

2003



National Transportation Safety Board

ANNUAL REPORT
to Congress

Foreword

The National Transportation Safety Board (NTSB) is an independent agency charged with determining the probable cause of transportation accidents and promoting transportation safety. The Board investigates accidents, conducts safety studies, evaluates the effectiveness of other government agencies' programs for preventing transportation accidents, and reviews the appeals of enforcement actions involving airman and seaman certificates issued by the Federal Aviation Administration (FAA) and the U.S. Coast Guard (USCG) and civil penalty actions taken by the FAA.

To help prevent accidents, the NTSB develops safety recommendations based on its investigations and studies. These are issued to federal, state and local government agencies and to industry and other organizations in a position to improve transportation safety. Recommendations are the focal point of the NTSB's efforts to improve safety of the nation's transportation system.

The NTSB's origins can be found in the Air Commerce Act of 1926, in which Congress charged the Department of Commerce with investigating the causes of aircraft accidents. Later, that responsibility was given to the Civil Aeronautics Board's Bureau of Aviation Safety.

In 1967, Congress consolidated all transportation agencies into a new Department of Transportation (DOT) and established the NTSB as an independent agency, placed within the DOT for administrative purposes. In creating the Safety Board, 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 working separately. Since 1967, the Board has investigated accidents in the aviation, highway, marine, pipeline, and railroad modes as well as hazardous materials transportation-related accidents.

In 1974, Congress reestablished the NTSB as a completely separate entity, outside the DOT, reasoning "...no federal agency can properly perform such (investigatory) functions unless it is totally separate and independent from any other...agency of the United States." Because the DOT is responsible for both the regulation and promotion of transportation within the United States and accidents may suggest deficiencies in the transportation system, the Board's independence was deemed necessary for proper oversight. The NTSB, which has no authority to regulate, fund, or be directly involved in the operation of any mode of transportation, seeks to conduct investigations and to make recommendations from a totally objective viewpoint.

In 1996, Congress assigned the Board the additional responsibility of coordinating Federal assistance to the families of aviation accident victims. In 2000, the Safety Board embarked on a major initiative to increase employee technical skills and make its investigative expertise more widely available to the transportation community by establishing the NTSB Academy. The George Washington University Virginia campus was selected as the academy's home. The NTSB took occupancy of its new facility in August 2003.

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Since its inception, the NTSB has investigated more than 124,000 aviation accidents and over 10,000 surface transportation accidents. On call 24 hours a day, 365 days a year, NTSB investigators travel throughout the country and to every corner of the world to investigate significant accidents and develop factual records and safety recommendations with one aim – to ensure that such accidents never happen again.

To date, the NTSB has issued more than 12,000 safety recommendations pertaining to the various transportation modes to more than 2,200 recipients. Because the Board has no authority to regulate the transportation industry, its effectiveness depends on its reputation for conducting thorough and accurate investigations and for producing timely, well-considered recommendations to enhance transportation safety.

The NTSB’s role in fostering advances in transportation safety has been significant – more than 82 percent of its recommendations have been adopted by the regulatory community and the transportation industry.



Board Members meet to discuss a Board report and associated recommendations.

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Most Wanted Safety Recommendations

The Safety Board uses its Most Wanted transportation safety improvements list to focus attention on Board recommendations that have the most potential to save lives and to highlight recommendations with the greatest impact on transportation safety.

This year, the Safety Board made three major revisions to the Most Wanted List of Safety Improvements, adding two new issues (medical certification of commercial vehicle operators and hardcore drinking drivers) and dividing the list into actions needed by federal transportation administrations and actions needed by the States and industry. Also, for the first time in the list's 13-year history, actions by federal agencies to recommendations were based on timeliness. Items on the list were color-coded: Green -- acceptable action, progressing in a timely manner; yellow -- acceptable action, progressing slowly; and red -- unacceptable action or progress has stalled. Those not coded are still under assessment.

2003 Most Wanted List

Action needed by federal agencies

AVIATION

The FAA should act to:

Require Restraint Systems for Children Under Age 2

- Require restraints for infants and small children during takeoff, landing, and in turbulent conditions to provide them the same level of safety as other passengers.

Reduce Dangers to Aircraft Flying in Icing Conditions (Yellow)

- Use current research on freezing rain and large water droplets to revise the way aircraft are designed and approved for flight in icing conditions.
- Give flight crews accurate information to quickly recognize dangers of all types of icing and maintain airspeeds to avoid loss of aircraft control.

Eliminate Flammable Fuel/Air Vapors in Fuel Tanks on Transport Category Aircraft (Yellow)

- Modify procedures to reduce the potential for flammable fuel/air vapors in fuel tanks until permanent changes can be implemented.
- Implement design changes to eliminate the generation of flammable fuel/air vapors in all transport category aircraft.

Stop Runway Incursions/Ground Collisions of Aircraft (Yellow)

- Give immediate warnings of probable collisions/incursions directly to flight crews in the cockpit.

Improve Audio and Data Recorders/Require Video Recorders (Red)

- Require cockpit voice recorders to retain at least 2 hours of audio.
- Require back-up power sources so cockpit voice recorders collect an extra 10 minutes of data when an aircraft's main power fails.
- Inspect and maintain data recorders yearly to make sure they operate properly.
- Install video recorders in cockpits to give investigators more information to solve complex accidents.

RAILROAD

The Federal Railroad Administration (FRA) should act to:

Implement Positive Train Control Systems (Yellow)

- Prevent train collisions and overspeed accidents by requiring automatic control systems to override mistakes by human operators.

Require Cab Voice Recorders/Improve Survivability of Recorders (Red)

- Install audio recorders to give investigators more information to solve complex accidents.
- Improve event recorder design survivability on new and rebuilt locomotives to protect data from fire and impact forces during train accidents.

HIGHWAY

The Federal Motor Carrier Safety Administration (FMCSA) should act to:

Improve the Safety of Motor Carrier Operations (Green)

- Prevent motor carriers from operating if it put vehicles with mechanical problems on the road or unqualified drivers behind the wheel.

Prevent Medically-Unqualified Drivers from Operating Commercial Vehicles (Yellow)

- Establish a comprehensive medical oversight program for interstate commercial drivers.
- Ensure that examiners are qualified and know what to look for.
- Track all medical certificate applications.
- Enhance oversight and enforcement of invalid certificates.
- Provide mechanisms for reporting medical conditions.

The National Highway Traffic Safety Administration (NHTSA) and DOT should act to:

Enhance Protection for Bus Passengers (Yellow)

- Redesign motor coach window emergency exits so passengers can easily open them.
- Issue standards for stronger bus roofs and require them in new motorcoaches.
- Devise new standards to protect motor coach passengers from being thrown out of their seats or ejected when a bus sustains a front, side, or rear impact or rolls over.

MARINE

USCG should act to:

Improve Drug and Alcohol Testing of Crews After Accidents (Yellow)

- Strengthen and clarify regulations to require that drug and alcohol testing be conducted quickly after serious marine accidents.

Require Voyage Data Recorders (Green)

- Mandate that all large ocean-going vessels be equipped with voyage data recorders to help investigators determine causes of accidents and incidents.

INTERMODAL

DOT, FAA, USCG, and the Research and Special Programs Administration (RSPA) should act to:

Update Hours-of-Service Regulations in Aviation, Marine and Pipeline Industries

- Set working hour limits for flight crews, aviation mechanics, pipeline controllers, mariners and other transportation operators, and provide predictable work and rest schedules based on current fatigue research, circadian rhythms, sleep and rest requirements.

Action needed by the states and industry

HIGHWAY

Improve Child Occupant Protection

- Enact state laws requiring booster seats for young children.
- Make vehicle backseats more child friendly.

Enact Primary Seatbelt Enforcement Laws

- Increase the number of people who wear seatbelts through stronger enforcement laws.

Promote Teen Highway Safety

- Strengthen underage drinking and driving laws.
- Enact graduated driver licensing legislation.
- Prohibit nighttime driving and cell phone use by young novice drivers.
- Restrict the number of teen passengers traveling with young novice drivers.

Reduce Hardcore Drinking Driving

- Enact state legislation and take other actions that are proven to reduce crashes involving those who repeatedly drink large amounts of alcohol and drive including:
 - Frequent, statewide sobriety checkpoints;
 - Legislation to create stricter sanctions for those arrested for the first time with a high blood alcohol concentration (BAC);
 - Zero blood alcohol requirement for convicted DWI; offenders when they get their license back;
 - Administrative rather than court-based license revocation for refusing to take or failing the sobriety test; and
 - Vehicle sanctions for DWI offenders.
- Eliminate plea bargaining for DWI offenses and programs that divert offenders and purge the offense record.
- Retain DWI offense records (to identify and prosecute repeat offenders) for at least 10 years.
- Develop and operate special sanction (court-based) programs for hardcore DWI offenders.

MARINE

Enhance Recreational Boating Safety

- Require mandatory education of boat operators.
- Require use of life jackets for children.
- Require safety instruction prior to personal watercraft rental.

Other Safety Recommendations

The Board has also been working to close many of its recommendations. For the first time since 1975, the number of open safety recommendations on the Safety Board's books has dipped below 1,000. The Office of Safety Recommendations and Accomplishments, in conjunction with the offices of Aviation Safety; Highway Safety; Marine Safety; Railroad, Pipeline, and Hazardous Materials Investigations; and Research and Engineering, has reduced that number to 980.

Open safety recommendations mean that the safety loop is not complete. One of the Board's approaches for closing the open recommendations is to use the "SWAT" Team approach. SWAT, or Safety With A Team, includes frequent meetings with DOT leaders to address open recommendations. The SWAT approach is working. In FY 2003, 255 recommendations were closed -- 90 percent of them satisfactorily. In addition, there are an additional 139 recommendations in the review process that will be closed when the Board approves the documents.

The NTSB and Congress

The Safety Board provided testimony to Congressional committees on several occasions during calendar year 2003. Below is a summary of testimony provided by the Board Members. Copies of NTSB testimony are available on the Board's website at <http://www.nts.gov/speeches>.

Ellen Engleman Conners testified before the Committee on Commerce, Science and Transportation, United States Senate, on February 27, 2003, for consideration of her nomination as President Bush's nominee to serve as Member and Chairman of the NTSB. Her nomination was approved by voice vote on March 13, 2003, with a term to expire December 31, 2007 and a two-year term as Chairman.

Mark Rosenker testified before the Committee on Commerce, Science and Transportation, United States Senate, on February 27, 2003, for consideration of his nomination as President Bush's nominee to serve as Member and Vice Chair of the NTSB. His nomination was approved by voice vote on March 13, 2003, with a term to expire December 31, 2005, and a two-year term as Vice Chair to expire April 3, 2005.

Richard Healing testified before the Committee on Commerce, Science and Transportation, United States Senate, on February 27, 2003, for consideration of his nomination as President Bush's nominee to serve as a Board Member. His nomination was also approved by voice vote on March 13, 2003, with a term to expire December 31, 2006.

In her first appearance before a Congressional Committee in her new role as Chair, Chairman Engleman Conners testified before the Committee on Appropriations, Subcommittee on Transportation, Treasury and Independent Agencies, regarding the Board's FY 2004 budget request on April 3, 2003. The testimony summarized the Board's mission, the Board's accomplishments throughout the year, major modal investigations including the Board's work on the Columbia Space Shuttle accident, safety recommendations and accomplishments, our advocacy outreach program with the states, and our "Most Wanted List."

State and Local Government Outreach

The arrival of a new Chairman, Vice Chairman, and a Board Member in 2003 brought a renewed commitment to work with the states to reduce transportation accidents. Chairman Engleman Conners made clear from her earliest appearances that she considers state actions to address hardcore drinking drivers, improve occupant protection practices, and other measures, to be critical in reducing the increasing toll of highway fatalities.

In order to promote state action related to Safety Board recommendations, the Board Members and staff continued to be vocal advocates in the states. Representatives met with state officials, as well as public advocacy groups, and provided assistance and encouragement to alcohol, occupant and child restraint coalitions. Other activities have included speaking at public events; and targeting print, radio, and television media.

The Safety Board has recognized for many years that strong enforcement and public education programs must accompany laws in order to have a significant impact upon transportation accidents, injuries and fatalities. Thus, the Board provided its active support for public education efforts promoting proper child safety seat and seat belt use, responsible alternatives to driving while impaired, and new initiatives to improve the training of teenage drivers. Further, the Board supported enforcement campaigns that have proven effective, such as "Click It or Ticket," and "Booze It and Lose It."

Improving transportation safety continues to be a priority in the states, as indicated by the numerous state safety programs, and the hundreds of bills considered by state legislatures. Many states considered measures that would address the Safety Board's occupant protection, graduated licensing, impaired driving, and recreational boating safety recommendations.

The Safety Board's state advocacy initiative was well illustrated in Illinois in 2003. In a special joint effort with the National Safety Council and others, the Safety Board successfully promoted the enactment of three important highway safety laws in Illinois – primary safety belt enforcement, a booster seat use requirement for children, and a passenger restriction for young novice drivers. This marked the first time that a state simultaneously enacted laws implementing three Safety Board recommendations. As a result, the Safety Board awarded Governor Rod Blagojevich and Senator John Cullerton, the sponsor of the three measures, special awards for their outstanding leadership in promoting the adoption of these important measures.

The states continued to make improvements in their transportation safety laws and programs, especially regarding children and youths. Seven states strengthened their child passenger safety laws to require the use of booster seats by older children. Additionally, four states strengthened their graduated driver licensing systems for newly licensed teenage drivers. Maine became the second state (along with New Jersey) to prohibit instructional permit holders from using a mobile telephone while driving.

In 2003, the Safety Recommendations and Accomplishments staff testified 25 times in 14 states; held 42 coalition meetings; gave 21 speeches at conferences; and conducted 67 other advocacy activities.

The continuing increase in drunken driving deaths prompted a number of states to strengthen their laws for addressing alcohol impaired drivers. In particular, attention is being directed toward hard core drinking drivers. These offenders drive with high BACs and they do so repeatedly. Thus, for example, both New Mexico and Washington imposed requirements for the installation of ignition interlocks on vehicles operated by hardcore drinking drivers. One of the Board's focus states was Pennsylvania, which enacted the first significant changes to its impaired driving law in more than a decade when it strengthened its laws addressing hardcore drinking drivers.

States continued to recognize the need to improve recreational boating safety. Nearly three dozen states considered proposals to strengthen boating while impaired laws, to require children to use life jackets while on a boat, or establish boater education requirements, and laws were enacted in 10 of these states. New Mexico became the 50th state to enact an enforceable boating while intoxicated law, establishing a blood alcohol standard and implied consent for boat operators. Four states enacted life jacket requirements, bringing the total to 44. And, 29 states now require boat operators to complete a boater education course, following the enactment of new requirements in four states. The Safety Board actively encouraged adoption of measures consistent with its recommendations, both through legislative testimony and outreach to industry groups.

In addition to these direct advocacy activities, the Board continued to routinely inform key state officials of significant Safety Board accident investigation activities, from initial launch to final adoption of reports and recommendations. The Board provided information to the states on 11 separate accident investigations in 2003.

Office of Aviation Safety

The Federal Aviation Act of 1958, as amended, and the Independent Safety Board Act of 1974 placed the responsibility for investigating and determining the probable cause for all civil aviation accidents within the NTSB. Other legislation authorizes the Board to investigate accidents involving public use (government) aircraft, except those operated by the armed forces and intelligence agencies.

Given the international nature of the air transportation industry and of the leading role of the United States in the development of aviation technologies, the Safety Board's investigation of domestic accidents and participation in foreign investigations is essential to the enhancement of aviation safety worldwide. The Board fulfills U.S. obligations with regard to foreign accident investigations, established by treaty under the auspices of ICAO, by sending accredited representatives to participate in investigations in cases where U.S. interests are involved.

The Board's major aviation accident reports, safety recommendations, and accident statistics are disseminated worldwide and have a direct influence on the safety policies domestically and abroad, helping to ensure the safe transport by air of U.S. citizens and other travelers around the world.

The Safety Board also investigates more than 2,000 general aviation accidents and incidents annually. These investigations can result in safety improvements that have far-reaching impact. Typically, NTSB investigations examine all factors surrounding an accident or series of accidents or serious incidents, thereby ensuring that regulatory agencies and the industry are provided a thorough and objective analysis of actual, as well as potential, deficiencies in the transportation system. Only then can solutions be proposed to correct deficiencies that may have caused an accident.

The Office of Aviation Safety has the responsibility for investigating aviation accidents and incidents and for proposing probable cause(s) for the Safety Board's approval. In conjunction with other offices within the Safety Board, the office also works to formulate recommendations to prevent the recurrence of similar accidents and incidents and to improve aviation safety.

The office headquarters is located in Washington, D.C., with 10 regional offices located in Parsippany, New Jersey; Atlanta, Georgia; Miami, Florida; West Chicago, Illinois; Arlington, Texas; Denver, Colorado; Seattle, Washington; Gardena, California; Anchorage, Alaska; and Ashburn, Virginia. The office has seven divisions that reflect the organization of the Safety Board's investigative process: Major Investigations; Regional Operations and General Aviation; Operational Factors; Human Performance; Aviation Engineering; Survival Factors, and Report Writing and Editing.

When the Safety Board is notified of a major aviation accident, it launches a go-team, which varies in size depending on the severity of the accident and the complexity of the issues involved. The team normally consists of an investigator-in-charge (IIC) and staff specialists in as many as 14 different specialties. Each staff expert leads a group of other specialists from government agencies, the industry, and first response teams as information is collected and analyzed. Safety Board staff members are designated as

The Office of Aviation Safety has 83 investigators and 47 support staff. In 2003, it launched on four major domestic investigations and five foreign accident investigations. The office completed three major reports and continued work on four other major investigations.

group chairmen to coordinate information for their part of the investigation from the on-scene activities through adoption of the final report. For the majority of the almost 2,000 commercial and general aviation accident/serious incidents investigated each year, a regional investigator, from one of the regional offices, serves as the IIC.

Operational Factors specialists in three disciplines -- air traffic control, operations, and weather -- support major investigations with intensive work in those areas. Aviation Engineering specialists provide technical skills in the areas of powerplants (engines), structures, systems, and maintenance. Human Performance specialists review the background and performance of those associated with an accident. Survival Factors specialists investigate circumstances that affect the survival of persons involved in accidents, including causes of injuries and fatalities.

The participation of operators, manufacturers, labor, and regulators augments the Board's resources and allows first-hand access to specialized information. For example, the manufacturer is the best source of information on the design of the specific aircraft being investigated. NTSB also makes use of outside laboratories and research facilities when necessary.

A public hearing may be convened, generally within a year of the accident, or depositions may be taken to collect additional information and review the investigation's progress. As an investigation is completed, a detailed narrative report is prepared. This report will analyze the investigative record and identify the probable cause of the accident.

Safety recommendations resulting from major investigations are generally included in the final accident report, although recommendations can be issued at any time during the course of an investigation if the Board determines that an issue poses an immediate threat to safety. Regional investigations frequently identify safety issues; in 2003, 34 safety accomplishments identified by regional investigators were implemented that corrected safety problems before they resulted in other accidents.

The Office of Aviation Safety manages the NTSB's international aviation affairs program as well. It does so by assigning an accredited representative and technical advisors from the manufacturers of the airframe and the engines to assist in the investigation. NTSB accredited representatives support foreign investigations conducted by other nations in accordance with the Convention on International Civil Aviation. The office also maintains liaison and coordination with other governments through the U.S. Interagency Group on International Aviation and ICAO.

Completed Major Aviation Investigations

In-Flight Electrical System Failure and Loss of Control of Jet Express Services' Beechcraft Super King Air 200 near Strasburg, Colorado

On January 27, 2001, a Raytheon (Beechcraft) Super King Air 200, N81PF, owned by North Bay Charter, LLC, and operated by Jet Express Services, crashed into rolling terrain near Strasburg, Colorado. The flight departed from Jefferson County Airport, Broomfield, Colorado, with two pilots and eight passengers aboard. N81PF was one

of three airplanes transporting members of the Oklahoma State University basketball team and associated team personnel. All 10 occupants aboard were killed; impact forces and post-crash fire destroyed the airplane.

On January 15, 2003, the Safety Board determined that the probable cause of the accident was the pilot's spatial disorientation resulting from his failure to maintain positive manual control of the airplane with the available flight instrumentation. Contributing to the cause of the accident was the loss of a.c. electrical power during instrument meteorological conditions. The report identified a safety issue regarding the lack of oversight for athletic team and other college- and university-sponsored travel and a safety recommendation concerning this issue was issued to the National Collegiate Athletic Association, the National Association of Intercollegiate Athletics, and the American Council on Education.

Ice Contamination on Wing Causes Crash of Peninsula Airways Flight 350 in Dillingham, Alaska

On October 10, 2001, a Cessna 208 Caravan, operated by Peninsula Airways as flight 350, crashed shortly after takeoff at Dillingham, Alaska. The pilot and all nine passengers were killed and the airplane destroyed by impact forces. On January 23, 2003, the Board determined that the probable cause of this inflight loss of control was ice contamination on the upper surface of the wing that the pilot failed to detect during his preflight inspection of the airplane.

Arcing in Fan Relay Causes Fire Onboard AirTran Flight 913 in Greensboro, North Carolina

On August 8, 2000, the flight crew of AirTran flight 913, a Douglas DC-9, reported smoke in the cockpit shortly after take off from Greensboro, North Carolina. The airplane landed safely and an emergency evacuation was conducted. Five passengers received minor injuries. The examination of the airplane found evidence of fire in the electrical panel behind the captain's seat and on the cabin side of the bulkhead forming the rear of the cockpit. On May 8, 2003, the Board determined that the probable cause of this accident was a phase-to-phase arc in the left heat exchanger cooling fan relay, which ignited the surrounding wire insulation and other combustible materials within the electrical power center panel.

Lavatory Fluid Leak Leads to Fire Onboard AirTran Flight 956 in Atlanta, Georgia

On November 29, 2000, AirTran flight 956, a Douglas DC-9, returned for an emergency landing at Atlanta, Georgia after the flight crew reported a fire on the airplane. The airplane landed safely and there were no injuries to the 97 people on board. Examination of the airplane revealed substantial sooting on the fuselage exterior, fire damage to the forward cargo bin, and buckling/melting of the passenger floor above the forward cargo bin. Further examination revealed extensive fire damage in the area between the cargo compartment liner and the fuselage skin. This area contains several wiring runs and hydraulic lines that were damaged by fire. On May 8, 2003, the Board determined that the probable cause of this accident was the leakage of lavatory fluid from the airplane's forward lavatory onto electrical connectors, which caused shorting that led to a fire.

Maintenance Failure Cited in Crash of Emery Worldwide Airlines DC-8 near Sacramento, California

On August 5, 2003, the Safety Board determined that the probable cause of the crash of an Emery Worldwide Airlines DC-8 aircraft near Sacramento, California, was a loss of pitch control resulting from the disconnection of the right elevator control tab. The disconnection was caused by a failure to properly secure and inspect the bolt attaching the right elevator control tab crank fitting to the pushrod.

Emery Worldwide flight 17 crashed into an auto salvage yard on February 16, 2000, while attempting to return for landing shortly after departing Sacramento Mather Airport. The DC-8 was on a scheduled cargo flight to Dayton, Ohio. The three crewmembers aboard the flight were killed; impact forces and post-crash fire destroyed the aircraft.

The Board found that at some time after the previous takeoff and before the accident takeoff roll, the bolt connecting the right elevator control tab crank fitting to the pushrod migrated out of the fitting, allowing the control tab to disengage from its pushrod and shift to a trailing edge down position. As the aircraft accelerated during the takeoff roll, the right control tab crank fitting contacted the disconnected pushrod, thereby restricting the upward movement of the control tab's trailing edge and leaving it in an extreme downward deflection. As a result, the aircraft's elevator surfaces were driven to command an extreme nose-up pitch attitude that the pilots were unable to overcome despite large nose-down forces applied to the control columns.

The Board judged that the maintenance errors that eventually resulted in the DC-8 crash occurred either during the most recent heavy maintenance "D" check (November 1999) or during subsequent maintenance of the aircraft. However, the Board was not able to determine precisely when the improper maintenance work was done.

