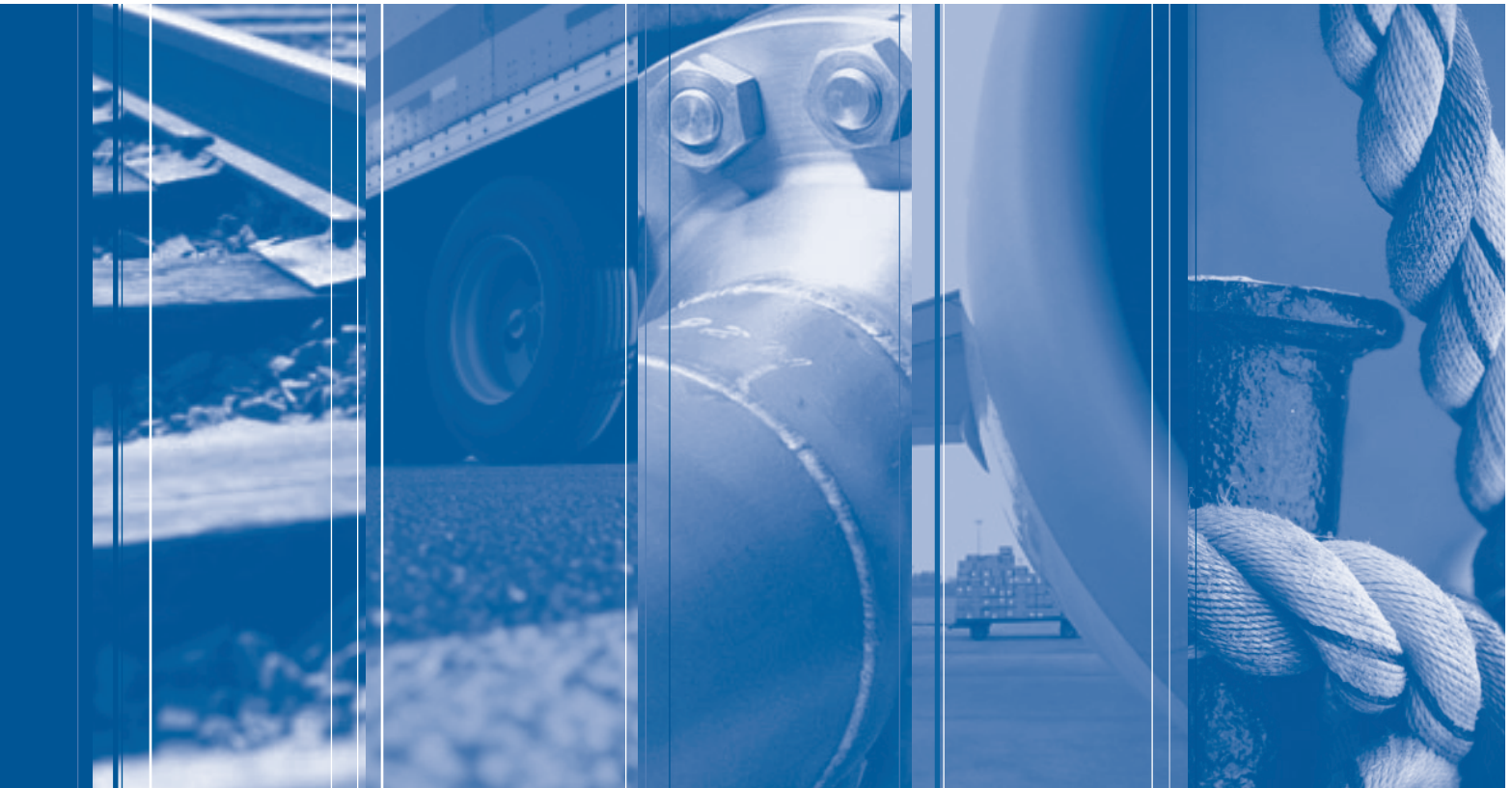


National Transportation Safety Board

ANNUAL REPORT

to Congress



2005 ANNUAL REPORT

NTSB/SPC-06/01



**National
Transportation
Safety Board**

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 Safety 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 aviation and seaman certificates issued by the Federal Aviation Administration (FAA) and the U.S. Coast Guard 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 the 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 accidents related to the transportation of hazardous materials.

