advocacy and Outreach	56

The Transportation Disaster Assistance Division coordinates federal government resources to support local and state governments, disaster relief organizations, and transportation carriers to offer services and information to family members and survivors following major aviation and rail accidents. Division staff also serve as the primary source of investigative information for family members and survivors for any accident investigated by the NTSB.³³

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

During 2023, division staff participated in 13 launches and provided nonlaunch family assistance support for an additional 745 investigations in all modes of transportation, interacting with 3,010 victims and family members.

³³ In 1996, Congress enacted the Aviation Disaster Family Assistance Act (Title 49 *United States Code* [U.S.C.] sections 1136 and 41113), charging the NTSB with assisting victims of aviation disasters and their families, and coordinating with federal agencies, domestic air carriers, and state and local authorities to ensure that the fundamental concerns of families are met. In 1997, the Foreign Air Carrier Family Support Act (Title 49 U.S.C. section 41313) required foreign air carriers operating flights to and from the United States to meet similar victim assistance standards as their US counterparts. The Rail Safety Improvement Act of 2008 (49 U.S.C. sections 1139 and 24316) gave similar responsibilities to the NTSB, Amtrak, and other interstate and intercity high-speed passenger rail operators following rail passenger accidents. Finally, in 2018, Congress further expanded the Board's responsibilities to provide information regarding NTSB investigative processes and products to the families of individuals involved in any accident investigated by the NTSB to the maximum extent practicable in advance of the media (49 U.S.C. section 1140).

Staff engaged with family members associated with 66 accidents, on average, each week; these encounters ranged from a single phone call or e-mail to several hours of work over multiple days with numerous family members from a single accident.

In addition, staff interfaced with 403 federal, state, and local agencies; transportation industry organizations; and other nongovernmental organizations that have a role in family assistance operations, with an average of 31 engagements per week requiring either travel or remote interaction. We also supported a total of 56 outreach events, directly interfacing with approximately 3,790 stakeholders.

Other Significant Achievements

The agency published the Federal Family Assistance Framework for Aviation Disasters, which replaces the Federal Family Assistance Plan for Aviation Disasters. The new 174-page document pivots focus to the four fundamental concerns of family members with an emphasis on inter-agency coordination.³⁴ The framework provides guidance to the family assistance response community, with a specific focus on roles and responsibilities of the NTSB, the American Red Cross, air carriers that hold obligations under Title 49 *U.S.C.* sections 41113 and 41313, and federal agencies that have established relationships with the NTSB.

³⁴ The four fundamental concerns are Notification of Involvement, Victim Accounting, Access to Information and Resources, and Personal Effects Management.



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