As a result of this investigation, the Board issued 15 recommendations to the FAA, including provisions for revised maintenance procedures, improved training for flight crews, the redesign of DC-8 elevator control tab installations, and replacement of DC-8 aluminum elevator geared tab crank arms.

Space Shuttle Columbia (STS-107) Reentry Breakup

On February 1, 2003, the Space Shuttle Columbia (shuttle ship designation OV-102) broke up while reentering the earth's atmosphere on shuttle mission STS-107. All seven astronauts onboard perished, and debris from the vehicle fell over a large section of Texas, and a smaller section of Louisiana. Soon after the shuttle was destroyed, the Safety Board launched six people to Texas and Louisiana to assist NASA in debris recovery and to help initiate the investigation. We sent two seasoned investigators-in-charge who have extensive experience with in-flight break ups, a forensic pathologist, and structure, systems and aircraft performance experts. In Washington, our staff worked on the radar data and worked with meteorologists to help locate wreckage.

In the weeks that followed, six investigators were assigned to the Kennedy Space Center in Florida helping NASA engineers reassemble portions of the shuttle. We also assigned several radar interpretation experts to assist their NASA counterparts at the Johnson Space Center in Houston. In addition, several NTSB supervisory personnel and public affairs personnel assisted members of the independent Columbia Accident Investigation Board, also operating out of the Johnson Space Center. In all, more than 50 Board employees supported the investigation. The CAIB issued its final report of the accident on August 26, 2003.

Flight Crew's Failure to Maintain Airspeed Causes Aviation Charter, Inc., Raytheon King Air 100 Crash in Eveleth, Minnesota

On November 18, 2003, the Safety Board determined that the probable cause of the October 25, 2002 crash of a Raytheon (Beechcraft) King Air 100 airplane, carrying Senator Paul Wellstone and seven others, was the flight crew's failure to maintain adequate airspeed, which led to an aerodynamic stall from which they did not recover. The airplane, operated by Aviation Charter, Inc., was on a flight from St. Paul to Eveleth, Minnesota, when it crashed on approach to the Eveleth-Virginia Municipal Airport. The airplane was destroyed and there were no survivors.

The Board concluded that the flight crew failed to maintain an appropriate course and speed for the approach to Eveleth and did not properly configure the airplane at the start of approach procedures. The Board also concluded that during the later stages of the approach, the flight crew failed to monitor the airplane's airspeed and allowed it to decrease to a dangerously low level (as low as about 50 knots below the company's recommended approach speed) and to remain below the recommended approach speed for about 50 seconds. The airplane then entered a stall from which it did not recover. The Board judged that while cloud cover might have prevented the flight crew from seeing the airport, icing did not affect the airplane's performance during the descent. Cockpit instrument readings on course alignment and airspeed should have prompted the flight crew to execute a go-around.

The Board found that Aviation Charter, Inc., was not making crewmembers sufficiently aware of its standard operating procedures, and cited the company's failure to provide adequate stall recovery guidance. Further, the company was not training its pilots in crew resource management in accordance with its FAA-approved training program. Consequently, the Board recommended that the FAA make such training mandatory for Part 135 on-demand charter companies that conduct dual-pilot operations.

The Board, noting that FAA surveillance of Aviation Charter, Inc., was not sufficient to detect the discrepancies that existed at the company, recommended that the agency conduct en route inspections and observe training and proficiency checks at all Part 135 on-demand charter operations, as is done at Part 121 and Part 135 commuter operations, to ensure the adequacy, quality and standardization of pilot training and flight operations. Additionally, the Board recommended that the FAA convene a panel of experts to determine the feasibility of a requirement for the installation of low-airspeed alert systems in airplanes engaged in commercial operations under Parts 121 and 135, and act accordingly on the panel's findings.

Major On-going Aviation Investigations

Federal Express Flight 1478 Crash in Tallahassee, Florida

On July 26, 2002, Federal Express flight 1478, a Boeing 727, crashed short of the runway 9 at Tallahassee, Florida. The airplane was on a scheduled cargo flight from Memphis, Tennessee to Tallahassee. Impact forces and a post-crash fire destroyed the airplane.



FedEx 727 following the accident in Tallahassee.

American Airlines Flight 587 Crash in New York City, New York

On November 12, 2001, American Airlines flight 587, an Airbus A-300-600, a scheduled flight to the Dominican Republic, crashed shortly after takeoff from John F. Kennedy International Airport, Jamaica, New York. The aircraft crashed into a residential area in Belle Harbor, New York. All 260 on board and five people on the ground were killed in the accident. The airplane and six houses were destroyed. This was the second deadliest accident in U.S. history. A public hearing was held in late 2002.



Investigators examine wreckage at AA flight 587 crash site.

Air Midwest Flight 5481 Crash in Charlotte, North Carolina



Hanger at Charlotte-Douglas International Airport after being struck by Air Midwest flight 5481.

On January 8, 2003, Air Midwest flight 5481 (d.b.a. US Airways Express), a Beech 1900, N233YV, crashed shortly after takeoff from Charlotte-Douglas International Airport, Charlotte, North Carolina. The flight was a scheduled passenger flight to Greenville-Spartanburg, South Carolina. The two crewmembers and 19 passengers onboard were killed. Pratt & Whitney, Canada, manufactured the Beech 1900 engines; therefore, in accordance with the provisions of Annex 13, the Transportation Safety Board of Canada was notified and sent an accredited representative to the scene.

Regional Aviation Operations

In 2003, the regional offices initiated 1,915 accident investigations and 50 serious incident investigations involving mostly commercial operations and completed 1,707 investigations. Regional accident and serious incident investigations are handled much like major investigations, but because these investigations are typically smaller in scope, they are usually conducted by a single regional investigator, who, working with representatives from other parties, ensures the investigation of all the relevant facts, conditions, and circumstances to determine the cause of the accident and identify any safety issues. The factual reports of the accidents/serious incidents conducted by the regions yearly are published on the NTSB's website. The brief and probable cause of the accident is available on the NTSB's website after the determination of cause.

Completed Regional Aviation Investigations

In the Alaska Region

Pilot Error and Inadequate Coordination Cause Passenger Flight to Takeoff on Taxiway in Anchorage, Alaska

On January 25, 2002, China Airlines flight 11, an Airbus Industrie A-340-300, took off from a taxiway at the Ted Stevens Anchorage International Airport, Anchorage, Alaska. The three cockpit crewmembers, 12 cabin crewmembers, and 237 passengers, were not injured. The airplane was not damaged. The airplane proceeded to Taipei, Taiwan, and landed without incident. Although the airplane had been cleared for takeoff on a runway, it accelerated onto a taxiway and took off. The NTSB determined the probable cause of this incident was the captain's selection of a taxiway instead of a runway for takeoff and the flight crew's inadequate coordination of the departure, which resulted in a departure from a taxiway. A factor in the incident was inadequate airline operator's procedures that did not require the crew to verbalize and verify the runway in use prior to takeoff.

In the Mid-Atlantic Region

Pilot's Failure to Maintain Control Causes Medevac Helicopter Accident in Cleveland, Ohio

On January 18, 2002, in Cleveland, Ohio, a medevac helicopter struck a building and impacted the ground following lift-off. The helicopter lifted off the hospital's rooftop helipad at night. The paramedic said that when the helicopter was about 20 feet above the helipad, and while he was programming the GPS receiver, a sudden gust of wind pushed the helicopter from behind. The pilot then made a rapid right cyclic input to avoid hitting the building, but the helicopter struck the building, and fell about 13 floors to ground level. The paramedic did not see or hear any warning lights, horns or unusual noises, and was not aware of any mechanical problems with

In 2003, the Office of Aviation Safety regional staff initiated 1,915 investigations, completed 1,707, and continued work on 899 investigations.

the helicopter. A police officer who flew two missions in the local area prior to the accident said the wind speed at 500 feet was at least 25 knots and gusting. An FAA inspector who stood on the rooftop helipad after the accident said the wind gusts were about 20-30 knots and they swirled around the heliport. The NTSB determined the probable cause of this accident was the pilot's failure to maintain directional control of the helicopter while hovering, which resulted in its collision with a building. Contributing factors included the confined area, tail wind, and wind gusts.

In the North Central Region

Swearingen SA227-AT Accident on Beaver Island, Michigan Caused by Flight Crew's Failure to Maintain Altitude During Approach

On February 8, 2001, a Swearingen SA227-AT, N318DH, operated by Northern Illinois Flight Center and piloted by a commercial pilot, was destroyed when it impacted trees and terrain near Beaver Island Airport, Beaver Island, Michigan. The pilot and pilot-rated front seat occupant were killed. Two passengers received minor injuries and two passengers received serious injuries. The airplane was on an on-demand air-taxi flight operating under 14 CFR Part 135 and was destroyed when it impacted trees and terrain while circling to land during a non-precision instrument approach at night. The pitch trim selector switch was found set to the co-pilot side. Regulations state that 14 CFR Part 135 operators cannot use the services of any person as an airman unless that person is appropriately qualified for the operation for which the person is to be used. The NTSB determined the probable cause of this accident was the flight crew not maintaining altitude/clearance during the circling instrument approach. Factors were the pilot-in-command initiating the flight without proper weather reporting facilities at the destination, the flight crew not flying to an alternate destination, the flight crew not following company and FAA procedures/directives, the lack of certification of the second pilot, the operator not following company and FAA procedures/directives, and the dark night and the low ceiling.

In the Northeast Region

Lear 25 Crash in Ithaca, New York Caused by Pilot's Spatial Disorientation

On August 24, 2001, a Learjet 25, N153TW, operated by Ameristar Jet Charter, Inc., was destroyed after impacting terrain while departing from the Tompkins County Airport, Ithaca, New York. The certificated airline transport pilots were killed. Night instrument meteorological conditions prevailed and an instrument flight rules flight plan was filed for the 14 CFR Part 135 on-demand cargo flight, destined for the Jackson County-Reynolds Field, Jackson, Michigan. The NTSB determined that the probable cause of this accident was the pilot's failure to maintain a proper climb rate while taking off at night, which was a result of spatial disorientation. Factors in the accident were the low visibility and cloud conditions, and the dark night.

*In the Northwest Region***Fuel Exhaustion Causes Boeing 307 Ditching in Elliott Bay, Seattle, Washington**

On March 28, 2002, a Boeing S-307 Stratoliner, N19903, registered to the National Air and Space Museum and operated by the Boeing Company as a 14 CFR Part 91 maintenance check and proficiency flight, ditched in the waters of Elliott Bay, Seattle, Washington, following a loss of engine power on all four engines. This Boeing 307 was the last aircraft of its type in the world. It was owned by the Smithsonian but had been restored by volunteers at the Boeing Company and was periodically operated by Boeing flight crews. The NTSB determined the probable cause of this accident was loss of all engine power due to fuel exhaustion that resulted from the flight crew's failure to accurately determine onboard fuel during the pre-flight inspection. A factor contributing to the accident was a lack of adequate crew communication regarding the fuel status.

*In the Southeastern Region***Pilot's Failure to Maintain Visual Lookout Causes F-16/Cessna 172 Midair Collision Over Bradenton, Florida**

On November 16, 2000, a General Dynamics F-16 military jet airplane operated by the U.S. Air Force and a Cessna 172 were involved in a midair collision near Bradenton, Florida. The F-16 was one of two airplanes operating on a low altitude training mission. No flight plan was filed for the Cessna 172. The pilot of the F-16 successfully ejected and the Cessna pilot (who was airline transport pilot qualified) was killed. Witnesses observed the first jet flying toward the south followed by the second jet located to the left and slightly lower than the first jet. They also observed a small civilian airplane flying from west to east perpendicular to the military jets. The second collided with the civilian airplane and initially continued southbound. The airplane was observed making a right turn, and then turning back to the left. The NTSB determined that the probable cause of this accident was the failure of the F-16 lead pilot and F-16 accident pilot to maintain an adequate visual lookout while maneuvering. Factors contributing to the accident were the F-16 flight lead pilot's decision to discontinue radar traffic advisory service, the F-16 flight lead pilot's failure to identify a position error in his aircraft's navigational system, the F-16 pilots subsequent inadvertent entry into class C airspace without establishing and maintaining required communications with air traffic control (ATC); and ATC's lack of awareness that there was more than one F-16 aircraft in the formation flight, which reduced the ATC controller's ability to detect and resolve the conflict that resulted in the collision.

*In the Southwest Region***Bell Gear Fatigue Failure Causes America West Airlines CRJ Flight Control Malfunction in Fresno, California**

On July 18, 2000, America West Express flight 6088, a Bombardier Canadair Regional Jet CL-65, N97325, experienced an autopilot pitch trim master caution light followed by an autopilot pitch trim nose down master caution light, and a pitch

trim malfunction. The airplane, operated by Mesa Airlines (d.b.a. America West Express) was not damaged. The three crewmembers and 20 passengers were not injured. The flight departed the Monterey Peninsula Airport, Monterey, California, and was scheduled to terminate at the Phoenix Sky Harbor International Airport, Phoenix, Arizona. The pilot reported that while climbing through flight level 200 the autopilot pitch trim master caution warning light and the autopilot pitch trim nose down master caution warning light illuminated. The captain stated that he disengaged the autopilot in accordance with the airplane flight manual procedures to resolve the problem. The first officer stated that they were able to manually adjust the stabilizer trim up and down, but at no point would the trim go below four units of trim. Investigation disclosed that an internal failure in horizontal stabilizer trim actuator) and the associated motor control unit resulted in Channel 1 of the system being inoperative. The NTSB determined the probable cause of this incident was the fatigue failure of the bell gear in the horizontal stabilizer trim actuator system.

Pilot's Inadequate Decision-making Causes Aerospatiale AS 355F1 Air Tour Helicopter Accident in Kahului, Hawaii

On July 21, 2000, an Aerospatiale AS 355F1, operated by Blue Hawaiian Helicopters, collided with mountainous terrain in the Lao Valley, Hawaii. The helicopter was operated as an on-demand air taxi sightseeing flight under the provisions of 14 CFR Part 135. A company flight plan was filed for the planned 30-minute long tour flight. The commercial pilot and six passengers were killed. Impact forces and a post-impact ground fire destroyed the helicopter. The impact site was on the north face of a 2,900-foot-high mountain, at about 2,850 feet. The NTSB determined the probable cause of this accident was the pilot's inadequate decision-making he continued visual flight rules flight into instrument meteorological conditions. Also causal was his failure to maintain terrain clearance resulting in a collision with mountainous terrain. A contributing factor was the low ceiling. As a result of this investigation, the operator agreed to make changes to its operating procedures.

On-going Regional Aviation Investigations

In the Central Mountain Region

Consolidated Vultee P4Y-2 Airtanker Accident in Estes Park, Colorado

On July 18, 2002, a Consolidated Vultee P4Y-2, N7620C, under contract to the Department of Agriculture Forest Service and piloted by a commercial pilot, was destroyed when it impacted into mountainous terrain six miles southwest of Estes Park, Colorado. A post-crash explosion and fire ensued. Prior to the impact, the airplane's left wing separated and aircraft control was lost while maneuvering to deliver fire retardant on the Big Elk wildfire, burning in an area northwest of Lyons, Colorado. The pilot and second pilot on board the airplane were killed. A witness on the ground took a series of photographs showing the airtanker's left wing separating at the wing root and the remaining airplane subsequently entering a 45-degree dive to the ground in a counter-clockwise roll. An examination of the airplane wreckage showed extensive

areas of preexisting fatigue in the left wing's forward spar lower spar cap, the adjacent spar web, and the adjacent area of the lower wing skin. The airplane was manufactured in 1945 and was in military service until 1956. In 1958, the airplane was converted to civilian use as an airtanker and served in that capacity to the time of the accident.

In-flight Fire in the Lavatory of a United Airlines Boeing 757

On January 11, 2003, the airplane was on a regularly scheduled flight from San Francisco to Boston with seven crew and 133 passengers on board. A lavatory fluid level sensor arced causing a flash fire in the lavatory. Flight attendants on board the airplane fought the fire with a Halon fire extinguisher, while the captain made an emergency landing at Salt Lake City, Utah. A fleet-wide inspection of all United Boeing 757 aircraft revealed five additional sensors that showed evidence of arcing and fire.

Mid-air Collision over Denver, Colorado

The accident occurred January 24, 2003, between a Piper PA-31T and a Cessna 172P. There were five fatalities on the two airplanes, three in the C-172 and two in the PA-31. Six people on the ground suffered minor injuries. Both airplanes came crashed in residential areas. The C-172 crashed into a house and severed a gas line, which subsequently exploded. Several issues with respect to the Class B airspace over the city and certain visual flight rules corridors are being examined.

Agusta A109K2 Life Flight Helicopter Tail Rotor Failure Accident at Salt Lake City, Utah

On June 7, 2003, the crew had just lifted off following a mountain rescue when witnesses observed the tail rotor depart from the helicopter. The pilot was killed in the crash. A paramedic was knocked unconscious. The initial examination of the tail rotor showed the trunion came apart in flight resulting in the tail rotor separation. An examination of the broken trunion showed several fatigue planes originating in the splines. The trunion was life limited at 2,700 hours. At the time of the accident, the part had just less than 700 hours. The U. S. Coast Guard operates several of these helicopters in support of homeland defense in the Washington, D.C. area and has expressed interest in the investigation's findings. An alert bulletin was issued advising all A109K2 operators of what was found.

American Airlines Boeing 757 Cockpit Door Blowout Panel Failure

On June 10, 2003, at 35,000 feet, 34 miles south of Dodge City, Kansas, during a routine closing of the cockpit door by a flight attendant, the blowout panel came out and fell striking the captain on the head and rendering him incapacitated. The first officer performed an emergency landing at Denver, Colorado. An examination of cockpit door blowout panels in several aircraft showed deficiencies in their design and revealed the potential for further aircrew injuries. An emergency airworthiness directive was issued directing changes to the door's design safety features.

In the Mid-Atlantic Region

Piper PA 32R-301T Accident in Byram Township, New Jersey

On September 8, 2002, a Canadian-registered Piper PA 32R-301T, C-GKLY, was destroyed during a forced landing to wooded terrain in Byram Township, New Jersey. The certificated private pilot and one passenger were killed. Two passengers were seriously injured. Preliminary FAA transcripts of ATC communications revealed that the pilot declared an emergency about four minutes before the crash. The airplane was in cruise flight at 3,500 feet mean sea level when the pilot reported a loss of engine oil pressure. Examination of the engine revealed that the zinc-plated crankshaft gear attachment bolt was fractured, and that the crankshaft no longer drove the gear. A review of the manufacturer's specifications revealed that a cadmium-plated bolt was indicated for the crankshaft gear application. An emergency airworthiness directive was issued in regard to this failure mode.

In the North Central Region

Canadair Challenger 600 Accident in Wichita, Kansas

On October 10, 2000, a Canadair Challenger 600-2B16 airplane, operated by Bombardier Incorporated, was destroyed on impact with terrain and an airport perimeter fence during initial climb at the Wichita Mid-Continent Airport, Wichita, Kansas. The airplane came to rest on a two-lane, north-south road located along the western perimeter of the airport. The pilot and flight test engineer were killed and the copilot was seriously injured.

Learjet 25D Accident in Salina, Kansas

On June 12, 2001, a Learjet 25D, operated by Avcon Industries, Newton, Kansas, was destroyed on impact with terrain on airport property during landing at Salina, Kansas. The pilot and co-pilot were seriously injured. The aircraft was on a test flight for a supplemental type certificate.

Piper PA-46-350P Accident near Benton Harbor, Michigan

On August 4, 2002, a Piper PA-46-350P, N316PM, owned and piloted by a private pilot, sustained substantial damage during an in-flight collision with the terrain following a loss of engine power near Benton Harbor, Michigan. The pilot and his two passengers were killed. Teardown inspection of the Lycoming TIO-540-AE2A engine revealed a separated crankshaft. There had been 14 similar failures of the P/N 13F27738 crankshaft. Approximately 1,600 engines, including the previous 399 recalled by AD 2003-04-51, were removed from service for crankshaft inspection or replacement.

*In the Northeast Region***Mid-Air Collision Between a Piper and a Mooney Over Caldwell, New Jersey**

On November 15, 2002, a Mooney M10 (Cadet), N9502V, and a Piper PA-32R-300 (Lance), N216CL, collided while maneuvering for an approach to Essex County Airport, Caldwell, New Jersey. The certificated private pilot in the Mooney, and the certificated private pilot in the Piper were killed. Night visual meteorological conditions prevailed, and no flight plan was filed for either flight.

*In the Southeastern Region***Flight Attendant Killed During Emergency Evacuation in Miami, Florida**

On November 20, 2000, an Airbus Industrie A300B4-605R, N14056, operated by American Airlines, Inc., as flight 1291, a scheduled international passenger flight, from Miami, Florida, to Port Au Prince, Haiti, had a flight attendant killed during an emergency evacuation after the flight returned to Miami. In addition, the aircraft received minor damage; three passengers received serious injuries, and one flight attendant and 18 passengers received minor injuries. After takeoff from Miami the flight experienced a pressurization system malfunction, which the captain identified as the airplane depressurizing, and flight attendants and passengers complained of pain in their ears. The flight crew placed the pressurization system into manual control, turned off the autopilot and autothrottle systems, and began a descent to return to Miami. During the return, several lavatory smoke alarms activated and the captain call light illuminated in the cabin, but no evidence of fire or smoke was found. The flight crew did not complete the checklists for manual pressurization control and emergency landing during the return to Miami, both which called for the airplane to be depressurized prior to landing. After landing and stopping on a taxiway, the captain noticed an aft baggage compartment fire loop light illuminated and elected to evacuate. During the initiation of the evacuation, the flight attendants could not open the doors. The flight attendant at the left door continued to attempt to open the door. When the door suddenly exploded open, he was forced from the airplane to the ground -- receiving fatal injuries. Post accident examination of the airplane showed that insulation blankets had not been properly secured and had partially blocked the forward and aft pressurization outflow valves, causing the pressurization system malfunction.

Passenger-initiated Emergency Evacuation in Tampa, Florida

On June 23, 2003, a Boeing 757-232, N633DL, operated by Delta Air Lines, Inc., as flight 1036, experienced a passenger-initiated evacuation of the airplane while pushed away from the gate and stopped on the ramp at the Tampa International Airport, Tampa, Florida. The airplane was not damaged; two passengers sustained serious injuries, and 30 passengers sustained minor injuries. The airplane had been pushed back from the gate, stopped, and the No. 1 engine had been started and was stabilized. The tug and towbar had been disconnected from the airplane and the groundcrew were returning to the terminal. During this time, the No. 2 engine

was being started when the captain noticed groundcrew members looking concerned towards the airplane. The captain then noticed annunciation of open emergency exit doors. The flight crew began securing the engines, and reportedly all but 12 of the 167 passengers evacuated the airplane using all doors and overwing exits except the 1L and 1R doors. The flight crew stated that they did not experience any indications or discrepancies during the No. 2 engine start.

Engine Failure and Ditching of Commuter Flight near Treasure Cay, Bahamas

On July 13, 2003, a Cessna 402C, N314AB, registered to Tropical International Airlines Inc., and operated by Air Sunshine Inc., as Air Sunshine flight 502, impacted with the water six miles west of Treasure Cay, Bahamas. The airplane received substantial damage, and sank in 15 to 30 feet of water. The airline transport-rated pilot and seven passengers received minor injuries. Two passengers were killed after they evacuated the airplane. According to the captain, at an altitude of 3,500 feet, oil was seen coming from the right engine. He then heard a “pop” and engine parts came out through the top of the cowling. He feathered the right propeller, and applied “full power” to the left engine. He said the landing gear and flaps were retracted, but he could not maintain altitude. The airplane descended at a rate of about 200 to 300 feet per minute for about five miles until it impacted the water. Just before impact with the water, he raised the nose; the airplane skipped over the water and came to rest. He opened the pilot’s side window, got out through the left cockpit window and then opened the main entrance door. The passengers were in the water about two hours before a U.S. Coast Guard helicopter rescued them. The Bahamian Government has delegated investigation of this accident to the Safety Board.