In 1974, Congress reestablished the NTSB as a completely separate entity, outside the DOT, reasoning that "...No federal agency can properly perform such (investigatory) functions unless it is totally separate and independent from any other...agency of the United States." Because the DOT 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 Safety Board the additional responsibility of coordinating Federal assistance to the families of aviation accident victims. In 2000, the 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. Beginning October 1, 2006, the name of the Academy will change to the NTSB Training Center to better reflect the internal training aspects of the facility.

Since its inception, the Safety Board has investigated more than 124,000 aviation accidents and over 10,000 surface transportation accidents. To date, the Board has issued about 12,350 safety recommendations pertaining to the various transportation modes to more than 2,200 recipients.

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 about 12,350 safety recommendations pertaining to the various transportation modes to more than 2,200 recipients. Because the Safety 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.

In 2005, the Safety Board issued 84 safety recommendations and closed 142 recommendations, 111 of which were based on actions classified as “acceptable.” In aviation, 29 were closed “acceptable”; 37 in highway; 8 in pipeline and hazardous materials; 10 in marine, and 27 in rail. The Board also updated its Most Wanted list of vital safety recommendations targeted to Federal regulators and the States.

NTSB investigators generated an additional 49 safety improvements through the Safety Proposal Review Board, a program that recognizes direct interaction between NTSB technical staff and industry representatives without requiring formal NTSB recommendations.

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.

2005 Annual Report

National Transportation Safety Board

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Most Wanted Safety Recommendations

In 2005, the NTSB marked the 15th anniversary of its Most Wanted list of transportation safety improvements. Established in 1990, the list focuses attention on safety improvements the Safety Board believes would significantly reduce accidents and save lives.

Over the past 15 years, more than 260 recommendations have been added to the Most Wanted list. The more than 200 that were removed have an 85 percent acceptance rate—higher than the Safety Board's overall recommendation acceptance rate of 82 percent.

Implementing recommendations from the Most Wanted list has significantly upgraded safety on fishing vessels, large cruise ships, and smaller passenger vessels. Passenger safety devices and information have improved in railcars, and rail tank cars that carry hazardous materials are stronger and more resistant to puncture. Aviation advances include ground proximity warning systems, fire detection and suppression systems in airline cargo holds, structural metal fatigue testing and repairs, better safeguards against hazards of wake vortex turbulence, and a complete safety overhaul of commuter airline safety requirements so they are similar to large passenger aircraft standards. The Most Wanted list has inspired major improvements in school bus construction, safety standards, and emergency exits, and stiffer standards for alcohol and substance abuse in all transportation modes. Pipeline safety has improved because of better awareness of the hazards of excavation damage when digging near pipelines.

The 2005 list contains 56 recommendations: 47 to Federal regulatory agencies and nine to the States. The Safety Board reviewed the Most Wanted list at two separate public meetings, one focusing on Federal issues and the other on State issues.

In 2005, the Safety Board again pressed for quicker action by the Federal Aviation Administration (FAA) to reduce airport runway incursions and accidents. However, the Board also noted positive progress by the FAA in pursuing aircraft fuel tank and aircraft wing icing safety; by the Federal Railroad Administration (FRA) in strengthening railroad recorder crashworthiness; and by the U.S. Coast Guard in moving forward on rulemaking to strengthen marine drug and alcohol testing requirements.

The Safety Board removed from the list a recommendation for nighttime driving restrictions for young novice drivers because 43 States, the District of Columbia, and Guam now have such restrictions. The Board also removed a recommendation regarding comprehensive minimum drinking age laws because 25 States and the District of Columbia have comprehensive laws and an additional 17 States have all but one element recommended by the Board. The Board added a recommendation to the list to restrict the use of wireless communication devices by young novice drivers, because learning to drive requires all the concentration that a novice driver can muster.

The Safety Board continued to evaluate timeliness designations for the Federal issues on the list. Since 2003, items on the list have been color-coded: **green** - acceptable action, progressing in a timely manner; **yellow** - acceptable action, progressing slowly; and **red** - unacceptable action or progress has stalled. The Federal agency items below are color-coded to indicate their status.

2005 Most Wanted List

Actions Needed by Federal Agencies

AVIATION

The FAA should act to:

Reduce Dangers to Aircraft Flying in Icing Conditions (RED)

- Use current research on freezing rain and large water droplets to revise the way aircraft are designed and approved for flight in icing conditions.
- Conduct additional research with the National Aeronautics and Space Administration to identify realistic ice accumulation and incorporate new information into aircraft certification and pilot training requirements.

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

- Implement design changes to eliminate the vulnerability of flammable fuel/air vapors in all transport category aircraft.

Stop Runway Incursions/Ground Collisions of Aircraft (RED)

- 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 backup power sources so cockpit voice recorders collect an extra 10 minutes of data when an aircraft's main power fails.
- Install video recorders in cockpits to give investigators more information to solve complex accidents.

Require Restraint Systems for Children Under Age 2 (RED)

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

RAILROAD

The FRA should act to:

Implement Positive Train Control Systems (YELLOW)

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

HIGHWAY

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

Improve the Safety of Motor Carrier Operations (YELLOW)

- Prevent motor carriers from operating if they 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) 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 motorcoach passengers from being thrown out of their seats or ejected when a bus sustains a front, side, or rear impact or rolls over.
- Develop standard definitions and classifications for each of the different bus body types.

MARINE

The U.S. Coast Guard should act to:

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

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

INTERMODAL

The DOT, FAA, Coast Guard, and Pipeline and Hazardous Materials Safety Administration should act to:

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

- 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

HIGHWAY

Improve Child Occupant Protection

- Enact State laws requiring booster seats for young children.

Enact Primary Seat Belt Enforcement Laws

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

Promote Teen Highway Safety

- Enact graduated driver licensing legislation.
- Restrict the number of teen passengers traveling with young novice drivers.
- Restrict the use of wireless communications devices by young novice drivers.

Eliminate 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 \geq 0.15).
 - Zero blood alcohol requirement for convicted driving-while-impaired (DWI) offenders when they get their license back.
 - Administrative rather than court-based license revocation for refusing to take or failing the sobriety test.
 - Vehicle sanctions for DWI offenders.
- Eliminate plea-bargaining 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.

Improve School Bus/Grade Crossing Safety

- Install stop signs at passive crossings.
- Prioritize for upgrade to lights and gates, crossings that school buses traverse that now only have warning signs.

- Install noise-reducing switches on new buses.
- Enhance bus driver training and evaluation.
- Include grade-crossing questions on commercial driver's license exams.

MARINE

Enhance Recreational Boating Safety

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

The NTSB and Congress

The NTSB provided testimony to Congressional committees several times during calendar year 2005. Below is a summary of testimony provided by Members and staff of the NTSB. Complete copies of NTSB testimony are available on the Board's website at <http://www.ntsbgov/speeches>.

Acting Chairman Mark V. Rosenker presented testimony to the U.S. Senate, Committee on Appropriations, Subcommittee on Transportation, Treasury, the Judiciary, Housing and Urban Development, and Related Agencies, on May 31, 2005, on behalf of the NTSB regarding the agency's appropriation needs for fiscal year 2006. The testimony summarized the Board's mission; accomplishments throughout the year; advocacy outreach program with the States; major investigations in the Offices of Aviation Safety, Highway Safety, Railroad, Pipeline and Hazardous Materials Investigations, and Marine Safety; the Most Wanted list; and Safety Recommendations and Accomplishments.

Acting Chairman Rosenker also presented testimony to the U.S. House of Representatives, Committee on Appropriations, Subcommittee on Transportation, Treasury, Housing and Urban Development, the Judiciary, and District of Columbia, on May 31, 2005, on behalf of the NTSB regarding the agency's appropriation needs for fiscal year 2006.