Main Landing Gear Failure During Taxi in Miami, Florida

On August 24, 2003, a Boeing 757-223, N609AA, operated by American Airlines Inc. as flight 1163, a scheduled domestic passenger flight, had a failure of the left main landing gear truck beam, while taxiing for takeoff at Miami International Airport, Miami, Florida. The airplane received minor damage. The two airline transport-rated pilots, four flight attendants, and 163 passengers reported no injuries. The flight had departed the gate and was taxiing at about 5-10 knots, when the airplane yawed and tilted to the left, and then stopped. Another pilot advised that there appeared to be a problem with the left gear. The airplane was shut down, the passengers and crew exited the airplane through door L1, using stairs. Examination of the left main landing gear revealed that the truck beam had a circumferential fracture forward of the aft two wheels, and had separated into two pieces. The truck beam had been in service since the airplane was new in 1996, and had accumulated 7,517 cycles. The service life on this part is 12,000 cycles or 10 years.

In the Southern Region

CRJ-200 Atlantic Southeast Airlines Accident in Atlanta, Georgia

On June 2, 2002, Atlantic Southeast Airlines flight 4509, a Bombardier Canadian Regional Jet, CL6002B-19, experienced a left main landing gear failure while landing

at the Atlanta Hartsfield International Airport, Atlanta, Georgia. The pilot, first officer, flight attendant, and 50 passengers were not injured. Upon landing the pilot deployed the thrust reversers and felt the airplane tilt to the left. At first he believed that he had a flat tire. However, as the aircraft continued down the runway, he realized that the left gear had collapsed. As the airplane began slowing, he notified the tower that he had a problem and ordered the flight attendant to prepare the cabin for an emergency evacuation, which progressed smoothly. Examination of the airplane found that the left main landing gear trunnion fractured due to corrosion just below its attach point to the wing spar.

In the Southwest Region

American Eurocopters AS350-B2 Air Tour Helicopter Accident in Meadview, Arizona

On August 10, 2001, an American Eurocopters AS350-B2 helicopter, N169PA, collided with mountainous terrain near Meadview, Arizona. The helicopter was operated by Papillon Grand Canyon Helicopters as an on-demand air tour sightseeing flight. The pilot and five passengers were killed, and another passenger was seriously injured. The helicopter was destroyed in the collision and post-crash fire. The flight originated at the McCarran International Airport, Las Vegas, Nevada, as a tour of the west Grand Canyon area with a planned stop at a landing site in Quartermaster Canyon. The helicopter was en route back to Las Vegas when the accident occurred. At an elevation of 4,041 feet, the accident site is on the western side of an escarpment known as Grand Wash Cliffs in a steeply sloped mountainous area covered with sparse brush, hard dirt, loose rocks, and Joshua trees indigenous to the high Arizona desert. The average elevation of the top of the mesa formed by Grand Wash Cliffs is about 5,500 feet. Surveys of all possible approach paths to the accident site were conducted and no ground contact evidence was found. All ground scars were confined to the immediate vicinity of the wreckage mass within the approximate diameter of the main rotor. The skids were spread and the cross tubes had rotated rearward in the fuselage attach clamps.

Mid-Air Collision of Two Firefighting Tankers Over Hopland, California

On August 27, 2001, two Grumman TS-2F firefighting tankers, call signs Tanker 87 and Tanker 92, collided in flight near Hopland, California, while engaged in a fire suppression mission. The California Department of Forestry (CDF) was operating the airplanes as public use fire suppression flights. The pilots of both airplanes were killed and the airplanes were destroyed in the collision sequence and post crash fire. As a result of the investigation, the CDF agreed to revamp the coordination procedures used for directing tanker fire retardant drops and maintaining separation of the orbiting airplanes awaiting drop instructions.

Alaska Airlines Boeing 737 Flight Control Malfunction in Los Angeles, California

On October 10, 2001, Alaska Airlines flight 497, a Boeing 737-700, N615AS, experienced a jammed horizontal stabilizer trim actuator during the takeoff initial climb from the John Wayne Airport-Orange County, Santa Ana, California. The

flight was destined for Seattle, Washington; however, the flight crew diverted to Los Angeles International Airport, Los Angeles, California. There were no injuries to the six crewmembers and 82 passengers, and the airplane was not damaged. The crew disengaged the autopilot and found the electric trim control inoperative at both the pilot and co-pilot controls and the manual trim control was jammed and immovable. The crew declared an emergency and made an uneventful landing. The pilot said he had trained for the jammed stabilizer emergency in the simulator; however, in this instance he applied "a lot more force" than was required in the simulator and was still unable to move the manual control. Post-flight examination revealed the horizontal stabilizer trim actuator motor was mechanically seized. According to a representative of Boeing Aircraft Company, with the motor seized, in order to manually trim the stabilizer, it would have been necessary for the flight crew to exert sufficient force on the trim wheel to cause the motor clutch to slip in addition to the force necessary to overcome normal system friction.

In-flight Breakup of Cessna 425 in San Jose, California

On March 6, 2002, a twin turbo-prop Cessna 425, N444JV, experienced a loss of control and a subsequent in-flight breakup in San Jose, California. The aircraft descended to ground impact in an area of rolling, hilly pastureland. The aircraft was destroyed in the accident sequence. The instrument-rated private pilot and two passengers were killed. The flight departed the Reid-Hillview airport in San Jose and was en route nonstop to La Paz, Mexico. Communications tapes, along with recorded radar data, disclosed that about 8,000 feet the pilot stated that he had "just lost my needle . . . give me...." There were no further communications from the aircraft. The radar data then showed the target for the aircraft began a series of erratic turns and altitude changed before radar contact was lost.

Beech E-90 Crash in Reno, Nevada

On March 13, 2002, a Beech E-90, N948CC, experienced an in-flight loss of control and descended into an unoccupied commercial building during a nighttime instrument approach to the Reno/Tahoe International Airport, Reno, Nevada. The airplane was operated by Pilot Services Corporation, doing business as Regent Air Service, Inc., Truckee, California. The airplane was destroyed. The airline transport certificated pilot and five passengers sustained minor injuries. The flight was operated under 14 CFR Part 135 as an on-demand round trip air taxi flight from Truckee to Durango, Colorado. The pilot stated that he initiated the approach, but he could not land because the weather conditions were inadequate. He executed a missed approach. The pilot then requested and received a radar vector to proceed to Reno. Snow showers existed at both Truckee and Reno, and the pilot reported that he had activated the airplane's anti-icing and deicing equipment. Approaching Reno, accumulated ice was observed dislodging from the wings when the deice boots were inflated. The deice boots on the vertical and horizontal stabilizers cannot be seen from the cockpit. There is no annunciator light or indicator gauge to indicate these components' functionality. The pilot reported to that the airplane's approach was initially stabilized upon reaching the authorized minimum descent altitude. Some ice was visible on the wing's leading edge stall strip, but it was "way less than 1/4-inch" in depth. The ice did not extend beyond the aft portion of the wing's deicing boot. The pilot reported that initially the airplane was flying at 140 knots, the recommended approach speed

for icing conditions. But, a few miles from the airport, the airspeed decreased to between 111 and 115 knots. Thereafter, he felt a vibration in the control yoke and the airplane began yawing. When the airplane started shaking he applied full engine power and decreased the pitch attitude. The airplane's stall warning light illuminated and the airplane descended to impact with the building.

C-130A Firefighting In-Flight Breakup in Walker, California

On June 17, 2002, a Lockheed C-130A, N130HP, broke apart in-flight while executing a fire retardant delivery near Walker, California. The three crewmembers were killed and the airplane was destroyed. The airplane was operated by the Department of Agriculture's Forest Service as a public use firefighting flight. Videotapes of the accident sequence indicated that the airplane had initiated its retardant delivery run. During the delivery, the wings separated from the fuselage near the wing roots. The airplane was manufactured in 1957, and placed in service by the U.S. Air Force. It entered civil service with the U.S. Forest Service in 1988. An initial examination of the airplane's records indicates the airplane had 21,863 flight hours. Preliminary examination of the wing structure found evidence consistent with fatigue at the failure locations in the wings.

Aero Commander 690A Accident in Bishop, California

On August 11, 2002, an Aero Commander 690A, N690TB, collided with terrain at the Bishop (uncontrolled) Airport, in Bishop, California. The accident occurred when the aircraft descended into the ground during the downwind to base turn in the airport's traffic pattern. The commercial certificated pilot and three passengers, two of whom were nationally renowned wildlife photographers, were killed. The airplane was destroyed. Personnel at the passengers' Bishop-based business office indicated that the passengers desired to reimburse the pilot for the cost of their transportation from Oakland back to Bishop. However, the pilot pointed out that he "did not have enough time in the aircraft type to act formally as a charter pilot." It was therefore agreed that "in exchange for the favor of the flight" the pilot would receive a photograph(s) from the passengers.

American West Airlines Airbus A320 Accident in Phoenix, Arizona

On August 28, 2002, an Airbus Industrie A320-231, N635AW, operating as America West Airlines flight 794, experienced a loss of directional control during landing rollout at the Phoenix Sky Harbor International Airport, Phoenix, Arizona. While decelerating about midfield, the airplane veered right off the runway and experienced the collapse and partial separation of its nose gear strut assembly upon traversing the dirt infield area south of the runway. The airplane was substantially damaged. On board were two flight crewmembers, three flight attendants, and 154 passengers (including four lap children). Ten people reported injuries. The captain reported that he was handling the flight controls, and the airplane touched down on the centerline of the runway about 1,200 feet beyond its threshold. During rollout, he positioned both thrust levers into reverse but then took the number one thrust lever out of the reverse position. He then moved the number two thrust reverser out of reverse and applied full left rudder and full left brake in an effort to maintain directional control. He indicated, however, that the airplane continued swerving to the right until it

departed the pavement and slid to a stop in a nose-down attitude with a collapsed nose gear strut. There was no fire. No mechanical or system failures have been identified; however, eight days before the accident, maintenance personnel had deactivated the number one thrust reverser. The investigation is focusing on crew training and flight standardization issues.

Medevac Helicopter Accident near Nipton, California

On September 7, 2002, a Bell 222UT twin-engine helicopter, N417MA, was destroyed upon impact with terrain following a loss of control while maneuvering near Nipton, California. The airline transport rated pilot, a flight nurse, and a paramedic on board the helicopter were killed. Mercy Air of Rialto, California operated the helicopter. The flight was en route to pick up the victim of an automobile accident near Baker, California. A witness reported the helicopter was “flying low and very fast” as it flew across the highway prior to impacting terrain. The helicopter impacted the ground in a nose-low attitude, and a post-impact fuel-fed fire consumed the helicopter.

Fairchild SA-227-AC Runway Excursion at Hawthorne, California

On September 29, 2002, a Fairchild SA-227-AC, N343AE, experienced a loss of directional control during the ground roll portion of a rejected takeoff. The airplane veered off the left side of a runway at the Hawthorne Municipal Airport, Hawthorne, California, and was substantially damaged upon impacting obstacles and a hangar. There were 21 persons on board the airplane; one passenger was seriously injured. The airplane was operated by C.A.T.S. Tours, Inc., (dba Skylink Charter, LLC) as an on-demand air taxi flight to the Grand Canyon, Arizona.

International Aviation Accident Investigations

The NTSB assists other nations with aircraft accidents that occurred outside the United States. The following are some of the ongoing investigations.

Thai Airways 737 Explosion in Bangkok, Thailand

The NTSB continues to provide technical support to the Government of Thailand’s investigation of a March 3, 2001 explosion and fire that destroyed a Thai Airways International 737-400 that was sitting at a gate at Don Muang International Airport, Bangkok. A flight attendant aboard the plane was killed and the airplane destroyed. The Government of Thailand is in the process of completing the final report on this accident.

Cessna 402B Crash in the Bahamas

The NTSB continues to provide assistance to the Bahamian government in its investigation of the August 25, 2001, crash of a Cessna 402B operated by U.S.-based Blackhawk International Airways Inc. The airplane crashed shortly after takeoff at Marsh Harbour Airport, Bahamas. Visual meteorological conditions prevailed at the time. The pilot and eight passengers, including the entertainer Aaliyah, were killed. The on-demand air taxi flight was destined for Opa-Locka, Florida.

CASA 235 Crash in Malaga, Spain

On August 29, 2001, an Iberia CASA 235 crashed near Malaga, Spain. The airplane was on final approach to the airport when the crew reported an engine failure and then subsequently reported that the other engine had failed. The captain and three passengers were killed and the first officer and 39 passengers were injured. The NTSB provided an accredited representative to participate in the investigation as the engines' country of manufacture.

MD-87 and Cessna Citation Collide in Milan, Italy

On October 8, 2001, a Scandinavian Airline System (SAS) MD-87 collided with a Cessna Citation business jet in Milan, Italy. The MD-87 had been cleared for takeoff, and the Citation was taxiing for takeoff on the same runway. All 114 people on the MD-87 and four people on the Citation were killed. Additionally, six people in a baggage handling facility were killed when the MD-87 impacted the building. Heavy fog was present at the time of the collision.

Air China B-767 Crash in Pusan, Korea

On April 15, 2002, the NTSB dispatched a team of investigators to assist the Government of South Korea in its investigation of the crash of an Air China Boeing 767-200ER near the city of Pusan. The aircraft departed Beijing to Pusan's Kimhae Airport. While turning onto final approach to Runway 18R at Kimhae, the aircraft impacted rising, wooded terrain, broke apart, and caught fire. Local authorities report that 128 of the 167 persons aboard were killed. The Government of South Korea is preparing a final report.



Air China crash site.

EgyptAir B-737 Crash in Tunis, Tunisia

On May 7, 2002, the Safety Board sent a team of investigators to assist the Government of Tunisia in its investigation of the crash of an EgyptAir Boeing 737-500 (SU-GBI). Fourteen of the 62 individuals on board were killed when the aircraft crashed while on approach to Tunis-Carthage Airport while on a flight from Cairo. Shortly before the accident, the captain reported a landing gear malfunction, and had performed a low pass over the airfield. The aircraft crashed during its second approach.



EgyptAir B-737 crash site.

China Northern Airlines MD-82 Crash in Beijing, China

On May 8, 2002, the Safety Board dispatched a team of investigators to assist the Government of China in its investigation of the crash of a China Northern Airlines MD-82 (B-2138). All 112 people aboard were killed when the aircraft, operating as flight 6136 from Beijing, crashed into a bay near the city of Dalian. The accident aircraft is one of 35 MD-82s manufactured in China.

China Airlines Boeing 747-200 Crash in the Straits of Taiwan

On May 25, 2002, China Airlines flight 611, a Boeing 747-200, crashed into the Straits of Taiwan near the southwest end of Makung Island, Taiwan. Preliminary radar data indicates that the 23-year-old airplane apparently broke up at about 30,000 feet. All 225 persons onboard were killed. Based on the findings of this investigation, the NTSB issued recommendations regarding repair of aircraft structures. Investigative authorities are preparing a final report on the accident.

DHL Boeing 757 and Bashkirian Airlines TU-154 Mid-Air Collision over Uberlingen, Germany

On July 1, 2002, DHL flight 611, a Boeing 757 and a Bashkirian Airlines Tupolev TU-154 collided in mid-air over Uberlingen, Germany. The two flight crewmembers on board flight 611 were killed, as were the 12 flightcrew members and 57 passengers onboard the Bashkirian flight. Both aircraft were under ATC control and were equipped with traffic alert and collision avoidance systems.



Recovery of China Airlines' wreckage.

African Commuter Services Gulfstream G-1 Crash in Busia, Kenya

On January 24, 2003, a Gulfstream G-1 operated by African Commuter Services, Ltd crashed shortly after take off from a dirt airstrip at Busia, Kenya. There were 14 persons on the airplane. The airplane was destroyed by impact and the two pilots and one passenger, the Labor Minister for Kenya, were killed. The investigation found that the airplane lifted off about half way down the 3,400-foot runway, but did not climb higher than 25 feet. Examination of the wreckage did not disclose any mechanical failures. However, the flaps were set to 20 degrees, which is not authorized for takeoff.

Air Algerie Boeing 737 Crash in Tamanrasset, Algeria

On March 6, 2003, Air Algerie flight 6289, a Boeing 737-2T4, registration number 7T-VEZ, crashed shortly after takeoff from Tamanrasset Airport in Tamanrasset, Algeria. Impact forces and post crash fire destroyed the airplane. Five crewmembers and passengers aboard were killed; one passenger was seriously injured. A NTSB accredited representative (with an FAA representative) traveled to Algeria approximately one week after the accident at the request of the U.S. Ambassador to Algeria. Subsequent to the on-scene investigation, a NTSB powerplants engineer

led a team to Brussels, Belgium, to teardown the accident engines. In addition, a NTSB systems engineer attended the teardown of accident components in Seattle. Throughout the investigation, a NTSB performance engineer worked with Boeing engineers to produce simulation data on the accident.

Swearingen Metro Crash in Mount Kenya, Kenya

On Saturday, July 29, 2003, a Swearingen Metro SA226-TC airplane, a charter flight operated by Air 2000 of South Africa, collided with mountainous terrain during cruise flight at Mount Kenya National Park, Kenya. Instrument meteorological conditions prevailed, and the aircraft was on an instrument flight plan. The two South African pilots, and the 12 American citizens onboard were killed. The airplane was destroyed. There was ground fire. The flight originated in Johannesburg, South Africa with stops in Tete, Mozambique and Nairobi, Kenya. The destination was Samburu, Kenya near a hunting lodge. A team led by an NTSB accredited representative accompanied Kenyan investigators to the scene. The team spent several days further assisting local investigators with the investigation.

Sudanese Airways Boeing 737 Crash in Port Sudan, Sudan

On July 8, 2003, Sudanese Airways flight 139, a Boeing 737-200 airplane, crashed in open terrain during an instrument approach to Port Sudan Airport, Sudan. The flight departed Port Sudan for Khartoum. However, it was returning to land after the pilot reported one of the two engines had lost power. Instrument meteorological conditions prevailed, and the aircraft was on an instrument flight plan. The two flight crewmembers, nine crewmembers, and 105 passengers were killed. One passenger was seriously injured. Impact forces and a ground fire destroyed the airplane. After Sudanese officials traveled to the United Kingdom to read the flight recorders, they requested NTSB on-site assistance. A team led by an NTSB accredited representative provided assistance for five days.

Public Hearings

Air Midwest Flight 5481 Crash at Charlotte, North Carolina, May 20-21, 2003

On May 20-21, 2003, the Safety Board held a two-day en banc public hearing, in which all five Board Members participated, as part of its ongoing investigation into the fatal crash of Air Midwest flight 5481 at Charlotte-Douglas International Airport, Charlotte, North Carolina.

The intent of the hearing was to further develop information regarding maintenance issues, including company and contract operations, training, surveillance, management, and oversight. The Members, a technical panel of NTSB investigators, and representatives of the parties to the hearing: FAA, Raytheon Aircraft, Raytheon Aerospace, Air Midwest, International Association of Machinists (IAM), Structural Modification and Repair Technicians, Inc. (SMART), and Air Line Pilots Association (ALPA) questioned witnesses. Information from the hearing will be used by the Safety Board to prepare a final report on the accident, including safety recommendations aimed at preventing similar accidents in the future.

Office of Highway Safety

Highway transportation accidents have a significant impact on American society. In 2002, more than 42,800 people were killed and more than three million were injured in motor vehicle accidents. The economic costs are also staggering and easily exceed \$130 billion in medical costs, property damage and lost wages. The Safety Board is charged the responsibility of reducing the toll through accident investigations. Changes in highway or vehicle design, driver training, occupant protection, and regulatory oversight are frequently recommended. In 2003, the Safety Board did important work regarding motor carrier safety oversight, 15-passenger vans, and medical qualifications of drivers.

Completed Major Highway Investigations

Lack of Federal and Operator Oversight and Inexperienced, Impaired Driver Cause Collision of Greyhound Motorcoach and Truck Tractor-Semitrailer in Loraine, Texas

On June 9, 2002, near Loraine, Texas, a 1993 Greyhound motorcoach with 37 passengers was traveling on Interstate 20, on a scheduled route from El Paso, Texas, to Abilene, Texas, at a driver-reported speed of 65 to 67 mph. A truck tractor-semi-trailer, being operated by a driver in training with a co-driver in the sleeper berth, was entering the interstate from a picnic area at a driver-estimated speed of 40 mph. The motorcoach collided with the rear of the semitrailer. Three passengers on the Greyhound bus were killed. Five passengers and the bus driver were seriously injured.

On February 26, 2003, the Safety Board determined that the probable cause of the accident was the unnecessarily slow acceleration of the unlighted semitrailer onto a high-speed interstate by an inexperienced and unsupervised driver who was impaired by cocaine. Contributing to the accident was the truck operator's failure to exercise adequate operational oversight and the FMCSA's failure to ensure the safety of and provide management oversight for new entrant motor carriers. As a result of this accident investigation, which focused on the safety of and management oversight for new entrant motor carriers, the Safety Board recommended a significant strengthening of new entrant safety oversight.

Novice Driver Using Cell Phone in an Unfamiliar Vehicle Causes SUV Crossover Accident in Largo, Maryland

On February 1, 2002, a Ford Explorer was traveling northbound on Interstate 95/495 (the Capital Beltway) near Largo, Maryland at an estimated speed of 70 to 75 miles an hour when it veered off the left side of the roadway, crossed over the median, climbed a guardrail, flipped over and landed on top of a southbound 2001 Ford Windstar minivan. All five persons in the two vehicles were killed. The Explorer driver was using a wireless phone at the time of the accident.

In 2003, the Office of Highway Safety's 34 staff members completed 49 investigations; continued work on 22 investigations; issued seven reports; and completed 44 dockets.

On June 3, 2003, the Board found that the probable cause of the crash was the Explorer driver's failure to maintain control of her vehicle in the windy conditions due to a combination of inexperience, unfamiliarity with the vehicle (she had just purchased it that evening), speed and distraction caused by use of a handheld wireless telephone. As a result, the Safety Board recommended that the nation's driver education courses should include warnings about the dangers of distracted driving, and novice drivers should be prohibited from using cell phones while at the wheel.

The Safety Board has long been concerned with the issues of distracted driving and novice drivers. The Board recommended that all States -- except New Jersey, which already has a similar proscription -- prohibit holders of learner's permits and intermediate licenses from using interactive wireless communication devices while driving.

The Board also urged NHTSA to develop a media campaign stressing the dangers of distracted driving, and that it work with the American Driver and Traffic Safety Education Association to develop driver training curricula that emphasize the risks of distracted driving. The Board cited a study showing that drivers engaged in phone conversations were unaware of traffic movements around them.

In addition, the Board said that NHTSA should determine the magnitude and impact of driver-controlled, in-vehicle distractions, including the use of interactive wireless communication devices, on highway safety and report its findings to the United States Congress and the States. The NTSB noted that the extent of wireless phone use in car crashes is unknown because most jurisdictions don't have driver distraction codes on their accident report forms. The Board recommended that those 34 states change their forms to add driver distraction codes and include wireless phone use in those codes.

The Board also recommended that NHTSA expand its current evaluation of electronic stability control (ESC) systems and determine their potential for assisting drivers in maintaining control of passenger cars, light trucks, sport utility vehicles and vans. Should this evaluation show benefits in ESCs, and then NHTSA should develop a schedule to mandate them for these vehicles. The Board noted that such a device might have helped the Explorer driver maintain control of her vehicle.

The Largo crash also demonstrated the benefits of seatbelt use. The driver of the Explorer, who was not wearing her seatbelt, was ejected and killed (because of the severity of the impact, seatbelt use was not an issue for the four persons in the Windstar). However, during the accident sequence, a Jeep Grand Cherokee ran into the wreckage of the minivan; the adult driver and the two children in the back seat were all restrained and escaped with minor injuries.

Drivers' Inability to Control 15-Passenger Vans Following Tire Failures Causes Two Separate Crashes in Texas and North Carolina

On July 15, 2003, the Safety Board determined that the probable cause of two crashes involving 15-passenger vans was tire failure, the drivers' response to that failure and the drivers' inability to maintain control of their vans in an emergency. The Safety Board concluded that the safe operation of 15-passenger vans requires a knowledge and skill level different and above that for passenger cars, particularly when the vans are fully loaded or drivers experience an emergency situation.

As a result of these accidents, the Safety Board made a series of recommendations to make vans safer and drivers more qualified, including a recommendation to the 50 states and the District of Columbia to establish a driver's license endorsement for 15-passenger vans requiring drivers to complete a training program on the operation of these vehicles and pass a written and skills test.

On May 8, 2001, a 1993 15-passenger Dodge van with a driver and 11 passengers, all members of the First Assembly of God Church, was traveling on U.S. Route 82 near Henrietta, Texas, at approximately 67 miles per hour. The left rear tire blew out, causing the van to leave the roadway and roll over several times. The driver and three passengers died.

On July 15, 2001, a 1989 Dodge Ram 15-passenger van with a driver and 13 passengers, owned by Virginia Heights Baptist Church of Roanoke, Virginia, was traveling at approximately 65 mph on U.S. Route 220, near Randleman, North Carolina. The van experienced a tread separation and blow out. The driver attempted to correct the rotation of the vehicle, but was unable to regain control and the van was rolled over. One person died in the accident.

Contributing to the accidents was the deterioration of the tires, which was caused by the churches' lack of tire maintenance. The drivers failed to check the condition of their tires for cracking and dry rot. The tires on these vans had become rotten from UV damage, age, limited use, and being operated in under-inflated conditions. Also contributing to the severity of the accidents was the lack of appropriate Federal Motor Vehicle Safety Standards applicable to 15-passenger vans in the area of restraints and occupant protection. In the Henrietta, Texas accident, only two persons were wearing lap/shoulder belts. Seven passengers were ejected. In the Randleman, North Carolina accident, the driver was wearing a lap shoulder belt and the front-seat passenger was wearing the lap portion of a lap/shoulder belt. Four passengers were ejected.

Traffic Signal Design Causes Metrolink Commuter Train/Truck Grade Crossing Accident in Burbank, California

On December 2, 2003, the Safety Board determined that the probable cause of the collision between a commuter train and a truck in Burbank, California, was a confusing traffic signal pattern.

The accident occurred on January 6, 2003, when eastbound Metrolink commuter train #210 struck a Ford F-550 crew cab, stake bed truck at the North Buena Vista Street grade crossing. Impact forces and post-crash fire destroyed the truck; the driver was killed. The train derailed and came to rest about 1,300 feet beyond the crossing. Of the 59 passengers and two crewmembers on board, 32 sustained injuries. One passenger, who was treated and released from a local hospital, died 15 days later.

The collision occurred when the truck driver made a shallow left turn onto North Buena Vista Street after activation of the flashing red left turn arrow. The signal system was functioning as designed, the Board said, and the truck driver acted accordingly, stopping his vehicle for the continuous red arrow that governed the left turn lane; only after that arrow changed to the all-red-flash mode did he proceed into the intersection and onto the crossing, and the collision occurred. The Board found that use of the all-red-flash

mode for traffic signals at a railroad grade crossing has ambiguous meaning, can be confusing to motorists, and, as a result, creates unnecessary risks to life and property.

As a result of the investigation, the Board recommended that the California Department of Transportation prohibit the all-red-flash option for traffic signal indications during the railroad hold interval at grade crossings. The Board also recommended that the City of Burbank install a raised median or other barrier system at the accident site. The Board made other recommendations aimed at improving signal usage nationwide and facilitating the dissemination of traffic and safety engineering guidelines.

On-going Major Highway Investigations

Barge/Bridge Accident on South Padre Island, Texas

The NTSB is investigating certain aspects of a September 2001 accident in which a tugboat and four barges collided with the Queen Isabella Causeway that connects South Padre Island to the mainland. The collision caused two of the highest sections of the causeway to collapse and ten passenger vehicles either fell with the collapsing sections or drove off the end of the remaining structure resulting in eight fatalities. The NTSB responded to assess the viability of the bridge's ship protection system and various jurisdictions' adherence to previous NTSB recommendations on that issue.

School Bus/Work Zone Accident in Omaha, Nebraska

The NTSB continues to investigate an accident in Omaha, Nebraska in October 2001 involving a school bus with 25 high school students and three adults. The school bus was traversing a curve on a bridge that was part of a work zone as a motorcoach entered the curve from the opposite direction. The school bus then struck a guardrail and a bridge rail, ultimately traveled off the bridge and fell 49 feet to a creek below. Three students and one adult were killed and the remaining passengers received injuries ranging from critical to minor.



School bus after accident in Omaha.

Work Zone Accident in Monaca, Pennsylvania

The NTSB is investigating an accident that occurred near Monaca, Pennsylvania in October 2001 when an 81-year-old driver of a 1984 two-axle truck loaded with apples reported that the truck's brakes failed as he descended a grade towards a bridge over the Ohio River. The truck entered a construction zone, struck and killed five workers. The driver and a passenger received only minor injuries.

Multiple Vehicle Accident in Smoky Conditions in Cuervo, New Mexico

The NTSB continues to investigate an accident near Cuervo, New Mexico in March 2002 that involved 12 vehicles (cars, trucks, an RV, and a school bus) that collided on an interstate when visibility was reduced by smoke that blew across the roadway. The smoke came from a brush fire started by a railroad work crew replacing rail. The accident resulted in seven fatalities.

15-Passenger School Van Accident in Memphis, Tennessee

The NTSB is investigating an accident in Memphis, Tennessee in April 2002, involving a 15-passenger van transporting six school-aged children to school as part of a private day care operation. The van traveling at 65 mph drifted off the roadway and collided with a concrete bridge abutment. The driver was ejected through the windshield and was killed. Four of the six children were killed and two suffered serious injuries.



School van rests next to bridge abutment following accident.

Barge/Bridge Accident in Webbers Falls, Oklahoma

The NTSB continues to investigate an accident on the Arkansas River near Webbers Falls, Oklahoma that occurred in May 2002. A towboat pushing two empty barges upriver veered left from its approach course to pass under an interstate highway bridge and collided with a bridge column that was out of the navigable channel. The impact collapsed a 503-foot section of the bridge that fell into the river and onto the barges below. Highway traffic continued to drive into the void in the bridge. Eleven highway vehicles including several tractor-trailers plunged into the river. Fourteen people died.



NTSB investigators on scene at Oklahoma bridge collapse.

Chartered Motorcoach Accident in Victor, New York

The NTSB is investigating an accident near Victor, New York in June 2002 involving a chartered motorcoach returning from a casino junket on an interstate highway. Passengers reported that the driver fell asleep. As the bus passed an exit ramp, it veered off the right side of the road, across a grassy area, up an embankment to an entrance ramp, into a guardrail and over the entrance ramp pulling 700 feet of guardrail with it. The bus struck three other vehicles in the process and ended up on its side. Five passengers were killed and 33 passengers were injured.

Multiple Passenger Car Accident in Hagerstown, Maryland

The NTSB continues to investigate an accident involving three passenger cars in Hagerstown, Maryland, in November 2002. A 55-year-old female operating a 1983 Chevrolet Caprice apparently experienced an epileptic seizure. The Chevrolet continued traveling down the roadway over 900 feet and collided with two other passenger cars. The driver of one of those cars was killed. The Board is examining the impact of passenger car driver medical conditions, and the mechanisms in place within the states to evaluate and oversee those drivers.

SUV/Tractor-trailer Median Crossover Accident in Fairfield, Connecticut

The NTSB is investigating an accident in Fairfield, Connecticut in January 2003, in which a northbound tractor-trailer overran a concrete median barrier on an interstate highway. The tractor and most of the trailer came to rest encroaching on the southbound lanes; a southbound car then struck the tractor and another southbound tractor-trailer rear-ended the car. About eight minutes later, a northbound SUV carrying nine Yale college students collided with the rear of the trailer that was encroaching on the northbound lanes. There were four fatalities in the SUV.

Driver Education Car Collides with Tractor-trailer in Belgrade, Montana

The NTSB continues to investigate an accident on a rural two-lane road near Belgrade, Montana in January 2003. The accident involved a tractor-trailer that collided with a driver's education car killing the 14-year-old student driver, two other students, ages 14 and 15, and a 49-year old instructor. The two vehicles approached each other in opposite lanes on a wet roadway where snow and slush had accumulated at the edges. Just before the vehicles would have passed each other, the car fishtailed into the path of the tractor-trailer. The truck driver attempted to avoid the car by steering to his left, but struck the car on its right side. The car continued down a 15-foot embankment.

Motorcoach Median Crossover Accident near Hewitt, Texas

The NTSB is investigating an accident near Hewitt, Texas, in February 2003 involving a motorcoach median crossover and an SUV. The motorcoach was traveling on an interstate highway in heavy rain, when it crested a hill and was confronted by stopped or nearly stopped traffic. The queue of traffic in the motor coach's lane was greater than that in the adjacent lane so the driver began to move from the right lane into the left. As he did, a car in front of him also began to move into the left lane. The motorcoach driver braked hard, lost control and went off the roadway, through the median and struck an SUV traveling in the opposite direction. The bus overturned. Two occupants of the SUV were killed, as were five occupants of the bus. Thirty-one people on the bus were injured.

Overweight Truck Brake Failure Accident in Glen Rock, Pennsylvania

The NTSB continues to investigate an accident in Glen Rock, Pennsylvania in April 2003, involving an overloaded dump truck on a weight-restricted street. The truck was on a residential street with a steep downgrade. The truck driver reported that the brakes on the truck failed, and he was unable to stop before striking four passenger cars that were stopped at an intersection that, in turn, struck three children on the sidewalk. Two people were killed and nine others, including the pedestrians, received serious to minor injuries.

Truck Rollover/Construction Zone Accident near Hebron, Kentucky

The NTSB is investigating an accident near Hebron, Kentucky in April 2003, involving a tractor with two semi-trailers (a double) that rolled over in the median in a highway construction zone on an interstate highway. The vehicle was in the

outside lane when the rear tires of the second semitrailer went off the paved portion of the roadway and into the dirt. The drop-off between the pavement and the dirt varied between two inches and five inches. When the driver steered back onto the pavement, the rear semi-trailer became unstable, causing the driver to lose control of the vehicle. The vehicle veered to the left across all lanes of travel and into the depressed center median. The rear semi-trailer overturned and slid into a parked pickup truck and roadway grader in the median, killing one highway worker and injuring a second.

Alcohol-Impaired Driver/Median Crossover Accident in Linden, New Jersey

The NTSB continues to investigate an accident in Linden, New Jersey that occurred in May 2003 and involved two cars and six fatalities. A car with a severely alcohol-impaired driver was traveling in the right hand lane of a 6-lane divided highway when he swerved to the left, crossed the other two lanes, mounted and crossed the 11.5-foot wide, six-inch high raised median, entered the opposite lanes, and collided head-on with another car occupied by five adults.

Intersection Collision with Fire Accident in Slippery Rock, Pennsylvania

The NTSB continues to investigate an accident near Slippery Rock, Pennsylvania in July 2003, involving an empty tractor-trailer and a small car at an intersection in a rural area. The tractor-trailer failed to stop for a stop sign, entered the intersection, and was struck by a small car near its fuel tank. The car became lodged on the side of the truck and was dragged approximately 128 feet. A fire began in the small car at the moment of impact and spread to the truck when the vehicles came to rest. The fire destroyed both vehicles. The truck driver was uninjured. A family of five, in the small car, was killed.



Accident scene in Slippery Rock.

Elderly Driver Crashes Through Farmers' Market in Santa Monica, California

The Safety Board continues to investigate an accident in Santa Monica, California in July 2003, involving an 86-year-old male who drove through portable, temporary barricades that blocked a street where an outdoor farmers' market had been set up. The driver drove through the market for approximately two and one-half blocks, striking pedestrians and impacting display booths. As a result of the accident, there were 10 fatalities and 75 other individuals and the driver were injured.

Public Hearings

Medical Oversight of Non-Commercial Drivers, March 18-19, 2003

The Safety Board held a public hearing on medical oversight of non-commercial drivers on March 18 and 19, 2003. The impetus for this hearing was a series of fatal accidents that involved drivers with potentially impairing or debilitating medical conditions that might have disqualified these drivers. In particular, the hearing reviewed the circumstances of numerous fatal accidents caused by drivers who suffered seizures, where the drivers was under treatment for the underlying conditions and was known to be prone to seizures. Many of these accidents were fatal to other vehicle occupants and pedestrians.

The two-day hearing explored the:

- Background and research into potentially impairing or debilitating medical conditions that might affect an individual's ability to drive.
- Current procedures for collecting and routing information on medically high-risk drivers to licensing authorities and medical review boards.
- The effectiveness of state oversight of licensed drivers who suffer from potentially impairing or debilitating medical conditions.
- Programs that aid doctors, law enforcement, licensing authorities, and others in reporting, managing, or counseling medically high-risk drivers.
- Programs that attempt to reduce the incidence of medically-related accidents through education and other proactive measures.
- Public policy considerations in the design and implementation of driver medical oversight programs.

Parties to the hearing included: the Association for the Advancement of Automotive Medicine, the American Medical Association, the American College of Emergency Physicians, the Association for Driver Rehabilitation Specialists, AARP, the Epilepsy Foundation of America, the American Sleep Apnea Association, the Alzheimer's Association, the National Council on Alcohol and Drug Dependence, Mothers Against Drunk Drivers, Advocates for Highway and Auto Safety, the American Insurance Association, the Governors Highway Safety Association, the American Association of Motor Vehicle Administrators, the National Conference of Uniform Traffic Laws and Ordinances, the International Association of Chiefs of Police, the National Sheriffs' Association, the National Conference of State Legislatures, NHTSA, the Centers for Disease Control and Prevention, and the Federal Transit Administration.

Public Forum on Driver Education and Training, October 28-29, 2003

The Safety Board examined the state of driver education and training programs in a public forum on October 28-29, 2003, in Washington, D.C. The forum explored the strengths and weaknesses of driver education programs and what could be done to improve them.

The Board began looking into driver education programs as a result of a January 2003 accident in Montana where three young people and their instructor were killed when the 14-year-old student driver lost control of the vehicle and swerved into oncoming traffic. The Safety Board's focus on driver education is an extension of its emphasis on graduated driver's licensing programs, one of the Board's Most Wanted safety improvements.

Representatives from the American Driver and Traffic Safety Education Association, the Governors' Highway Safety Association, the Driving School Association of the Americas, the American Automobile Association, the National Safety Council, and state Departments of Education and Transportation were among the forum participants. Discussions focused on state programs, their effectiveness and needs, teaching standards and techniques, the use of simulators, driver education programs overseas, and current initiatives to improve the safety of young drivers. Driver education teachers, students and recent graduates of driving programs also shared their perspectives on the effectiveness of current driver training methods.

Office of Marine Safety

The NTSB is authorized to investigate marine accidents involving foreign vessels in U.S. territorial waters or U.S. vessels anywhere in the world. In past years, the Board has conducted marine accident investigations as far away as the Persian Gulf and the South China Sea. To carry out its marine safety program, the Board maintains a small staff of professional investigators at its headquarters that includes licensed master mariners, marine engineers, naval architects, and human performance and survival factors specialists.

The Board generally investigates accidents involving:

- the loss of six or more lives;
- the loss of a self-propelled vessel of over 100 gross tons or damage to any vessel;
- property damage exceeding \$500,000;
- serious hazardous materials threats to life, property, and the environment;
- Coast Guard safety functions (e.g., vessel traffic services, search and rescue operations, vessel inspections, aids to navigation); and
- a public/nonpublic vessel collision with one or more fatalities or \$75,000 or more in property damage.

In September 2002, the Safety Board and the USCG concluded a new agreement setting out each agency's role in the investigation of major marine shipping accidents. With the memorandum of understanding, the two agencies resolved a long-standing uncertainty over how to determine which will lead the investigation of a major marine accident. Among its advantages, the new agreement permits the Safety Board to focus its attention on cruise ships and other passenger vessel accidents, while ensuring that accidents that involve Coast Guard functions are independently reviewed.

Marine accident reports of these investigations contain an in-depth analysis of the accident, a finding of probable cause or causes, and safety recommendations to prevent similar accidents from occurring. As in the other transportation modes, the Safety Board undertakes studies involving specific marine safety issues, which typically result in the issuance of recommendations to federal and state agencies and the maritime industry.

On-going Marine Investigations

U.S.S. *Greenville* and *Ehime Maru* Collide in Pearl Harbor, Hawaii

The NTSB continues to investigate the February 2001 collision between the nuclear submarine *U.S.S. Greenville* and the Japanese fishing training vessel *Ehime Maru*. The *Greenville* had departed Pearl Harbor with civilian guests on board to demonstrate the ship's maneuvering capabilities. The crew was putting the submarine through a series of turns, dives, and surfacing operations. As the *Greenville* reached the surface during an

In 2003, Office of Marine Safety's eight investigators and seven staff members investigated eight accidents, completed one report, and continued work on 10 investigations.

emergency ascent maneuver, its conning tower and vertical tail fin struck the *Ehime Maru*, which had left Honolulu earlier that day. Shortly after the collision, the *Ehime Maru* sank. Nine of the 35 people on board the Japanese vessel perished. The U.S. Navy subsequently towed the *Ehime Maru* to shallow water and recovered eight of the nine victims. The last victim remains missing and is presumed drowned.

Barges in the Tow of U.S. Towboat, *Robert Y. Love*, Collide with Highway Bridge near Webbers Falls, Oklahoma

The Office of Marine Safety is supporting the Office of Highway Safety in the investigation of the May 26, 2002, collision of the U.S. towboat *Robert Y. Love* with the I-40 highway bridge over the Arkansas River near Webbers Falls, Oklahoma. The *Robert Y. Love* was pushing two empty 297-foot-long asphalt barges northbound on the Arkansas River, approaching the I-40 highway bridge, when the master, who was alone in the pilothouse, lost consciousness. The *Robert Y. Love* veered left from its approach course, and one of the barges collided with a bridge support west of the navigable channel. The impact collapsed a 503-foot section of the span, which fell into the river and onto the barges below. According to witnesses, highway traffic continued to drive into the void in the bridge. When traffic finally stopped, eight passenger vehicles and three tractor-trailer combinations had fallen into the river. The accident resulted in 14 fatalities, five injuries, and an estimated \$20 million in damage to the bridge. Marine issues involved in this accident include the medical condition of the master, and the protection of highway bridges from marine collisions.

Small Passenger Vessel (Tour Boat), *Panther*, Sinks in Everglades National Park

The Safety Board is investigating the December 30, 2002, sinking of the *Panther*, a tour boat carrying 33 passengers, in the Ten Thousand Islands area of Everglades National Park, Florida. Boats that were nearby at the time of the sinking rescued the passengers. None of the passengers were able to retrieve their life jackets before the vessel sank, and many of them, including non-swimmers, were forced to enter the water. The vessel, although refloated after the accident, was a constructive total loss. Issues involved in this accident include the adequacy of the material condition of the vessel, accessibility of lifesaving equipment on board the vessel, adequacy of the maintenance and repair procedures of the vessel's owner, and adequacy of emergency preparedness in Everglades National Park by the National Park Service.

Tank Barge *B. NO. 125* Explodes at Dock in Bayonne, New Jersey

On February 21, 2003, an explosion and fire occurred on the loaded tank barge *B. NO. 125*, as it unloaded gasoline at the Port Mobil Terminal in southwestern Staten Island, New York. The fire did not propagate to storage tanks at the facility, which is operated by ExxonMobil. However, several buildings and vehicles close to the dock were destroyed. Two workers were killed and one was severely injured.

The Safety Board participated in the USCG's investigation of this accident. On March 28, 2003, the U.S. Attorney for the Eastern District of New York requested that the Coast Guard and the Safety Board suspend their investigative efforts on this accident until its criminal investigation has been completed.

Safari Spirit Sinks in Kisameet Bay, British Columbia

The Safety Board is investigating the May 8, 2003 grounding and sinking in Kisameet Bay, British Columbia of the *Safari Spirit*, a U.S. uninspected small passenger vessel. The vessel was en route from Seattle to Juneau and was carrying 10 passengers and six crewmembers. The *Safari Spirit* was transiting the Kisameet Bay when it struck a charted submerged rock and ran aground. Passengers and some of the crew were transferred to shore in the vessel's motor launch and in boats from a local marina that had arrived on scene to render assistance. As the tide receded, the vessel's position shifted on the rock and allowed water to flood over the stern causing the *Safari Spirit* to sink in about 70 feet of water. No one was injured in the accident. As a result of the sinking, the owners declared the vessel a constructive total loss. Issues involved in this accident include the adequacy of the navigation policies, practices and equipment, and the adequacy of emergency passenger evacuation procedures.

Cruise Ship, Norway, Boiler Explosion in Miami, Florida

The Safety Board is investigating the May 25, 2003, boiler explosion aboard the Norwegian Cruise Line passenger ship *Norway*. The explosion occurred while the ship was moored in Miami, Florida, with 2,135 passengers and 911 crewmembers on board. The explosion killed eight crewmembers and injured 19 others. All passengers were evacuated safely. At the time of the explosion, three of the *Norway's* four main propulsion boilers were in normal-in-port operating status, supplying steam to electrical generators and auxiliary equipment while the ship was moored to the dock in Miami. Boiler 21, located in the forward starboard side of the boiler room, was secured and was not in operation at the time. Boiler 23, located aft of boiler 21, was the boiler involved in the explosion. No maintenance was being carried out on boiler 23 at the time of the explosion. The explosion caused extensive damage to boiler 23, the boiler room and extended to accommodation spaces located three decks above the boiler. Issues involved in this investigation include the adequacy of the maintenance, repair, and inspection of the boilers on board the *Norway*.

U.S. Small Passenger Vessel, Taki-Too, Capsizes near Garibaldi, Oregon

The Safety Board continues to investigate the June 14, 2003 capsizing of the small passenger vessel *Taki-Too* while attempting to transit Tillamook Bar at the entrance to Tillamook Bay near Garibaldi, Oregon. The *Taki-Too*, which attempted to depart the bay despite the posting of rough bar warnings by the Coast Guard, capsized to starboard after being struck on its port side by a large wave. Of the 19 persons aboard, including the master and the deckhand, 11 died (10 passengers and the master). Eight of the nine victims whose bodies were found were not wearing personal flotation devices (PFDs). Two persons remain missing and are presumed drowned. Issues involved in this accident include the adequacy, accessibility, and use of lifesaving equipment on board the vessel; the adequacy of current regulations related to the wearing of PFDs on board small passenger vessels; and the adequacy of Coast Guard procedures for limiting transit of small vessel when rough bar warnings have been issued.



NTSB staff examine the Taki-Tooo.

Staten Island Ferry, *Andrew J. Barberi*, Crashes into Pier in New York Harbor

On October 15, 2003, while on a regularly scheduled run between lower Manhattan (Whitehall Terminal) and Staten Island (St. George Terminal), the 310-foot Staten Island passenger ferry *Andrew J. Barberi* struck a pier at the St. George Terminal. Ten passengers were killed and more than 30 injured. As part of the investigation, the investigative team conducted witness interviews of crewmembers, passengers, first responders, and company officials. In addition, the team tested the steering and propulsion systems and examined the navigation equipment on board the *Andrew Barberi*. During these tests, the team witnessed the operation of the transfer system passing control from engine room to wheelhouse, and from wheelhouse to wheelhouse. The tests verified that the equipment and systems performed as designed. Further, the team examined the ferry *Samuel I. Newhouse* (sister ship to the *Barberi*), and completed three round trip transits over the ferry route to observe ferry operations. The team also completed preliminary surveys of damages to the vessel and to the dock.

Office of Railroad, Pipeline and Hazardous Materials Investigations

Railroad Safety

Railroads are one of the nation's safest forms of transportation, but the potential for tragedy exists in railroad operations as it does in every other mode of transportation. Millions of passengers are carried each year on Amtrak and rapid rail systems, and over 1.52 million carloads of hazardous materials move by rail each year. Railroads move about 32 million carloads each year.

Since 1967, Congress has assigned the primary responsibility for railroad accident investigation to the NTSB. As in the other surface modes, the Board performs in-depth analyses of selected rail accidents, determines the probable causes, and issues recommendations to make changes to prevent similar accidents. Because of its small staff and limited resources, the Railroad Division does not investigate every rail accident reported to the FRA. In order to use the Safety Board's resources most efficiently, the Board has established accident criteria to help highlight accidents that have significant safety issues for investigation.

The Safety Board also conducts studies of significant railroad safety issues, often based on a set of accident investigations specifically undertaken as the basis for the study. In other cases, the studies may be based on analyses of regulations, railroad safety programs and procedures, audit reviews of management and operations practices, or other research. In addition, the Board investigates selected accidents involving specific lifesaving issues.

Completed Major Rail Investigations

Amtrak Engineer's Loss of Situational Awareness Causes Collision with MARC Train in Baltimore, Maryland

The NTSB issued a final report on its investigation into the June 17, 2002, collision of an Amtrak passenger train with a MARC commuter train at an interlocking near Baltimore's Penn Station. The MARC train had just departed the station southbound on a permissive diverging signal indication and was crossing the No. 2 track to reach the southbound No. 3 track when it was struck in the side by the Amtrak train operating northbound on the No. 2 track in violation of a stop signal indication. The collision resulted in six minor injuries.

On May 12, 2003, the Safety Board determined that the probable cause of the accident was the Amtrak engineer's loss of situational awareness in the moments before the collision because of excess focus on regulating train speed, which led to a failure to comply with signal indications. Contributing to the accident was the engineer's lack of familiarity with and proficiency in the operation of the diesel-electric locomotives and the lack of a positive train control system.

In 2003, the 39 Railroad, Pipeline and Hazardous Materials Investigations staff members launched on 12 accidents, completed 12 reports, and continued work on 14 investigations.

Burlington Northern Santa Fe Train Engineer Distracted by Cell Phone Causes Train Collision near Clarendon, Texas

On May 28, 2002, an eastbound coal train collided head-on with a westbound intermodal train in single-track, track warrant control territory near Clarendon, Texas. Two crewmembers were aboard each train. All crewmembers jumped from their moving trains just prior to the collision. The conductor and engineer of the coal train were critically injured, the conductor of the intermodal train was seriously injured, and the engineer of the intermodal train was killed. Three locomotives and 29 freight cars were destroyed. Damage estimates exceed \$8 million.

On June 3, 2003, the Safety Board concluded that the engineer of a Burlington Northern Santa Fe (BNSF) coal train was distracted by a cell phone call when he was supposed to be stopping his train and caused a head-on collision with a BNSF intermodal train. Also noted in the probable cause was the train conductor's failure to ensure that the engineer complied with track warrant restrictions.

Through its investigation the Safety Board determined that the coal train engineer was talking on his cell phone when his train passed the stopping point indicated in the track warrant. The Board concluded that the engineer's cell phone use likely distracted him and he did not take proper note of the after-arrival stipulation and therefore did not stop his train.

As a result, the Board issued a recommendation to the FRA to amend regulations to control the use of cell phones and other personal wireless devices by railroad operators while on duty. The Board's report further concluded that after-arrival warrants issued to moving trains create an unacceptable risk of a head-on collision. Therefore, the Board recommended that the FRA, in areas where there is no positive train control system, restrict the issuance of after-arrival track warrants to trains only after they have stopped at the specified location to allow safe passage of the on-coming train.

Inadequate Operating Procedures Cause Norfolk Southern Freight Train Derailment near Farragut, Tennessee

On September 15, 2002, westbound Norfolk Southern Railway train No. 15T derailed in Farragut, Tennessee, while moving at 38 mph. The train was made up of three locomotives, 56 loads, and 86 empties -- a total of 142 cars with a gross weight of 9,948 tons. Two locomotives and the first 25 cars derailed. A tank car containing sulfuric acid was punctured, releasing a cloud of toxic fumes that prompted local responders to evacuate about 2,600 people from a 4.4-square-mile area around the site. The evacuation lasted for about 2 1/2 days. Several local residents were treated for minor respiratory difficulties.

On July 21, 2003, the Safety Board determined that the probable cause of the derailment of Norfolk Southern train 15T was the decision by the train dispatcher and signal maintainer to allow the train to pass over the spring switch at maximum authorized speed before the switch had been adequately inspected or clamped closed and the lack of company procedures requiring that train dispatchers, after receiving a report of a problem involving a main track switch, immediately stop trains or implement an appropriate speed restriction in the affected area.



Norfolk Southern freight train derailed near Farragut, Tennessee.

As a result of its investigation, the Board made recommendations to the FRA, and Norfolk Southern Railway to require that train dispatchers, upon receiving reports of potentially hazardous conditions involving a main track segment or switch, stop train movements or immediately implement an appropriate speed restriction for the affected area and remove the restrictions only after the completion of those inspections and/or repairs that are essential for the safe movement of trains.

Crescent City, Florida Amtrak Derailment Caused by Heat-Induced Track Buckle

On August 5, 2003, the Safety Board determined that the probable cause of the April 18, 2002, Amtrak Auto Train derailment near Crescent City, Florida, was a heat-induced track buckle that developed because of inadequate CSX Transportation (CSXT) track-surfacing operations. These operations included the misalignment of the curve, insufficient track restraint, and failure to reestablish an appropriate neutral rail temperature.

The northbound Auto Train derailed 21 of 40 cars. The train, carrying 413 passengers and 33 Amtrak employees, derailed in a left-hand curve while traveling about 56 mph. The accident resulted in four fatalities, 36 serious injuries, and 106 minor injuries.

The equipment and track costs associated with the accident totaled about \$8.3 million. Board investigators noted that the track buckle that caused the derailment probably originated during the passage of a CSXT coal train over the accident curve.



Crescent City, Florida derailment accident site.



Derailed passenger cars at Crescent City, Florida.

Investigators also found that the track buckled because of its instability. Contributing to its instability was the roadbed width of the track on the curve embankment, the ballast condition of the track, the rail anchoring in the area, the surfacing operations undertaken by CSXT at this location, and the temperature controls used during and after the surfacing operations.

The Board's report stated that at the time of the accident CSXT did not provide adequate requirements for ensuring effective rail anchoring and establishing known reference points against which any subsequent movement of the track can be measured. The report also noted that CSXT failed to ensure that its track maintenance workers routinely fulfilled the requirements of its existing track standards.

As a result of its investigation, the Board made recommendations to the FRA, the Transportation Security Administration, CSXT, and Amtrak.

Improper Design and Safety Oversight Failure Cited in Los Angeles, California Funicular Railway Collision

On August 5, 2003, the Safety Board determined that improper design and construction of the drive system caused the collision of two cars on the Angels Flight Funicular Railway. The collision occurred on February 1, 2001 in downtown Los Angeles, California. The probable cause also cited the failure of the Los Angeles Community Redevelopment Agency and the California Public Utilities Commission to ensure that the railway system conformed to safety design specifications and known funicular safety standards.

The accident occurred when the ascending car reversed direction and began accelerating down the incline. The operator in the station at the top of the hill

pressed the emergency stop button but the car did not slow or stop and continued gaining speed until it collided with the car at the bottom. The runaway car derailed in the collision. One person was killed and seven others were injured. Damage was estimated at \$1.7 million.

The Board's investigation concluded that had the emergency brakes been functional at the time of the accident, they would likely have stopped the runaway train. The Board noted that the brake system as designed was inadequate because emergency brakes could not be activated or tested independently. Additionally, track brakes or a safety cable would have stopped the runaway car and prevented the collision even without working emergency brakes. The Board's report also concluded that the absence of an emergency walkway hampered access by emergency responders, made evacuation of the injured passengers difficult, and increased the risk to both passengers and emergency responders.

As a result of the investigation, the Board issued recommendations to the California Public Utilities Commission urging them to adopt funicular regulations that include provisions for emergency stopping in all foreseeable failure modes, containment of passengers in the event of a collision, and emergency egress and ingress for passengers and emergency responders. The Board recommended that the City of Los Angeles Community Redevelopment Agency, before recommending Angels Flight service, ensure that the drive system meets accepted industry standards; require a redesign of the braking system to allow for independent testing of the system; require that system operators and maintenance personnel follow detailed operating, inspection, and maintenance procedures; and direct a redesign of Angels Flight to include safety provisions for emergency stopping, containment of passengers in the event of a collision, and emergency egress and ingress.

Speeding Operator's Failure to Stop and Car Builder's Failure to Test Train Cause AirTrain Derailment at JFK International Airport, New York

On September 27, 2002, the Air Rail Transit Consortium AirTrain #121 derailed in a curve on the aerial track way that runs between the Howard Beach Station and the Federal Circle station near the John F. Kennedy International Airport in Jamaica, New York. The AirTrain was participating in a train acceleration test to determine the necessary power allocation for operating loaded passenger cars. The three-car train consist was made up of two cars loaded with concrete blocks to simulate passenger loading along with one empty car. The blocks were unsecured on sheets of ply-board in the passenger compartments. During the test, the train derailed on top of a parapet retaining wall; because of the impact with the retaining wall, the concrete blocks in the car shifted, pinning the operator against the driver's console. The operator was killed.

On September 17, 2003, the Safety Board determined that the probable cause of the accident was the failure of the train operator, for undetermined reasons, to keep his train below maximum authorized speed and to stop his train at the location specified in the test design, and the failure of the car builder to ensure that the test train was operated in accordance with the test protocols. Contributing to the severity of the accident was the failure to properly secure the load that had been added to the first car of the accident train.

Train Crew's Inattentiveness Causes BNSF Freight Train/Metrolink Commuter Train Collision in Placentia, California

On October 7, 2003, the Safety Board determined that the probable cause of the April 23, 2002, collision between a BNSF freight train and a stopped Metrolink commuter train in Placentia, California was the freight train crew's inattentiveness to the signal system and their failure to observe, recognize, and act on the approach signal. Contributing to the accident was the absence of a positive train control (PTC) system that would have automatically stopped the freight train short of the stop signal and thus prevented the collision. As a result of the collision, the leading Metrolink cab car and the leading truck of the second Metrolink passenger car derailed. No BNSF equipment derailed; 161 persons were transported to area hospitals and two Metrolink passengers were killed. Damage to track and equipment exceeded \$4.6 million.

A number of safety issues were identified during the Safety Board's investigation, including the attentiveness of the BNSF train crew and passenger car survival factors. Examination of wreckage and review of medical records indicated that the two fatalities and many of the abdominal injuries were the result of impact with workstation tables in the passenger car. The Board noted that DOT is conducting research, including full scale crash testing that may result in table design features to better mitigate such injuries. The investigation also identified that exterior instructional signage describing the emergency window removal procedure was not present, nor was it required by regulation, at emergency windows on intermediate levels of the multiple-level passenger railcars involved in this accident. Collision impact forces resulted in significant damage to the lead passenger car with the result that patrons in the rear intermediate level of the car could not utilize the exit doors. Fortunately, these passengers were not incapacitated and were able to remove emergency windows from the inside.

Another safety issue in the Placentia accident was the absence of PTC systems. The Board concluded that had a fully implemented PTC system been in place on the BNSF's San Bernardino Subdivision at the time of the accident, the system would have intervened to stop the freight train before it could enter into the track area occupied by the Metrolink train, and the collision would not have occurred. Safety Board railroad accident investigations over the past 30 years have shown conclusively that the most effective way to avoid train-to-train collisions is through the use of PTC systems that will automatically intervene when the crew does not respond appropriately to signals. The need for such systems has been identified (with numerous recommendations) on the Board's list of Most Wanted transportation safety improvements since 1990. As a result of this investigation, the Safety Board made recommendations to the American Association of Railroads, the FRA, and the BNSF Railway Company.



Aerial photo of the Placentia accident scene (credit: Orange County Sheriff's Department).

Ongoing Rail Investigations

CSX Freight Train Derailment and Release of Hazardous Materials in Baltimore, Maryland

On July 18, 2001, an eastbound CSXT freight train, consisting of three locomotive units and 60 cars, derailed 11 cars while traveling through the Howard Street tunnel in downtown Baltimore, Maryland. Three of the derailed cars contained hazardous materials. The derailment resulted in a release of hazardous materials and a fire that lasted several days. The accident caused the city of Baltimore to restrict local traffic and light rail operations and to postpone a Baltimore Orioles baseball game at the Camden Yard Stadium. Commercial communication facilities were also disrupted. A broken water main over the tunnel in the derailment area hampered the firefighting and the investigation. Two firefighters were injured.

Canadian Pacific Railway Freight Derailment and Hazardous Materials Release in Minot, South Dakota

On January 18, 2002, a Canadian Pacific Railway freight train with two locomotives and 112 cars derailed 31 cars near Minot, North Dakota. Several tank cars carrying anhydrous ammonia were breached, and a vapor plume covered the derailment site, as well as a portion of Minot. About 100 residents were evacuated, with 21 admitted to the hospital with respiratory and burn injuries. The train's conductor was transported to the hospital with breathing difficulties, and one local resident was killed.



Freight train derailment in Minot, South Dakota.

Amtrak Derailment in Kensington, Maryland

Amtrak train No. 30 (the Capitol Limited), derailed near Kensington, Maryland, on July 29, 2002. The train was en route from Chicago, Illinois to Washington, D.C. with 164 passengers and 12 crewmembers. The train consisted of two locomotives and 13 cars. A total of 11 cars derailed, six of them on their sides. As a result of the derailment, 97 passengers were transported to area hospitals, six sustained serious injuries.

Canadian National Illinois Central Freight Train Derailment near Tamaroa, Illinois

On February 9, 2003, a Canadian National Illinois Central freight train derailed near Tamaroa, Illinois. The train consisted of two locomotives and 108 freight cars (76 loads and 32 empties) and was moving at 41 mph. There were no injuries or fatalities. Between 800 and 1,000 people were evacuated from Tamaroa because of the hazardous materials release and resulting fire. Twenty-two freight cars derailed, including 19 tank cars transporting flammable and corrosive hazardous materials: five loaded tank cars with vinyl chloride, seven tank cars (five loaded, two with residue) of methanol, two loaded tank cars of phosphoric acid, two loaded tank cars of hydrochloric acid, and three loaded tank cars of formaldehyde. The three other derailed cars were covered hopper cars containing plastic pellets. Methanol from two loaded tank cars was released and ignited. One vinyl chloride tank car and one hydrochloric acid tank car were leaking.

BNSF Freight Trains Collide in Scott's Bluff, Nebraska

On February 13, 2003, a BNSF loaded coal train, collided with a BNSF road switcher, which was building a train in the Scott's Bluff, Nebraska rail yard. Initial indication is that the road switcher (local) was in the foul of the east switch and received a sideswipe type collision contact from the coal train. The coal train consisted of two BNSF locomotives and 120 loaded open top hoppers of coal with 17, 561 trailing tons and 6730 feet long. The speed of the coal train was operating in a Centralized Traffic Control 50 mph authorized single main track territory. The switcher was coupled to 17 cars and moving eastward at the time of the collision. The coal train derailed both of its locomotives and its first 28 cars. The switcher derailed its locomotive and four training cars. No hazardous materials were released other than diesel fuel from the overturned road switcher locomotive. No fires or evacuations resulted from the accident.

The coal train conductor was killed after jumping prior to the collision and then being buried under the wreckage. The train's engineer received medical attention. The road switcher engineer was temporarily trapped in his locomotive, extracted and treated for minor injuries. The other two crewmembers were not injured.

Maintenance-of-Way Workers Killed in Laguna Niguel, California

On April 1, 2003, an eastbound Amtrak train 774 struck two maintenance-of-way workers at control point (CP) Avery in Laguna Niguel, California. Both workers were killed. They were part of a five-person gang performing minor maintenance on the switch and turnout at CP Avery. According to event recorder data, train speed was 90 mph. The engineer placed the train into emergency braking moments before impact.

Union Pacific Runaway Train Derailment, City of Commerce, California

On June 20, 2003, 30 Union Pacific (UP) loaded freight cars and one empty freight car derailed 28 cars after running loose (without locomotives) for 28 miles. The cars became loose as they were being prepared for switching in the UP Montclair yard. The derailment occurred as the cut of runaway cars entered a siding in the City of Commerce, California. During the course of the derailment some of the cars impacted nearby residences, destroying two houses and damaging six others. Thirteen people suffered minor injuries and were transported to local hospitals. There were no hazardous materials released and no fire. About 150 people were evacuated from the area because of broken gas and water lines. Estimated damages are \$2.4 million.

Pipeline Safety

The Safety Board is responsible for investigating all pipeline accidents in which there is a fatality, substantial property damage or significant environmental impact. The Board may also investigate additional selected accidents that highlight safety issues of national importance or that involve a selected accident prevention issue.

Approximately 2.2 million miles of natural gas pipelines in the United States are managed by 866 transmission and gathering operators; 1,310 distribution operators; 70 liquefied natural gas operators; and about 50,000 master meter operators. Approximately 160,000 miles of hazardous liquid pipelines are managed by about 220 operators, as well as about 2,000 miles of carbon dioxide pipelines.

In 2002, gas transmission operators reported 81 incidents, with one fatality and property damage of \$24.3 million; distribution operators reported 102 incidents, with nine fatalities and property damage of \$23.6 million; and hazardous liquid operators reported 143 accidents with one fatality, \$33.7 million of property damage, and about 4.0 million gallons of spilled product resulting in a net loss of 3.3 million gallons.

Completed Major Pipeline Investigations

Internal Corrosion Causes Natural Gas Pipeline Explosion and Fire in Carlsbad, New Mexico

On August 19, 2000, a 30-inch diameter natural gas transmission pipeline, operated by El Paso Natural Gas Company, ruptured adjacent to the Pecos River near Carlsbad, New Mexico. The escaping natural gas ignited and killed 12 members of a family who were camping at a nearby site on the Pecos River. The force of the rupture and the violent ignition of escaping gas created a 51-foot-wide crater about 113 feet along the pipe. A 49-foot section of pipe was ejected from the crater in three pieces. All three pieces showed evidence of internal corrosion damage, but one piece showed significantly more corrosion damage than the other two.

The failed pipeline segment was constructed in 1950 without pig traps. When pigging facilities were added to the pipeline about 25 years later, a pig receiver was installed upstream of the rupture site. However, at this receiver, a separate storage leg or tank to collect the pig liquids was not installed. Instead, a drip, which was designed to collect liquid moving along the pipeline, was installed downstream of the pig receiver. Post accident visual examination of the drip revealed that, at one point, about 70 percent of the drip cross-section was filled with solidified materials. The Safety Board concluded that because of the partial clogging of the drip upstream of the rupture location, some liquids bypassed the drip, continued through the pipeline and accumulated at a low point in the pipeline where corrosion and the subsequent failure occurred.



Post rupture fire – the 85-foot tall support structures for the pipeline bridges across the river are visible in lower left.

On February 11, 2003, the Safety Board concluded that the pipeline ruptured as a result of severe internal corrosion that caused a reduction in the pipe wall thickness to a point that the remaining metal could no longer contain the pressure. Also noted in the probable cause was that the severe corrosion had occurred because El Paso Natural Gas Company's corrosion control program failed to prevent, detect, or control internal corrosion within the company's pipeline. The Safety Board determined that ineffective Federal pre-accident inspections of El Paso Natural Gas Company that did not identify deficiencies in the company's internal corrosion program also contributed to the accident. As a result of its investigation into this accident, the Safety Board issued three safety recommendations to RSPA and one to NACE International.



Crater created by pipe rupture.

Ongoing Pipeline Investigations

Pipeline Rupture and Release of Crude Oil in Cohasset, Minnesota

On July 4, 2002, a 34-inch diameter pipeline transporting crude oil experienced a rupture in a marsh west of Cohasset, Minnesota, resulting in the release of approximately 252,000 gallons of crude oil into the marsh. Due to concerns that the crude oil might escape the area, a controlled burn was executed in coordination with company, local, state and federal officials. The fire was ignited on the afternoon of July 4, and extinguished itself approximately 24 hours later. As a precaution, residents from 12 homes were evacuated in the surrounding area before the start of the in situ burn. There were no injuries or fatalities as a result of the oil release or controlled burn. The release of crude oil into the environment, and the resultant in situ burn, covered an area of approximately 11 acres and impacted wildlife, vegetation, the soil, surface waters, and groundwater.



Ruptured pipeline section of the 34" line.



Smoke cloud resulting from the in situ burn.

Explosion and Fire at ConocoPhillips Glenpool South Storage Tank Farm Facility in Glenpool, Oklahoma

On April 7, 2003, tank number 11 at the ConocoPhillips Glenpool South tank farm facility exploded and burned. The tank farm is located 12 miles south of Tulsa, Oklahoma, and has a capacity of 14.4 million gallons. Products stored at this facility include gasoline, diesel fuel, toluene and naphtha. Tank 11 was constructed in 1981 and had a capacity of 3.36 million gallons. At the time of the explosion, the tank was being filled with diesel fuel from a pipeline operated by Explorer Pipeline. The tank was previously filled with gasoline. Approximately 30 minutes after the delivery commenced, at which time approximately 336,000 gallons had been delivered into the tank, it exploded and burned.

The fire burned for approximately 15 hours, and destroyed the tank. A nearby neighborhood was evacuated and schools were closed for two days. Approximately nine hours after the tank exploded, nearby 138,000-volt power lines, affected by the fire's heat, failed and fell to the ground. Unburned fuel inside the dike was ignited and the fire spread throughout the facility's dike. There were no injuries or fatalities.

Natural Gas Explosion in Wilmington, Delaware

On July 2, 2003, a contractor hired by the City of Wilmington was replacing street curbs in front of a house when the contractor accidentally struck and pulled an unmarked gas service line feeding the house. The service line separated and the leaking gas exploded, leveling two houses. Two adjacent houses were also damaged as a result of the explosion and had to be demolished. There were 14 injuries.

Hazardous Materials Safety

According to the American Chemistry Council, chemicals impact every sector of the economy and are an essential contributor to the nation's standard of living, including the production of synthetic fabrics, life-saving medicines, packaging materials, adhesives and paints, automobile parts, composite materials for aircraft, and fertilizers to name a few. The most current figures published by RSPA indicate that more than 3.1 billion tons of hazardous materials are shipped within the United States each year, and that more than 800,000 shipments of hazardous materials enter this nation's transportation system each day in all modes, nearly a two-fold increase over the RSPA's previous estimate of 500,000 shipments per day.

The growth in the transportation of hazardous materials is also reflected in the number of hazardous materials incidents reported to RSPA over the past 10 years. In 2002, 15,347 hazardous materials incidents were reported, compared to 12,838 reported in 1992. For 2002, the reported damages from hazardous materials releases totaled \$50.9 million, more than double the \$22.8 million reported in 1993. Although the number of reported injuries and fatalities have fluctuated over the past 10 years, 221 fatalities and 4,000 injuries were reported from 1993 through 2002 and attributed to the release of hazardous materials.

Completed Hazardous Materials Investigations

Fatigue Failure and Corrosion Cause Cargo Tanker Rupture in South Charleston, West Virginia

On January 5, 2002, a tractor/cargo tank semitrailer departed the Bayer Corporation plant in South Charleston, West Virginia. As the tractor/semitrailer departed the plant and entered the cross street, the semitrailer catastrophically failed at the void space between the first and second of three independent tanks on the semitrailer. The semitrailer was built in 1974 and had three independent stainless steel tanks joined in a single unit by girth bands that overlapped the adjoining ends of the successive tanks. Carbon steel stiffeners extended longitudinally along each side of the trailer and provided additional support.

The cargo tanks were covered with insulation and a steel jacket. At the time of the accident, the three cargo tanks contained a total of 5,152 gallons of polypropylene glycol. Although no release occurred and this chemical is not regulated as a hazardous material by the DOT, the cargo tank semitrailer can be used for the transportation of regulated hazardous materials. There were no fatalities, injuries, or evacuations. The roadway was closed for seven hours. On August 21, 2003, the Safety Board determined that the probable cause of the accident was a combination of fatigue failure caused by incomplete welding on the tie bands and of the extensive corrosion of the frame. FMCSA is requiring that all similarly designed semitrailers be inspected and repaired. Semitrailers that are not inspected or repaired will be removed from hazardous materials service.



Cargo tanker rupture in South Charleston, West Virginia.

Hazardous Materials Support Of Completed Other Modes' Investigations

Emery Worldwide Airlines DC-8 Crash in Rancho Cordova, California

On February 16, 2000, an Emery Worldwide Airlines, Inc. McDonnell Douglas DC-8 departed Mather Airport, Sacramento, California. Moments after takeoff, the flight crew declared an emergency. Two minutes after takeoff, the airplane crashed into an automobile salvage yard east of the airport in Rancho Cordova. The airplane was transporting a package containing 16 detonating fuses as a declared item of cargo. The fuses did not cause or contribute to the accident. Additional information is available in the Aviation Safety section.

Ongoing Hazardous Materials Investigations

Rupture of Railroad Tank Car and Release of Hazardous Materials in Freeport, Texas

On September 13, 2002, a 24,000-gallon capacity railroad tank car containing 4,500 gallons of flammable waste catastrophically ruptured at the BASF Corporation chemical plant in Freeport, Texas. At the time of the accident, the tank car was positioned at a cargo transfer station in the plant. To liquefy the solid waste and to facilitate its transfer, steam heat had been applied to the tank car for several hours between September 11 and the morning of September 13.



Rupture of railroad tank car in Freeport, Texas.

Plant employees involved with the transfer operation noticed vapors venting intermittently through the tank car's safety relief valve. About 30 minutes before the rupture, vapors were venting through the safety relief valve continuously, indicating increasing pressure within the tank car. BASF employees then began to apply water to the tank car with the hope of cooling the tank and reducing the pressure. The area was evacuated, and the tank car ruptured about 20 minutes later. The force of the explosion propelled the 300-pound dome housing from the tank car about 1/3 mile. Two nearby storage tanks containing oleum (fuming sulfuric acid and sulfur trioxide) were damaged and released about 10,650 pounds of oleum. The tank car, highway cargo tank, and the transfer station were destroyed in the accident. Twenty-eight employees and area residents reported minor injuries.

Rupture of a Nurse Tank and Release of Anhydrous Ammonia in Calamus, Iowa

On April 15, 2003, a non-specification cargo tank used exclusively for agricultural purposes (commonly known as a nurse tank) split open at the bottom of the tank and released about 1,300 gallons of anhydrous ammonia at a filling facility near Calamus, Iowa. Two operators were seriously injured from exposure to the anhydrous ammonia. One operator died from his injuries nine days after the accident.

Structural Failure of a Highway Cargo Tank and Release of Anhydrous Ammonia in Middletown, Ohio

On August 22, 2003, a DOT specification MC 331 cargo tank developed a crack in the front head of the tank as the tank was being loaded with anhydrous ammonia. Ammonia vented for several hours through the 16-inch crack located on a weld seam on the front head. The ammonia was transloaded into another cargo tank. Several plant employees

were treated for respiratory complaints. The MC 331 cargo tank had received the DOT-required five-year internal inspection in March 2002. Since then the cargo tank had been used only for transporting anhydrous ammonia from two producers. Because the cargo tank was constructed of tempered steel, it could only be used to transport anhydrous ammonia with a moisture content exceeding 0.2 percent. The ammonia being loaded at the time of the failure routinely did not have the minimum moisture content.

Hazardous Materials Support Of Other Modes' Ongoing Investigations

AirTran DC-9 Cargo Compartment Fire in Atlanta, Georgia

On November 29, 2000, the crew of AirTran Airways flight 956, a McDonnell-Douglas DC-9, reported an electrical malfunction and returned for an emergency landing at Atlanta Hartsfield International Airport, Atlanta, Georgia. The hazardous materials safety issue being examined is the potential involvement of hazardous materials in a cargo compartment fire.

CSXT Freight Train Derailment and Release of Hazardous Materials in Baltimore, Maryland

On July 18, 2001, an eastbound CSXT freight train, consisting of three locomotive units and 60 cars, derailed 11 cars while traveling through the Howard Street tunnel in downtown Baltimore, Maryland. Three of the derailed cars contained hazardous materials. The derailment resulted in a release of hazardous materials and fire that lasted several days. Hazardous materials issues being examined are the performance of the tank cars transporting the hazardous materials, environmental impact, and risks of transporting hazardous materials shipments through urban tunnels.

Canadian Pacific Railway Derailment in Minot, North Dakota

On January 18, 2002, a Canadian Pacific Railway freight train with two locomotives and 112 cars derailed 31 freight cars near Minot, North Dakota. Five of 15 cars that were carrying anhydrous ammonia catastrophically failed, and instantaneously released about 150,000 gallons of anhydrous ammonia. The ammonia created a vapor plume about 5 miles long and 2 1/2 miles wide, and affected approximately 15,000 residents near the derailment site and a portion of the city of Minot. Over the next few days, an additional 70,000 gallons of ammonia were released from six other tank cars. The release of the ammonia resulted in one fatality, more than 300 injuries and the displacement of residents for up to 30 days. The hazardous materials issues are the vulnerability of tank cars in cold temperatures, and methods of reducing the risks of transporting hazardous chemicals.

Pipeline Rupture and Release of Crude Oil in Cohasset, Minnesota

On July 4, 2002, a 34-inch diameter pipeline transporting crude oil experienced a catastrophic failure in a remote open wetland area west of Cohasset, Minnesota, resulting in the release of approximately 6,000 barrels (252,000 gallons) of crude oil. The Hazardous Materials Division is documenting and evaluating the environmental impact of the release and the controlled burn to consume the spilled oil.

Federal Express B-727 Crash in Tallahassee, Florida

On July 26, 2002, a Boeing B-727-232, operating as FedEx flight 1478, crashed into trees on short final approach to runway 9 at the Tallahassee Regional Airport, Tallahassee, Florida. The Hazardous Materials Division is documenting the hazardous materials cargo on the aircraft, the release of any hazardous materials, and their impact upon the accident.

Canadian National Illinois Central Freight Train Derailment near Tamaroa, Illinois

On February 9, 2003, a Canadian National Illinois Central freight train derailed near Tamaroa, Illinois. Between 800 and 1,000 people were evacuated from Tamaroa because of the hazardous materials release and resulting fire. Of the 22 freight cars derailed, 19 were tank cars transporting various flammable and corrosive hazardous materials. Methanol from two loaded tank cars was released and ignited. One vinyl chloride tank car and one hydrochloric acid tank car were leaking. The Hazardous Materials Division is evaluating the survivability of the tank cars that derailed in the accident.

Office of Research and Engineering

As accident investigations become more complex, it is essential that investigators receive support in a wide range of disciplines to precisely determine the source and chronology of an accident or incident. To assist them, technical specialists in the Office of Research and Engineering performed accident reconstructions, vehicle performance analyses, radar analyses, visibility calculations, simulations of vehicle and occupant motion, animations, data recorder readouts and analyses, medical factor analyses, materials failure examinations, and fire and explosion analyses. In addition, the office supported the Safety Board's investigation and administration staff by maintaining the agency's information technology system, aviation accident and other databases, information product distribution, and agency websites.

Significant Technical Accomplishments

American Airlines Flight 587

On November 12, 2001, an Airbus A300-600R, operating as American Airlines flight 587, crashed just after takeoff from JFK International Airport in New York. The investigation showed that the vertical stabilizer fractured from the remainder of the airplane causing an unrecoverable loss of control.

Analysis of the radar data and flight recorders indicated the airplane encountered a wake from a previously departed aircraft. A six-degree-of-freedom aerodynamic simulation model of the A300 was created by RE staff for in-house use. Subsequent airplane performance analysis revealed the pilot commands and airplane responses. Knowing these behaviors, investigators calculated the aerodynamic loads imparted to the vertical fin of the aircraft. Computational fluid dynamic calculations are being conducted and analyzed by staff to accurately determine the aerodynamic loads on the tail. Investigators are now pursuing the effects of these loads on the structural design, the manufacturing techniques, and the material behavior of the composite vertical fin.

Simulations of the airplane's behavior during the accident scenario are being developed to better understand the potential for airplane/pilot coupling, as it pertains to the particular circumstances of the accident flight. Ground tests on board an Airbus A300 airplane and motion simulator tests at NASA have been conducted to address these issues.

Staff from the Materials Laboratory assisted in the examination of the recovered vertical stabilizer components at the scene of the accident and in the ongoing documentation, testing, and analysis of the composite structure. Areas of study for the ongoing investigation have included documentation of the damage to the structure, compilation and analysis of the various nondestructive inspections used to evaluate the damage to the stabilizer and rudder, a fractographic examination of the broken composite lugs that attach the stabilizer to the fuselage, and a material property evaluation.

In 2003, Research and Engineering's 74 staff members completed two study plans and two annual reviews of accident data; completed 159 materials lab cases; examined 59 CVRs, 69 FDRs, and 34 rail event recorders; published 73 reports; received 3,179 public inquiries and 423 FOIA requests; had 4.6 million visitors to the NTSB website; and supported every accident investigation across the modes.

Other Significant Work Accomplishments

Safety Studies

Safety Study of Weather-Related General Aviation Accidents. The Safety Board has long been concerned with the disproportionate number of fatal general aviation accidents associated with bad weather. An 18-month study initiated by the Safety Board is designed to look at the factors that affect a private pilot's likelihood of being involved in a weather-related accident.

During a 10-year period from 1991 to 2000, there were approximately 19,700 general aviation accidents, and about 3,700 of those accidents were fatal. Although fewer than seven percent of all accidents occurred in IFR conditions, bad weather was associated with nearly one-quarter of all fatal accidents. Similarly, 64 percent of the accidents that occurred in IFR were fatal, compared to less than 16 percent of the accidents that happened in VFR conditions.

Weather has always been one of the biggest hazards facing general aviation pilots, and numerous attempts have been made over the years to reduce the number of accidents associated with weather. However, weather continues to play a significant role in general aviation accidents. Safety Board investigators will be using a different study approach than has been used in the past by contacting other pilots who were flying in the area when weather-related accidents occurred to determine what may have made the accident flight different from the non-accident flights. By identifying combinations of weather, pilot experience, and aircraft equipment most often associated with weather-related accidents, the Safety Board will be better able to make recommendations for reducing the number of such accidents in the future.

Aviation Activity Data. The Safety Board's 2002 *Study of Transportation Safety Databases* highlighted the need for better exposure data to support the analysis of risk factors for transportation accidents. Continuing in our efforts to improve safety data, the Board has developed a set of recommendations specific to the need for flight hour reporting of nonscheduled Part 135 (on-demand air taxi) operations.

Although scheduled and nonscheduled Part 121 air carriers and scheduled Part 135 carriers are required to regularly report revenue flight activity to the DOT's Bureau of Transportation Statistics, nonscheduled Part 135 operators are not currently required to report flight activity for their revenue flights -- even though this segment of commercial operations accounts for 50 to 60 percent of all commercial accidents each year. In 2002, the FAA substantially revised its estimate of nonscheduled Part 135 flight activity for 2001 and retroactively applied the change back to 1992. Those changes affected the accident rate for nonscheduled Part 135 operations by more than 40 percent. A change of this magnitude, affecting 10 years of accident rate statistics, highlighted the imprecise nature of activity measures for this segment of aviation. The Safety Board therefore recommended improving the methods that the FAA uses to estimate nonscheduled Part 135 operations.

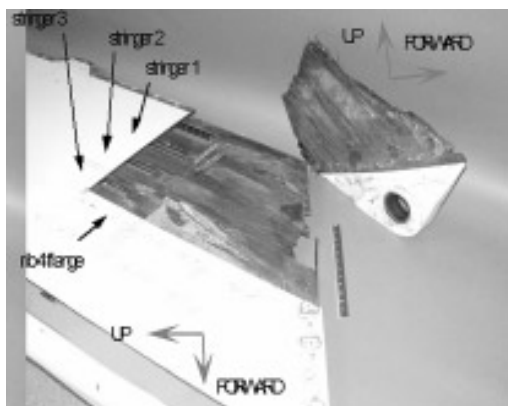
Aviation Annual Review for Commercial and General Aviation. The Safety Board prepares annual statistical reports summarizing commercial aviation accidents and general aviation accidents. Both the *Annual Review of Commercial Aviation* and the *Annual Review of General Aviation* have been redesigned to graphically display accident data and to better communicate what we know about accident characteristics. Recent annual reviews for general aviation have included detailed analyses of survivability, midair collisions, controlled flight into terrain, flight in instrument meteorological conditions, loss of engine power due to carburetor icing and fuel exhaustion/starvation, and amateur-built aircraft.

Supervisory Control and Data Acquisition Systems. Advances in computer technology have enabled nearly all pipeline operators to remotely monitor and operate their pipelines. The systems used by pipeline companies to perform these operations are collectively referred to as supervisory control and data acquisition (SCADA) systems. From 1996 through 2002, the Safety Board investigated 18 pipeline accidents; in 10 of these investigations, the Board identified SCADA safety issues. All but one of these accidents involved hazardous liquid pipelines. Issues identified in these accidents include inadequate leak detection capability, poor controller interface design, operational errors, and inadequate alarm design. In October 2002, the Board initiated a study of pipeline SCADA systems to document the pipeline industry's use of SCADA systems for the detection of pipeline leaks and mitigation of leaks once detected. The ongoing study will also evaluate the designs of these SCADA systems and consider if these designs facilitate the controllers' job of monitoring the pipeline.

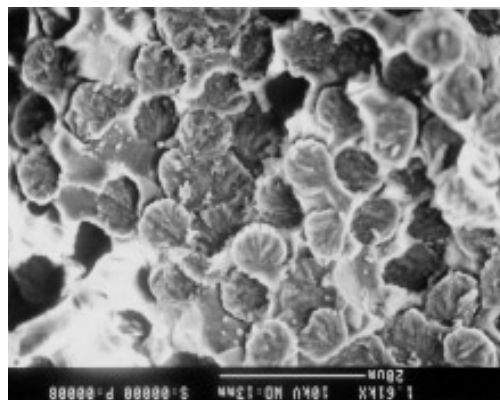
The Safety Board developed a 67-item SCADA questionnaire for distribution to all liquid pipeline operators. The questionnaire covers basic details on company demographics, the SCADA system for the pipeline, the alarms used, and the review processes for evaluating SCADA system performance. The Board is conducting site visits to examine liquid pipeline SCADA systems in more detail. These site visits include interviews with controllers, SCADA managers, and training personnel as well as observations of the control room, workstations, and SCADA system.

Materials Laboratory

Staff materials engineers examined parts and wreckage from more than 100 accidents, involving all transportation modes, in 2003. A prominent example of the work performed by the laboratory staff is the evaluation of the fractures in the lugs of the vertical stabilizer of the American Airlines flight 587 Airbus A300-600. Staff engineers closely examined representative areas of all of the types of broken surfaces on the lugs, using a scanning electron microscope to determine fracture directions, and looked for preexisting conditions that may have affected the load capacity of the lugs or the type and direction of the fracture.



American Airlines flight 587 vertical stabilizer left rear lug attachment shown disassembled and sectioned for examination.



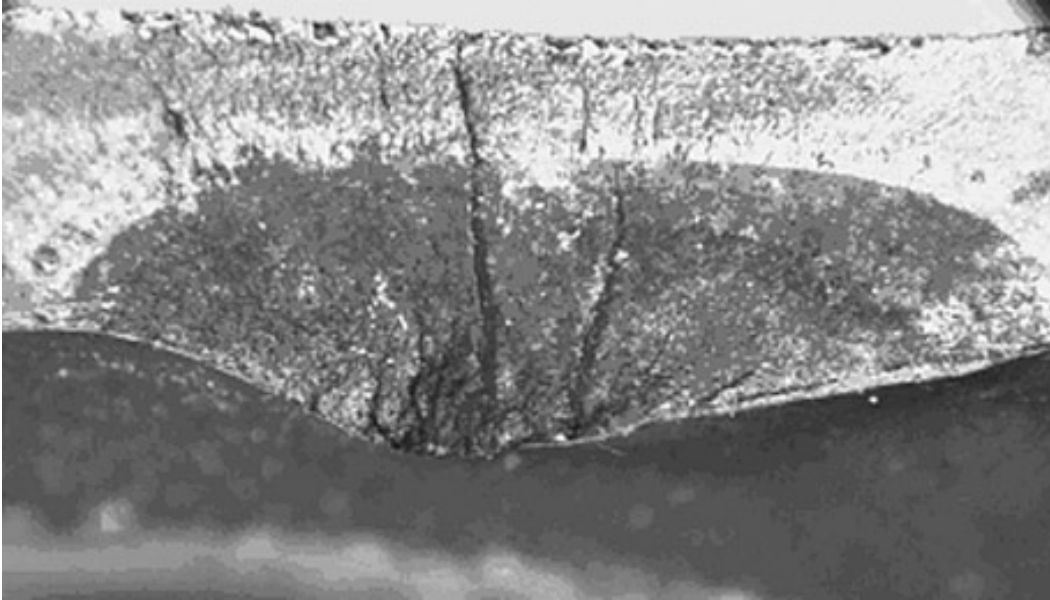
Scanning electron micrograph showing typical fractured fiber ends for the composite lugs on the American Airlines flight 587 vertical stabilizer.

In addition to the American Airlines flight 587 accident, Materials Laboratory engineers assisted in the examination of nine other in-flight structural breakups in the United States, including the loss of two firefighting airplanes -- a Lockheed C130A and a Consolidated Vultee P4Y-2. Both of these airplanes experienced wing failures because of fatigue cracking. Reexamination of the structure from another C130A that crashed in a remote area in California in 1994 has also revealed new evidence of fatigue cracking in the wing structure of that airplane.

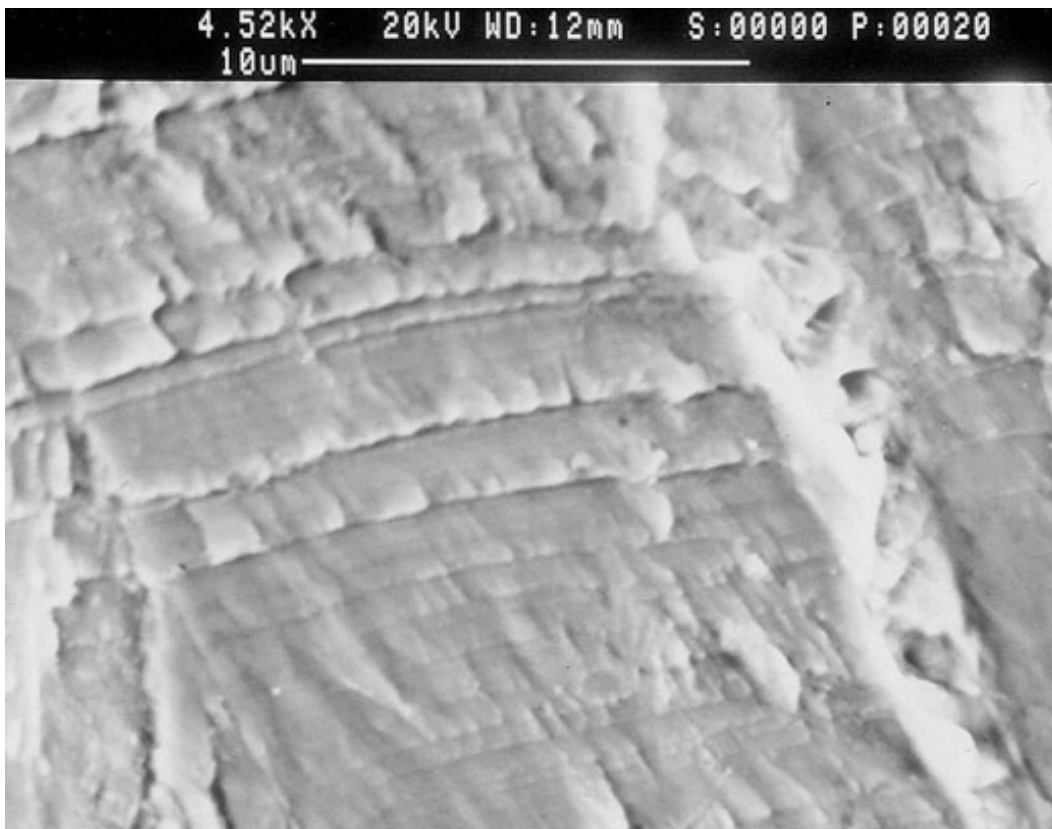
In a foreign accident, the Materials Laboratory staff has played an important role in the discovery and documentation of a large area of fatigue cracking in the belly skin of a Boeing 747 that experienced an in-flight structural breakup over the ocean near Makung Island, Taiwan, on May 25, 2002. The government of Taiwan is investigating this accident, and the cause has not yet been determined.

Other investigations conducted by the Materials Laboratory in 2003 included several significant nonaviation accidents. The laboratory conducted a study of the brittle behavior of railroad tank cars involved in a derailment in Minot, North Dakota, on January 18, 2002. In this accident, five tank cars carrying hazardous materials ruptured in a brittle manner. The tank car material was tested at various temperatures to determine at what point the material changes from ductile fracture behavior to brittle fracture behavior. In addition, joint bars, which hold together cut rail ends, were found broken at the scene of this accident, and laboratory engineers found fatigue cracking on these bars. Laboratory engineers also examined the ruptured crude oil pipeline from an accident in Cohasset, Minnesota, on July 4, 2002, and found that fatigue cracking had initiated from the inside of the pipe along the longitudinal seam weld. These two accidents are still under investigation.

During 2003, the Materials Laboratory generated reports on 40 components that fractured as a result of fatigue cracking. Included in this group were five propeller blades and four crankshafts from general aviation airplanes, and a tail rotor blade and a main rotor hub from helicopters. As these fatigue fractures demonstrate, the results of research on the parts and structure examined by the Materials Laboratory is quite often the primary information used in determining the probable causes of these accidents.



Initial portion of the fatigue crack in a Hughes 269A helicopter cluster fitting showing a heavily corroded region closest to the origin area. The distinctive arc indicates where the fatigue process paused for a period of time, allowing extensive corrosion buildup in the previously cracked region.



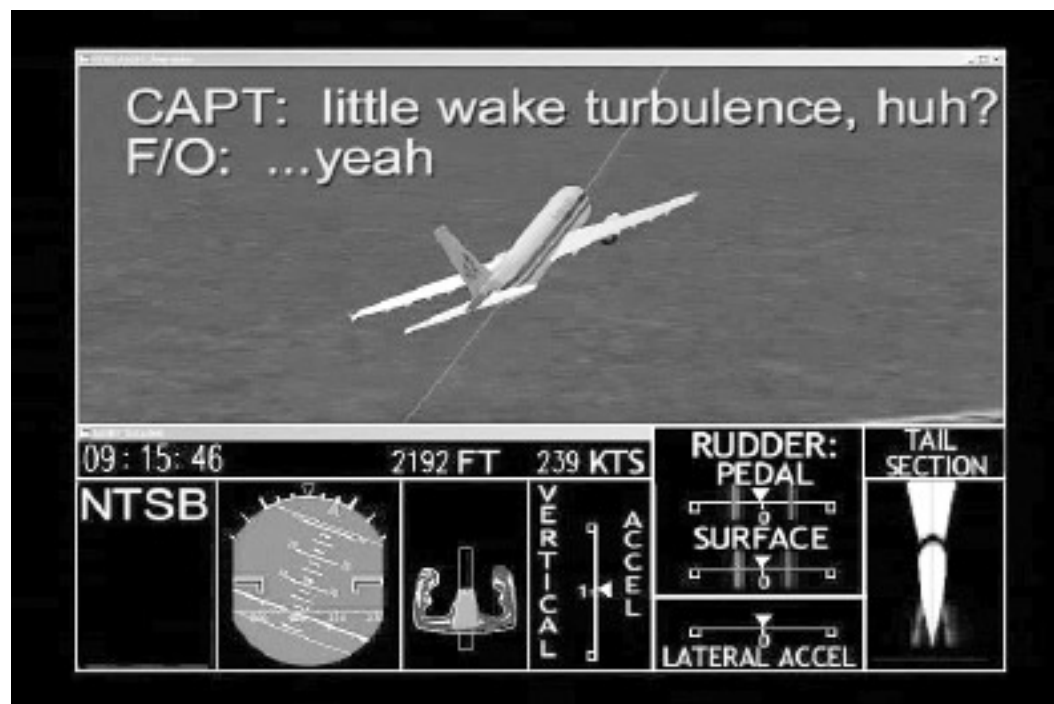
Scanning electron micrograph of fatigue striations located on a fracture face of the shell of a cargo truck semitrailer. In this image, the crack was propagating primarily upward, and the closely spaced striations represent individual crack front positions created by fluctuating stress as the semitrailer was being driven. The scale bar at the top is approximately 0.0004 inch long.

Vehicle Performance

Performance engineers have conducted analyses supporting several investigations. These analyses covered a wide range of subjects including airplanes, marine vessels, trains, road vehicles, and vehicle occupants.

King Air Accident. RE staff is finalizing its investigation into the King Air accident near Duluth, Minnesota, that took the life of Senator Paul Wellstone and eight other passengers and crew. Staff traveled to the scene and gathered physical evidence pertaining to the flight's last events. Subsequent airplane performance analysis and detailed airplane simulations were performed to recreate the accident sequence and determine the cause of loss of control. The effects of airframe icing and the pilot's management of proper airspeed have been examined.

American Airlines Flight 587. Staff is currently involved with the ongoing American Airlines flight 587 accident investigation. Vehicle performance issues played a significant role in the public hearing held in Washington, D.C., in November 2002. The vehicle performance animation laboratory developed a detailed animation of the airplane's flight path derived from flight data recorder information, which was presented at the beginning of the public hearing. The animation is at www.nts.gov/events/2001/AA587/anim_587.htm.



Animation frame showing American Airlines flight 587 immediately following first wake encounter.

Air Midwest Flight 5481. In January 2003, an Air Midwest Beech 1900D crashed on takeoff from Charlotte International Airport, Charlotte, North Carolina. The flight crew experienced a loss of pitch control immediately after takeoff. Performance engineers have developed a flight simulator for this aircraft, and have been analyzing the effects of the aircraft's weight and balance on its pitch control. Additionally,

engineers are determining the limiting range of the pitch control system during this flight to help investigators assess the role of recent maintenance activities to this system.

FedEx B-727. In June 2002, a Federal Express Boeing 727 on approach to Tallahassee, Florida, crashed short of the runway. Vehicle performance staff conducted an extensive on-scene investigation, gathering physical evidence from the scene. Airplane performance calculations are now being conducted to determine what role the pilot and airplane played in the cause of the accident. In addition to these major aviation accidents, staff continues to provide technical support to Safety Board regional office investigations of general aviation aircraft accidents. Staff engineers also supported a number of highway and railroad vehicle accident investigations in 2003 by developing detailed vehicle and occupant simulations.

CSX/Baltimore Rail Tunnel Investigation. On July 18, 2001, a CSX train carrying hazardous materials derailed in a tunnel in downtown Baltimore, Maryland, resulting in a serious fire. RE staff documented the large number of rail fractures and successfully reconstructed 122 pieces of the two rails. RE fire investigators have cataloged fire damage, and are involved in a joint effort with the Nuclear Regulatory Commission to generate a computer model of the fire that can be used to assess the thermal damages that might have been inflicted in a hypothetical case involving the shipment of spent nuclear fuel. Additionally, staff is also involved in the geophysical and civil engineering investigations of the tunnel, its environment, and surrounding utility infrastructure, as they were involved in and responded to the effects of the fire.

Largo, Maryland Sport Utility Vehicle Loss of Control. RE staff developed a simulation of the Ford Explorer involved in the accident, which was traveling along the Capitol Beltway at high speed while being subjected to high winds. The simulations showed that the vehicle was controllable under these conditions, and that the driver's use of a wireless telephone deteriorated her ability to properly control the vehicle. This preoccupation, combined with the driver's inexperience with the vehicle, facilitated a delayed reaction and over-correction to the effects of a wind gust, which allowed the vehicle to leave the roadway, cross the median, and enter the opposing lanes of traffic.

Omaha, Nebraska School Bus Accident. In October 2001, a school bus ran off a bridge on a roadway that was under construction. Vehicle simulations have been conducted to analyze the potential view of the school bus driver as he traveled along the reconstructed roadway. The temporary roadway was constructed in such a fashion that oncoming traffic may have appeared to cross over into the path of the accident vehicle. Analysis of the simulations is ongoing to gauge the significance of the road geometry to the driver's view. The school bus driver subsequently reacted with a hard steering input that resulted in the bus striking a bridge rail and falling to the riverbed below.

Victor, New York Motorcoach Accident. In June 2002, a Coach USA motorcoach ran off the road at a New York State Thruway exit, failing to negotiate the ramp, and crossed into traffic on the entrance ramp. Vehicle simulations are exploring the driver's inputs and the effects of the guardrail on the dynamics of the bus.

Aviation Accident Investigation Software. The Data Analysis Numerical Toolbox and Editor (DANTE) windows-based computer program was developed by RE staff to simplify, automate, and augment many airplane performance calculations and to analyze and manage large volumes of electronic data from flight data recorders, radar sites, and simulator and flight tests. This program has been shared with government investigation authorities in Canada, Germany, Australia, and Taiwan, and with the U.S. Air Force 84th Radar Evaluation Squadron and the U.S. Air Force Safety Center. The program and documentation are available to authorized users worldwide by means of a link on the Safety Board website that allows a download of the complete program, users manual, and tutorial. RE periodically updates the program to respond to current investigative needs and as a result of suggestions made by the large user group.

Accident Data and Public Records

Twenty accident reports and studies were published in 2003, and docket information on the Alaska Airlines flight 261 and American Airlines flight 587 accidents was made available on the website. Almost 3,000 requests for public records and more than 390 requests under the Freedom of Information Act were processed through the Public Inquiries Branch during 2003. Data specialists in the Office of Research and Engineering continue to respond to requests for aviation accident information and research. Some of these requests concerned the accident frequency of a particular aircraft model or air carrier, while others were interested in particular types of accidents. The new availability of accident data from 1962-1983 on the Safety Board website, combined with complete download and text search capabilities, now allow most research to be done directly online. The Safety Board anticipates that an increasing number of data users who have commercial or research interests will now regularly acquire the data directly through the website. The office also issued statistical information on U.S. civil aviation and published Safety Board annual reviews of aircraft accident data for U.S. air carriers and for general aviation.

Cockpit Voice Recorders/Flight Data Recorders

Staff engineers extracted, formatted, and analyzed data from 62 cockpit voice recorders (15 foreign), 69 flight data recorders (12 foreign), and 12 rail recorders in 2003.

During the investigation into the American Airlines flight 587 accident, the Safety Board's recorder laboratory staff discovered that the data recovered from the flight data recorder on the Airbus A300-600R was filtered or smoothed prior to its being recorded on the flight recorder. This factor hampered the investigation by not giving investigators a clear indication of the aircraft's motion just prior to the accident. The lab worked with the manufacturer to determine the extent of the filtering and to develop a mathematical process whereby investigators could estimate the original conditions from the smoothed data. Board staff members are working with the FAA to ensure that this specific condition is corrected. Additionally, the FAA is currently surveying other manufacturers to determine if any filtering or smoothing is being applied to the data that is recorded on the flight data recorder.

Staff engineers recently completed a four-year update to the minimum performance standards that are used by the aviation industry to make and install new flight data and cockpit voice recorders. Additionally, the new manufacturing standards include

specifications that cover onboard cockpit video and cockpit digital data. These standards were developed through European Organization for Aviation Electronics sponsorship and included input from representatives of all major airframe and equipment manufacturers and government and accident investigation organizations throughout the world.

Medical Factors

Research and Engineering staff continue to pursue safety improvements regarding the use of prescription and over-the-counter medications by vehicle operators (as detailed in Safety Recommendations I-00-1 through -5; A-00-4 through -6, H-00-12 through -15, M-00-1 through -4; R-00-1 through -8). In 2003, staff presented jointly with representatives from the Food and Drug Administration and NHTSA at the Lifesavers Conference, a national gathering of state and local highway safety specialists.

Research and Engineering staff continue to support investigations into commercial driver medical conditions and in 2003 provided background information (through the Government and Industry Affairs staff) on this issue to the Congressional Research Service and to the Senate Commerce Committee during deliberations on the FMCSA's appropriations.

Staff also assisted the Office of Highway Safety in the organization and presentation of a recent hearing on the topic of medical oversight of non-commercial drivers. Staff continues to assist in the investigation of highway accidents involving non-commercial driver medical conditions and in the development of a report to address this issue.

Research and Engineering supports the training of investigators, physicians, psychologists, and physiologists in the medical aspects of accident investigation. Military, civilian, private, commercial, academic, and governmental employees receive education in the collection and analysis of medical information in accident investigation through the NTSB Academy and in formal programs and presentations coordinated through the Office of Research and Engineering. In 2003, the office scheduled the first-ever civilian aerospace medicine residency rotation with the Board's Medical Officer, allowing a civilian physician specializing in aerospace medicine to have hands-on experiences in civil aviation accident investigation.

In 2003, Research and Engineering staff (with Transportation Disaster Assistance and Aviation Survival Factors staff) supported Columbia Accident Investigation Board staff through consultation in the areas of crew remains recovery and transport, pathology evaluation, and cockpit/cabin survivability issues. Staff provided continued support of the investigation of a non-fatal cargo aircraft accident in Florida requiring consultant review of radiographic studies, formal evaluation of cockpit voice recordings, and formal medical testing of a pilot to evaluate the possibility of an unrecognized pre-existing medical condition, and the potential impact of a color vision deficiency waiver by the FAA.

The staff provides medical consultation to accident investigators in all modes on about 100 accidents a year. The following are some examples from 2003:

- a rail accident in Missouri involving an engineer on multiple medications, including a sedating over-the-counter antihistamine.
- a rail accident in Illinois involving an engineer diagnosed with manic-depression on multiple medications.
- a fatal highway accident in New Jersey involving an off-duty police officer with a blood alcohol level in excess of 0.30 percent.
- a fatal highway accident in Florida involving a driver with previously diagnosed seizures and cognitive deficits.
- a fatal highway accident in Pennsylvania involving a driver with a commercial driver's license and severe vertigo.
- a fatal experimental aircraft accident in Oklahoma involving a current commercial air carrier pilot with a history of treatment for depression and of use of multiple painkillers.
- a balloon passenger fatality in California involving recent use of marijuana.

Fire and Explosion Factors

Technical specialists in fire and explosion from the Office of Research and Engineering investigated fires in marine, highway, pipeline, and general aviation accident investigations. In May 2003, investigators traveled to Miami, Florida, to help investigate a boiler explosion on board the SS *Norway*. In July 2003, investigators assisted with a fire that resulted from a collision between a tractor-trailer and a car to determine if the car's high-density polyethylene fuel tank played a role in the fire. Staff investigators are supporting the investigation of the April 7, 2003 explosion and fire of a 100,000-gallon fuel storage tank in Glenpool, Oklahoma. Wreckage has been examined to help identify the source and mechanism of the ignition event leading to the explosion.

A course on investigating fires and explosions in cooperation with the new Academy is under development. The course will include such topics as the fundamentals of ignition and the effects of heat release on flame spread. Hands-on training will be enhanced with the TWA flight 800 reconstruction, which is being integrated into the course. In addition, other aircraft parts are being procured to use in demonstrating the effects of in flight fires. The fire and explosion investigative short course was presented earlier in 2003 at the Academy.

Information Products and Distribution

In 2003, Internet activity for the Safety Board website at www.nts.gov showed moderate growth, with an increase in average hits per day up about 300 over 2002. Average hits per day averaged 15,000 for the year. More than 230,000 publications were downloaded, with the most popular reports continuing to be those involving aviation. The website's searchable aviation accident database, which was expanded in late 2002 to cover investigations conducted from 1962 to 1983, had 100,000 hits in 2003.

Beginning in August 2003, all Safety Board meetings, public hearings, public forums, and symposia started being webcast to a worldwide audience via the Internet. The first public forum to be webcast was a two-day event in October 2003 regarding driver education and training. Archived webcasts for these events are available for three months on line and also on CD-ROM. The events are also videocast internally, making it easy for all employees to monitor proceedings while continuing to work in their offices.

During 2003, the Office of Research and Engineering continued to implement a revised, searchable docket management system on the agency's intranet to manage public and official use records related to accident investigations, safety studies, and other activities. Over 16,000 documents were added in 2003 to the new system, which is currently accessible only to Safety Board employees and fulfillment contractors. Work began late in 2003 to make the docket system an integrated part of the public website, thus making the vast majority of accident investigation information collected by Safety Board staff available to interested parties worldwide.

Information on the agency's internal website was also expanded and improved in 2003, with updated information being added weekly. Efforts continue to coordinate the conversion of a variety of workflow systems to a web-based format that is seamlessly integrated with the agency's intranet. Applications converted to that format over the past years have included personnel, timekeeping, financial, and public records tracking systems.

Internet activity in 2003 remained steady after an initial surge of activity in January following the crash of Air Midwest flight 5481 in Charlotte. On January 8, the day of the crash, there were over 21,000 unique visitors to the site. The most popular publication accessed online was the Alaska Airlines flight 261 accident report, which was adopted at a Board meeting in December 2002. The implementation of a new web activity reporting software package in 2003 provides Safety Board staff a more accurate representation of web site statistics.

Information Technology: e-Gov Initiatives

The Information Technology Software Development team continues to make significant strides with Safety Board e-Gov initiatives, bringing more information to the public through an expanding Internet website and FTP site.

Aviation. As the census for all aviation accidents in the United States, the entire Safety Board database is now available to the public through interactive queries and official database downloads.

A new aviation query screen was introduced this year. The full agency dataset is now available, ranging from 1962 to the present.

http://www.nts.gov/nts/query.asp - Microsoft Internet Explorer

Address Go File Back

Accident/Incident Information
 Date Range and 1962 - present
(mm/dd/yyyy) (mm/dd/yyyy)
 City
 State
 Country
 Investigation Type
 Injury Severity

Aircraft
 Category
 Amateur Built
 Aircraft Make
 Model
 Registration

Operation
 Operation
 Schedule
 Airline

Enter your word string below: (This option will slow the query performance)
 (see Examples)


NTSB Status
 NTSB Accident Number
 Report Status
 Probable Cause Issued between and
(mm/dd/yyyy) (mm/dd/yyyy)

Sort by in order. Show records per page.

Subscription Services -- Safety Board Press Releases and Safety Recommendations. The public is now able use the Safety Board Listserv registration via the Internet to receive immediate notification of Board press releases and the issuance of safety recommendations.

NTSB - Mailing Lists - Microsoft Internet Explorer

Address: <http://www.ntsb.gov/registration/registration.htm> Go Back

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Aviation	<input type="radio"/> Subscribe	<input type="radio"/> Unsubscribe
Highway	<input type="radio"/> Subscribe	<input type="radio"/> Unsubscribe
Marine	<input type="radio"/> Subscribe	<input type="radio"/> Unsubscribe
Pipeline/Hazmat	<input type="radio"/> Subscribe	<input type="radio"/> Unsubscribe
Railroad	<input type="radio"/> Subscribe	<input type="radio"/> Unsubscribe

Done Internet

Pilot/Operator Report Submission. A program has been developed for pilots/operators to submit their accident/incident reports via the Internet. Once submitted, the report is placed in the Safety Board Docket and provided to the investigator-in-charge for import into the Safety Board database system.

NTSB Form 6120.1 - Aircraft Information - Microsoft Internet Explorer

Address: mntest/epoint.1/Private/Aircraft.aspx?EventID=20030212P00002&Aircraft_Key=1

The National Transportation Safety Board
Pilot/Operator Aircraft Accident/Incident Report or Form 6120.1

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Home > My Events > Event Report > Aircraft Info. > Aircraft Information

Aircraft Information < Prev. Save Cancel Next >

Registration Number:

Manufacturer: Amateur-built: Yes No Unknown

Model: Serial Number:

Max Gross Weight: lbs Weight at time of accident: lbs

Center of Gravity: Inches from Nose

Category Of Aircraft: Airplane

Landing Gear

Fixed Retractable

Check any additional configuration that applies:

Amphibian Float Hull Ski/wheel Tail/heel
 Emergency Float High Skid Ski Skid Tricycle

Seat Information

Total Number Of Seats: If large aircraft, how many seats for: **Flight Crew:**
Cabin Crew:
Passengers:

< Prev. Save Cancel Next >

Done Local intranet

Symposia

Symposium on Transportation Vehicle Recorders, June 4-5, 2003

The Safety Board, in conjunction with the Society of Automotive Engineers, hosted a symposium on transportation vehicle recorders, June 4-5, 2003, in Alexandria, Virginia.

The symposium brought together a broad spectrum of manufacturers, operators, safety and regulatory officials, and other industry and government specialists to share the latest technical information and experiences in the use of vehicle recorders in all modes of transportation.

Topics explored during the two-day meeting included:

- state-of-the-art in accident recorder technology;
- accident recorder survivability/crashworthiness requirements;
- video/imaging recorder technology;
- data privacy issues;
- acquiring data during regular commercial operations; and
- proactive use of data in commercial operations to prevent accidents and improve efficiency.

In addition, the following transportation mode-specific workshops were conducted on the afternoon of the second day.

- Aviation workshop (first topic): Presentation and discussion on FedEx's experience on the installation of dual-combi recorders and the re-certification of digital flight data recorder systems.
- Aviation workshop (second topic): Presentation and discussion on the adequacy of recorder data sources (filtering, sampling rates).
- Highway workshop: Panel discussion on event data recorders, focusing on user perspectives on parameters and data accessibility.
- Marine workshop: Interactive workshop on practical aspects of safeguarding and retrieving voyage data recorder data aboard vessels.
- Rail workshop: Presentations and discussion on perspectives of rail event recorder maintenance programs and practices.

Administrative Law Judges

Since 1967, the Safety Board has served as the “court of appeal” for airmen, mechanics or mariners whenever the FAA or Coast Guard takes a certificate action. The Board’s administrative law judges hear, consider and issue initial decisions on appeals filed with the Board. Included are appeals from orders issued by the FAA’s Administrator amending, modifying, suspending or revoking, in whole or in part, certificates of airmen, air agencies and air carriers, for alleged violations of the Federal Aviation Regulations or for lack of qualification; FAA actions denying applications for the issuance or renewal of airman certificates; and appeals of certain FAA civil penalty orders issued by the FAA against pilots, flight engineers, mechanics or repairmen where the amount in dispute is less than \$50,000. The judges also adjudicate claims for fees and expenses stemming from certificate and civil penalty actions under the Equal Access to Justice Act (EAJA).

The Board currently has four judges. Two are based in Washington, D.C. and hold hearings primarily in the eastern half of the United States. The other two are based in Arlington, Texas and Denver, Colorado and hear cases primarily in the western half of the country.

Either the certificate holder or the FAA may appeal the judges’ decisions in these cases to the five-member Board. The Board’s review on appeal of its administrative law judges’ decisions is based on the record of the proceeding, which includes hearing testimony (transcript), exhibits and the judge’s decision, as well as appeal briefs submitted by the parties.

The FAA has the right to appeal decisions of the five-member Board to the U.S. Court of Appeals where that agency determines that the Board’s decision “will have a significant adverse impact” with respect to aviation safety duties and powers designated to be carried out by the FAA. Airmen and mechanics have the right to appeal all adverse Board decisions to the Court of Appeals. Upon review of the Board’s decision, the Court of Appeals has the power to affirm, modify or set aside that decision in whole or in part -- or, if need is found, to order further proceedings by the Board. The decision of the Court of Appeals is subject to review by the U.S. Supreme Court on writ of certiorari.

In April 2000, Congress enacted Section 716 of Aviation Investment and Reform Act for the 21st Century (Public Law 106-181). This act expanded the Board’s jurisdiction to include review of FAA designations of safety enforcement actions as emergencies, which require the order to be effective immediately, upon petition by the affected certificate holder. The Board has delegated this review authority to its administrative law judges. There is no administrative review of the administrative law judges’ decisions in these cases.

Marine certificate actions are heard first by the Coast Guard’s administrative law judges, and may be appealed to the Commandant of the Coast Guard. The ruling of the Commandant may then be appealed to the NTSB, where the Board follows the same appellate process as it does in considering the initial decisions of its law judges in aviation cases. In 2003, the Board closed one marine case. There were no marine appeals filed with the NTSB.

There were 349 aviation certificate appeals filed with Board’s Office of Administrative Law Judges in 2003; 126 of these cases were from emergency orders. The Board’s judges held 84 hearings and closed 398 cases in 2003.

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During 2003, 60 of the judges' decisions were appealed to the full five-member Safety Board for review. The Board decided 46 appeals, reversing the judges' decisions in two cases. Nineteen of the Board's decisions were appealed to the U.S. Courts of Appeals, which rendered eight decisions in 2003, affirming the Board in five and remanding one case back to the Board for additional disposition. The remaining two cases were dismissed.

There were seven EAJA applications filed with the Board's administrative law judges in 2003, and 11 EAJA cases were decided by the judges. In 2003, seven of the judges' EAJA decisions were appealed to the full Board, which issued rulings in 10 EAJA cases.

NTSB Academy

On August 1, 2003, the NTSB Academy moved into its new home on the Ashburn, Virginia campus of the George Washington University. With more than 300 seats in four classrooms and an auditorium, and state-of-the-art audio/video instructional resources, the Academy is equipped to meet the training needs of current and future generations of accident investigators and partners in the transportation safety community.



Entrance to the new NTSB Academy.

NTSB investigators are both instructors and students at the Academy. While advancing the field of transportation accident investigation by sharing their investigative tools and techniques with others in the accident investigation and disaster assistance communities, NTSB staff must also continue to learn from subject matter experts in a variety of fields to add to a knowledge base to keep pace with evolving technologies that are increasingly components of Board investigations.

In 2003, the Academy delivered 12 courses attended by more than 500 people, doubling the number taught in 2002. Seventy of the students were NTSB staff. Academy students come from accident investigation agencies around the world; past as well as potential future parties to Safety Board investigations, such as equipment manufacturers and unions; disaster relief agencies, including the American Red Cross; and representatives from local, state and federal law enforcement agencies. A total of 16 foreign countries were represented at Academy courses in 2003: Brazil, Canada, Chile, France, Germany, Ireland, Japan, Korea, Monaco, Peru, South Africa, Spain, Sweden, Taiwan, The Netherlands, and the United Kingdom.

In 2003, the NTSB Academy delivered 12 courses attended by more than 500 people, doubling the number of those taught in 2002. Twenty-six courses in aviation, highway, marine, railroad, and family assistance are scheduled in 2004, with many more in development.

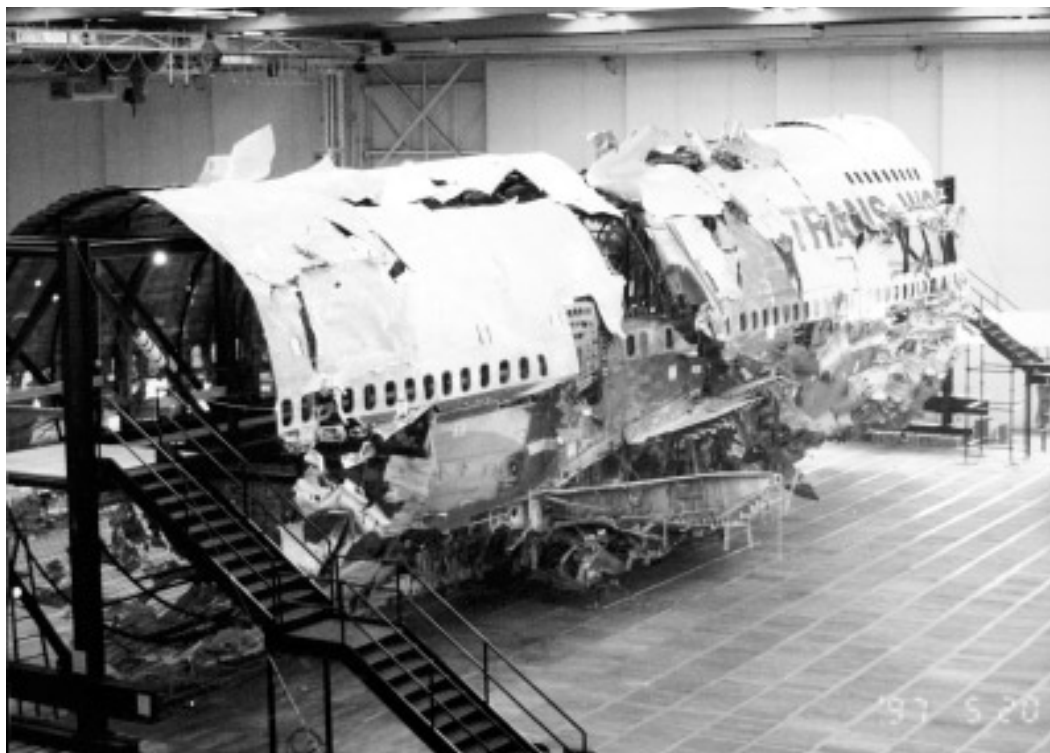


Jim Cash, RE, teaches class at the Academy.

Twenty-six courses in aviation, highway, marine, railroad, and family assistance are scheduled to be delivered in 2004, with many more in development. In September 2003, the International Society of Air Safety Investigators (ISASI) brought its one-day tutorial program to the Academy. With 170 participants who heard presentations by both NTSB and FAA investigators, the tutorial was the best attended in ISASI's 39-year history.

The Academy will also continue to promote transportation safety through hosting and conducting educational symposia. The Academy is currently developing proposals for several symposia. Symposia sponsored in whole or part by the Safety Board have been exceptionally well attended and have served to advocate transportation safety, both here and abroad, on topics including general aviation accident prevention, the role of fatigue in accident causation, legal aspects of accident investigation, and family assistance. The Academy will continue to build on this successful record with symposia designed to address newly emerging safety issues as well as re-examining topics that would benefit from the airing of new areas of research leading to safer operations.

The main laboratory, approximately the size of a football field, now houses the reconstructed wreckage of TWA flight 800. The wreckage was first reconstructed in 1997 in Calverton, New York. In early 2001, the same engineering firm that put it together under the direction of NTSB investigators, dismantled it. In October 2003, nearly 30 large trucking containers were moved from Calverton to the Academy in Ashburn. The reassembly of the wreckage was completed in December 2003.



TWA flight 800 wreckage reassembled in new Academy facility.

NTSB investigators will use this reconstructed wreckage in Academy courses attended by leaders in the aviation safety, law enforcement, manufacturing and investigative communities around the world. The purpose of the preservation and reassembly of the wreckage is to share the knowledge learned from one of the nation's largest aviation disasters and the most complex investigation ever undertaken by the Safety Board.

In addition to the main laboratory, the Academy features a smaller materials lab that will increasingly be employed to support major investigations, particularly those that may call for the use of the Academy's main lab. For the first time in NTSB history, the Board has its own facility capable of handling very large intact pieces of wreckage. A fully automated remote controlled 15-ton crane makes the examination, moving and reconstruction of parts or sections of any type of vehicle or craft possible.

The Academy's ample facilities also expand the resources of the Board's investigative functions. The Mid-Atlantic regional aviation office – one of 10 regional offices around the country – was relocated from Washington, D.C. to the Academy, opening up needed office space at Board headquarters.

Transportation Disaster Assistance

In 1996, Congress passed the Aviation Disaster Family Assistance Act that gave the NTSB the responsibility of assisting the victims of aviation disasters and their families. The Board's primary responsibility involves coordination between federal agencies, commercial airlines, state and local authorities, and the families of victims. Additionally, in 1997, Congress enacted the Foreign Air Carrier Support Act to ensure foreign air carriers operating to the United States meet the same standards for victim assistance as their domestic U.S. counterparts.

In the event of an accident in which the Office of Transportation Disaster Assistance (TDA) is tasked to respond, a team of specialists is launched, composed of an administrative officer; and managers for emergency operations, crisis operations, forensic sciences, and disaster services. Although the office has mandatory responsibilities for major aviation accidents, the expertise and techniques developed by this team have been called upon repeatedly to assist in accidents in all modes.

Primary tasks of the team upon arrival at the accident site include coordinating resources provided by local, state and federal agencies responding to assist victims and their families; establishing a Joint Family Support Operations Center (JFSOC); and ensuring that the airline establishes a Family Assistance Center (FAC). Normally the JFSOC and the FAC are co-located at a hotel where the families are lodged.

Accident Launches

In 2003, TDA specialists assisted on the following accidents:

Air Midwest Flight 5481 in Charlotte, North Carolina (21 fatalities). Coordinated the federally legislated efforts of responding local, state and federal agencies, and with the local Red Cross chapters to ensure support for family members. The TDA specialists held four family briefings in the five days they were on-scene and coordinated a site visit/memorial service, keeping the families informed on the progress of the investigation and providing a suitable environment for them to grieve. All of those killed were positively identified before the NTSB team returned to Washington.

NASA Space Shuttle Columbia Crash, Texas/Louisiana (seven fatalities). Assisted the Columbia Accident Investigation Board by coordinating with various federal, state and local agencies the victim recovery process and positive identification efforts.

Motorcoach Median Crossover Accident, Hewitt, Texas (six fatalities). Briefed survivors and the family members of the victims on the status of our investigation and our investigative progress. Assisted NTSB highway investigators with obtaining forensic injury documentation and witness interviews.

Taki-Too Capsizing, Tillamook, Oregon (nine fatalities). Supported the Office of Marine Safety during the on-scene investigation by working with the Tillamook County Medical Examiner facilitating positive identification of the victims and ensuring the proper toxicological tests were performed on the crew. Assisted the charter fishing operator by arranging for mental health assistance and debriefing through the American Red Cross.

Elderly Driver Crashes into Farmers' Market, Santa Monica, California (10 fatalities). Coordinated with the American Red Cross to provide mental health counselors to those affected by the crash. Assisted the Office of Highway Safety by providing support as needed.

Grand Canyon Helicopter Crash, Meadview, Arizona (seven fatalities). Assisted the Office of Aviation Safety by facilitating interviews. Worked closely with the consulates of Germany and Japan to provide investigative information to the family members and to acquire ante mortem information necessary for positive identification. Coordinated with the American Red Cross to provide mental health debriefings with the tour operator employees.

NTSB Academy Courses

The Office of Transportation Disaster Assistance provides comprehensive courses for professionals who support families of major transportation accident victims following a tragedy. The hands-on instruction provides participants with an operational know-how that enables them to respond to transportation disasters with confidence. These courses bring together leading experts in the field and cover a wide range of topics including initial accident notification, grief and trauma, forensic procedures, multi-cultural memorial services, and effective family briefings.

The "Family Assistance During Transportation Disasters" course brings together leaders from many transportation disciplines to share knowledge and enhance family assistance operations following transportation disasters. NTSB TDA specialists, grief and trauma specialists, federal transportation officials, and other professionals present a course focused on meeting both the immediate and long-term needs of family members affected by transportation disasters. Topics include:

- federal and commercial carrier partnerships;
- accident notification and NTSB family assistance response;
- on-scene accident operations;
- family assistance operations;
- family briefings;
- traumatic grief and mourning; and.
- forensic recovery and identification operations.

This course was presented in March at the George Washington University's Ashburn, Virginia campus and again as the first class at our new NTSB Academy in September. Over 130 transportation professionals representing domestic and international air carriers, airport authorities, several government agencies and private organizations, and airport authorities attended the two courses from 12 countries.

The “Transportation Disaster Response: A Course for Law Enforcement Officers” course enhances community readiness for a major aviation or other transportation accidents. NTSB disaster response specialists and accident investigators, federal and state law enforcement officials, and other professionals present a variety of disaster response topics. Law enforcement officials leave this course with new knowledge gained from other communities that have responded to major transportation disasters, and a confident skill set enabling them to prepare their own resources in advance.

This course was presented in June and December at the NTSB Academy.

Partnerships With Other Agencies

The NTSB and the Office of Transportation Disaster Assistance share memorandums of understanding with several other federal agencies. These agencies include the American Red Cross, the Department of Health and Human Services, the Department of Defense, the Department of State, the Department of Justice, the Federal Emergency Management Administration, and the FBI. Together, these agencies often collaborate to support both the investigative and family assistance effort at major accidents.

Member Profiles



Ellen Engleman Conners
Chairman

Ellen Engleman Conners became Chairman of the National Transportation Safety Board on March 24, 2003.

Chairman Engleman Conners was previously Administrator of the U.S. Department of Transportation's Research and Special Programs Administration (RSPA) from September 2001 until March 2003. As Administrator of RSPA, she was head of the safety regulatory offices of both Hazardous Materials Safety, responsible for 800,000 daily hazardous materials shipments, and Pipeline Safety, responsible for 2.2 million miles of natural gas and oil pipelines. Chairman Engleman Conners also headed of the Office of Emergency Transportation, which included the Crisis Management Center, a 24/7 communications center directly involved in the September 11th response, the Civil Reserve Air Fleet program, and coordination with FEMA under the Federal Response Plan. In addition, she was responsible for the Transportation Safety Institute, the Volpe Transportation Center and the research coordination within DOT.

During her tenure at RSPA, Chairman Engleman Conners successfully directed the organization to increase its efficiency and effectiveness in its safety mission. Among the her accomplishments, she significantly increased safety enforcement actions for both the Office of Pipeline Safety (OPS) and the Office of Hazardous Material Safety and aggressively cleaned up the record of unresolved NTSB safety recommendations to OPS, which resulted in its removal from the NTSB's "Most Wanted" list for the first time in 12 years.

She also served as the Transportation Security Administration's representative to the initial Transition Planning Team for the proposed Department of Homeland Security (DHS) and led the U.S. Coast Guard transition to DHS and represented the Secretary at the European Union Ministers of Transport Annual Meeting in Bucharest, Romania, and at the Global Disaster Information Network Conference in Rome, Italy.

With experience in public and governmental affairs, public policy and administration, she is a business leader and attorney. Before assuming her post at RSPA, Chairman Engleman Conners was chief executive officer of a consortium for research and development of advanced transportation and energy technologies.

Chairman Engleman Conners previously served as both Director of Corporate and Government Affairs and as a Member of the Board of Directors at Direct Relief International, a non-sectarian medical relief agency. She co-founded the Vitamin Angel Alliance, which focuses on international nutritional relief for children and women in need. She served as governmental affairs executive for GTE North, Inc., with responsibilities for federal and state telecommunications public policy and corporate communications in a 10-state region. She was a Congressional Fellow

in the office of Senator Richard G. Lugar and was Personal Assistant to former Secretary of Labor Lynn Martin.

She is an officer in the U.S. Naval Reserve and serves in Naval Reserve Mobile Public Affairs Team Detachment 208 in Jacksonville, Florida. Chairman Engleman Conners has a Masters in Public Administration from the Kennedy School of Government at Harvard University and a J.D. and B.A. from Indiana University. She was admitted to the Bar in the State of Indiana and the Federal Court system, and has received APR accreditation from the Public Relations Society of America.

She serves a five-year term as Member, which expires on December 31, 2007. Her two-year term as Chairman, which required separate nomination by the President and confirmation by the Senate, began on March 24, 2003.



Mark V. Rosenker
Vice Chairman

Mark V. Rosenker was designated as Vice Chairman of the National Transportation Safety Board on April 3, 2003. He was sworn in as a Member of the Board on March 24, 2003, after Senate confirmation.

Beginning January 20, 2001 until the announcement of his nomination to the Board, Mr. Rosenker served as Deputy Assistant to the President and Director of the White House Military Office. In this capacity, he had responsibility for policies, personnel and plans that involve Department of Defense assets in direct support of the President. He later held a temporary assignment at the Transportation Security Administration, where he advised on the roll out of the Federal screener program.

Prior to his White House appointment, Mr. Rosenker was Managing Director of the Washington, DC office for the United Network for Organ Sharing (UNOS), overseeing the development, implementation and management of a national public information program dealing with all facets of organ transplantation in the U.S. Before joining UNOS, Mr. Rosenker served 23 years as Vice President, Public Affairs for the Electronic Industries Alliance.

Mr. Rosenker's interest and experience in transportation safety dates back more than three decades to his time at a major national public affairs organization. His clients there included the American Safety Belt Council, the Motorcycle Safety Foundation, and the Safety Helmet Council of America. He later served as Director of Communications for the American Moped/Motorized Bicycle Association.

Mr. Rosenker's professional experience also includes service in the federal government at the Department of Interior, the Federal Trade Commission and the Commodity Futures Trading Commission. In 1990, he was appointed as a member of the American Battle Monuments Commission (ABMC). After serving four years, Mr. Rosenker received the Commission's highest honor, the AMBC Meritorious Service Medal.

A Major General in the Air Force Reserve, General Rosenker entered the Air Force in 1969 through the University of Maryland ROTC program. He is a graduate of the Air Command and Staff College and the Air War College. His current reserve assignment at the Pentagon is Mobilization Assistant to the Secretary of the Air Force, where he advises and supports the Secretary on reserve component issues.

Mr. Rosenker's two-year term as Vice Chairman expires on April 3, 2005. His term as a Board Member expires on December 31, 2005.



John J. Goglia
Member

John Goglia began serving as a Member of the Safety Board in August 1995. With more than 30 years experience in the aviation industry, he is the first Board Member to hold an FAA aircraft mechanic's certificate.

As a Board Member, Mr. Goglia distinguished himself in numerous areas of transportation safety. In particular, he was instrumental in raising awareness of airport safety issues, including the importance of airport crash fire and rescue operations and the dangers of wildlife at airports. He hosted a joint government-industry conference to highlight airport safety trends and facilitate improvements. He played a key role in focusing international attention on the increasing significance of aircraft maintenance in aviation accidents. He pressed successfully for greater integration of civilian and military safety information, becoming a featured speaker at national aviation symposiums attended by military

leaders and major defense contractors. He is also a leading proponent of airplane child safety seats.

Mr. Goglia was an outspoken advocate for greater compassion and sensitivity in dealing with surviving family members of victims of transportation accidents. He worked diligently to ensure that families receive timely and forthright information following transportation accidents. In recognition of his dedication to helping grieving families, the National Air Disaster Alliance awarded him its 2001 Aviation Safety Award.

During his appointment as a Board Member, Mr. Goglia participated in numerous air, rail and bus accident investigations. He chaired the Board's public hearing on the ValuJet crash into the Florida Everglades. He was the on-scene Member at the Fox River Grove, Illinois grade-crossing accident that killed seven high school students in a school bus, the Silver Spring, Maryland commuter rail collision and the Bourbonnais, Illinois fatal train crash involving Amtrak's City of New Orleans.

Prior to becoming a Board Member, Mr. Goglia held numerous positions in the airline industry and was involved for more than 20 years as a union flight safety representative on accident investigation teams. For 12 years, he operated his own aircraft service company. Mr. Goglia also served as the Governor's appointee to the Boston Area Second Airport Site Selection Board and the Massachusetts Workers Compensation Review Commission.

Long a champion of aviation education, Mr. Goglia served as Chair and a founding member of the National Coalition for Aviation Education, an aviation industry organization that advances education among America's youth and aviation workforce. He was an original member of the steering committee to establish the International Society of Aviation Maintenance Professionals, a society dedicated to advancing safety and professionalism throughout the aviation maintenance industry.

Mr. Goglia's term expired on December 31, 2003.



Carol J. Carmody
Member

Carol J. Carmody of New Orleans was sworn in on June 5, 2000, as the 30th member of the Safety Board, and was appointed Vice Chairman on January 19, 2001. Effective September 16, 2002, Ms. Carmody began serving as the Acting Chairman; she also served in this capacity from January 22 through September 23, 2001.

Ms. Carmody brings to the job more than 20 years experience with the aviation community. Before coming to the NTSB, she worked as an independent consultant focusing on international and environmental issues. She served as the U.S. Representative to the Council of the International Civil Aviation Organization (ICAO) in Montreal from 1994 to 1999. Early in her term, she was instrumental in persuading ICAO to start a safety oversight program to assess the compliance of countries with ICAO standards. This was a first at ICAO, and the results will improve safety for the traveling public around the world.

Ms. Carmody spent from 1988 to 1994 as a professional aviation staff member of the Senate Commerce Committee. She worked on legislation to mandate inspections for aging aircraft, to improve pilot training, to phase out Stage 2 aircraft, to authorize passenger facility charges, and to reform the FAA -- particularly in areas of finance and procurement.

Until 1988, when she joined the Senate Committee, she had worked for 11 years at the FAA in jobs of increasing responsibility, leading to her appointment in 1985 as Deputy Director of Congressional Services in the Office of the Administrator. Her FAA career began in the Budget Office in 1977.

Since her appointment as Board Member, Ms. Carmody has been on-scene member at several accidents, including the aircraft accidents which killed Minnesota Senator Paul Wellstone in October 2002 and Missouri Governor Mel Carnahan in October 2000; the Amtrak derailment in Kensington, Maryland in July 2002; and the March 2001 Aspen, Colorado airline crash that killed 18 people.

In July 2002, Ms. Carmody also chaired a public hearing to examine safety issues surrounding the January 18, 2002, Minot, North Dakota, derailment and subsequent release of over 200,000 gallons of anhydrous ammonia. In October 2002, Ms. Carmody chaired an en banc hearing into the November 2001 crash of American Airlines flight 587; all Board Members participated in this hearing, with Acting Chairman Carmody presiding.

Her career includes managing a firm that administered Taft-Hartley pension plans; owning and managing an employment agency; serving at the Central Intelligence Agency; and working at Braniff Airlines. Ms. Carmody has a Master's in Public Administration from American University in Washington, D.C. and a Bachelor of Arts from the University of Oklahoma.

Ms. Carmody's term as Member expires on December 31, 2004. Her term as Vice Chairman expired in January 2003.



Richard Healing
Member

Richard F. Healing was sworn in as a Member of the National Transportation Safety Board on March 28, 2003.

Before joining the Safety Board, Mr. Healing had been Director of Transportation Safety and Security for the Battelle Memorial Institute since March 2002. Based in Washington, DC, he had primary responsibility for Battelle's relationship with the FAA.

Prior to this, Mr. Healing had served since 1985 as Director, Safety and Survivability, for the Department of the Navy. During his Navy civilian career, his work focused on aviation safety and emphasized benefits from sharing military safety information with other aviation community participants, especially commercial aviation.

In 2001, Mr. Healing was presented the Navy's highest civilian award—the Distinguished Civilian Service Medal. He also was recognized with the SAFE International "General Spruance Award" for safety education achievement, and an Aviation Week "Laurel" for bringing new awareness to the importance of wire health and condition monitoring technology in aviation. His other awards include the Navy Superior Public Service Medal for creating the Navy's Safety Non-Developmental Items program, and the Defense Superior Service Medal for active military service during Desert Storm and Desert Shield. Before coming to Washington in 1983, Mr. Healing was President and CEO of an engineering, construction and contracting services firm in Connecticut. He also was Executive Vice President and Managing Director of Fairfield Precision Industries, a manufacturer of replacement parts for the military.

A licensed Professional Engineer since 1974, Mr. Healing attended the U.S. Coast Guard Academy and graduated from Worcester Polytechnic Institute. He pursued graduate studies at the University of Bridgeport, Bridgeport Engineering Institute, Rensselaer Polytechnic Institute, Harvard University, and Georgetown University. He graduated from the Naval War College in 1990, and was selected to participate on the President's Commission on Executive Exchange. In 1991, he was a Senior Executive Fellow at Harvard University. Mr. Healing served 6½ years active duty in the U.S. Coast Guard. After more than 29 years and four commands, he retired from the Coast Guard Reserve as a Captain.

Mr. Healing's term as Board Member expires on December 31, 2006.



John Arthur Hammerschmidt
Former Member

John A. Hammerschmidt served for over 18 years at the Safety Board. He served as a Member of the Board since June 1991 and, prior to that, served as Special Assistant to the Board Chairman and Member during 1985-91. He has been appointed by the President and confirmed by the U. S. Senate three times. He was named Vice Chairman and Acting Chairman in January 2003 until his departure from the Board in April 2003.

Mr. Hammerschmidt is a private pilot, and was the senior Safety Board Member. He participated on-scene in more than five dozen major accident investigations and public hearings, involving all transportation modes: highway; aviation; rail; marine; pipeline; and space launch. His on-scene investigations include the 2001 collision between the U.S. nuclear attack submarine *USS GREENEVILLE* and the Japanese fisheries training vessel *EHIME MARU* near Honolulu, Hawaii; the 2000

Alaska Airlines flight 261 accident near Point Mugu, California; the 1999 gasoline pipeline accident in Bellingham, Washington; the 1997 Comair EMB-120 commuter airline accident near Monroe, Michigan; the 1996 collision of the bulk carrier *BRIGHT FIELD* with the Port of New Orleans River Walk Shopping Mall; the 1995 Atlantic Southeast Airlines EMB-120 commuter accident at Carrollton, Georgia; the 1994 USAir DC-9 accident at Charlotte, North Carolina; and the 1993 Amtrak accident near Mobile, Alabama, the worst in Amtrak history.

In 2000, Mr. Hammerschmidt chaired the Board's four-day public hearing on the Alaska Airlines flight 261 accident. In 1999, he chaired the Board's public hearing in Miami, Florida on the 1998 fire aboard the cruise ship *MS ECSTASY* as the vessel was leaving the Port of Miami. In 1997, he chaired a four-day public hearing in San Juan, Puerto Rico on the worst pipeline accident ever investigated by the Board, an explosion that killed 33 people. In 1996, he chaired the Board's public hearing into the Fox River Grove, Illinois grade-crossing accident that killed seven high school students in a school bus. In 1995, he chaired the five-day public hearing in Indianapolis, Indiana on the American Eagle ATR-72 accident near Roselawn, Indiana. In 1994, he chaired the public hearing in Charlotte, North Carolina on the USAir DC-9 accident there and he chaired the public hearing in Ypsilanti, Michigan on the American International Airways DC-8 accident at the U. S. Naval Air Station, Guantanamo Bay, Cuba.

Prior to 1985, Mr. Hammerschmidt served in the Office of the Vice President of the United States (1984), and from 1974-83 he was the Chief Executive Officer of the Hammerschmidt Lumber Company, Inc., Harrison, Arkansas. Mr. Hammerschmidt was also president of the Boone County (Arkansas) Industrial Development Corporation.

In 1971, Mr. Hammerschmidt graduated from Dartmouth College "with highest distinction" in his major and was named a Rufus Choate Scholar. He later attended Vanderbilt Law School and Harvard Business School. He also studied at the Catholic University of Ecuador in Quito as part of Georgetown University's foreign study program.

Member Hammerschmidt's term on the Safety Board expired on December 31, 2002 and he departed the Board in April 2003.



George Washington Black, Jr.
Former Member

George W. Black, Jr., P.E., became a Member of the Safety Board on February 22, 1996, and was the first practicing highway engineer to be a Board Member. He is a 1968 graduate of the Georgia Institute of Technology, with a Bachelor of Civil Engineering degree, and is a registered professional engineer. While at Georgia Tech, Mr. Black worked in one of the original Multi-Disciplinary Traffic Crash Investigation Teams funded by the DOT. Member Black was an Air Force ROTC graduate and served as an Aircraft Maintenance Officer while stationed in Texas and southeast Asia. He was assigned to the supervision of flight line maintenance of B-52D and KC-135A aircraft.

Returning to traffic safety engineering in 1973, he became the first traffic engineer for Gwinnett County, Georgia, in the Atlanta metropolitan area. The county has a population of 475,000 persons and 2,500 miles of roadway. Member Black remained with Gwinnett County for 24 years, retiring as Director of Transportation in 1996. During his last ten years with the county, he oversaw the implementation of a nearly \$500 million road and airport improvement program.

Mr. Black helped found the County Police Department's fatal accident investigation unit in 1974. He was a member of that unit for the next 22 years and assisted in the investigation of 2,000 fatal or critical-injury traffic crashes and rail-highway grade crossing incidents. He also taught accident investigation and reconstruction in the county and state police academies for 23 years.

Member Black is a fellow of the Institute of Transportation Engineers, and a member of the American Society of Civil Engineers, the National Society of Professional Engineers, the Society of Automotive Engineers, the Transportation Research Board, the National Committee on Uniform Traffic Control Devices (technical committee), and other professional organizations.

Mr. Black was the recipient of the 1991 Institute of Transportation Engineers' Karl Bevens Award and the 1997 Transportation Professional of the Year Award, the American Society of Civil Engineers' 1996 National Civil Government Award and its 2001 President's Award. In August 1998, he received the International Institute of Transportation Engineers' Edmund R. Ricker Traffic Safety Award, and in April 1999, he received an Aviation Week and Space Technology "Laurels Award" for his work on the 1994 crash of US Air flight 427 near Pittsburgh, Pennsylvania.

Member Black was the on-scene Board Member for several accidents including Delta flight 1288 at Pensacola, Florida; United Express flight 5926 at Quincy, Illinois; Korean Air flight 801 on Guam; and American flight 1420 in Little Rock, Arkansas. In other modes of transportation, he was on scene at a propane gas explosion in San Juan, Puerto Rico; a fatal interstate bus crash in Cheesequake, New Jersey; and school bus accidents in Monticello, Minnesota and Holmdel, New Jersey.

Mr. Black's term as a Safety Board Member expired on December 31, 2001. He resigned from the Board in January 2003.