Acting Chairman Rosenker testified before the U.S. House of Representatives, Committee on Transportation and Infrastructure, Subcommittee on Railroads, on July 21, 2005. The hearing was held to evaluate the current state of grade crossing safety and efforts to reduce the incidence of grade crossing accidents. The Acting Chairman testified about the Safety Board's findings on train whistle audibility and passive grade crossing safety and updates on positive train control safety.

Acting Chairman Rosenker testified before the U.S. Senate, Committee on Commerce, Science and Transportation, on November 1, 2005, in consideration of his nomination by President Bush to serve as Member of the NTSB. The Committee approved the Acting Chairman's nomination by voice vote on November 2, 2005, with a new five-year term to expire on December 31, 2010.

Mr. Robert Chipkevich, Director, Office of Railroads, Pipeline, and Hazardous Materials Investigations, testified on behalf of the NTSB before the U.S. House of Representatives, Committee on Transportation and Infrastructure, Subcommittee on Railroads, on April 28, 2005. The hearing was held to evaluate new technologies being developed to enhance the safety and security of freight and passenger trains. Mr. Chipkevich testified on the importance of implementing positive train control systems.

State and Local Government Outreach

About 42,000 people are killed each year in highway accidents, and the Safety Board believes it is imperative that State and local governments make highway safety a top priority. Safety Board Members and staff delivered this message throughout 2005 via wide-ranging public appearances including legislative testimony, presentations to public and private sector groups, media events, and leadership in safety coalitions.

The States considered and enacted a variety of legislation and regulations related to Safety Board recommendations. The National Conference of State Legislatures reports that State legislators considered more than 1,500 bills regarding highway safety issues during their 2005 legislative sessions.

Even though 39 States and the District of Columbia have adopted many elements of the Safety Board's recommended graduated driver licensing (GDL) system, highway crashes continue to be the leading cause of death among teenagers. Almost 8,000 teen drivers were involved in fatal crashes in 2004. Twenty-seven States considered teen driver legislation in 2005, with most proposing to add restrictions to existing GDL systems such as passenger limitations, restrictions on cell phone use, and nighttime driving restrictions. Oklahoma enacted legislation establishing a comprehensive graduated driver licensing law that fully satisfies the Board's recommendation. Hawaii, Montana, Nevada, and Wyoming also enacted legislation that either established a new (Montana and Wyoming) or improved an existing (Hawaii and Nevada) graduated driver licensing law. Laws in these States, however, do not fully satisfy the Board's recommendation.

The most significant new trend was adoption of wireless communication device restrictions for novice drivers holding a learner's permit or intermediate license. Eleven States and the District of Columbia have adopted laws related to use of these devices. Thirty-five States considered this legislation in 2005 and eight adopted measures, six of which comport with the Board's recommendation. In addition, in 2005, the Board testified for the first time on the Most Wanted School Bus/Grade Crossing recommendation in Arkansas.

Increasing proper safety belt use is the single most important measure that can be taken to reduce deaths and injuries from traffic crashes. The Safety Board provided support to State education and enforcement efforts, which led to a new milestone of belt use by 80 percent of motor vehicle occupants. The Board's efforts focused on States that do not place restrictions on the enforcement of their safety belt use requirements, such as South Carolina, which adopted primary enforcement in 2005. The Board worked with nine States (Arkansas, Arizona, Massachusetts, Maine, Missouri, Montana, South Carolina, Virginia and Wisconsin) in 2005 to improve safety belt use laws. Fourteen States considered and six States (Connecticut, Idaho, North Dakota, New Mexico, Washington, and West Virginia) adopted legislation to expand their child passenger safety requirements to require older children to use booster seats.

NHTSA estimates that more than 16,000 persons die in alcohol-related highway crashes each year. These preventable deaths prompted many States to consider legislation to reduce impaired driving in 2005. In particular, attention was directed toward hardcore drinking drivers, offenders who drive with a high blood alcohol concentration, or who are repeat DWI offenders. At least 10 States strengthened their laws addressing hardcore drinking drivers.

In 2005, the Safety Recommendations and Communications staff testified 23 times in 13 States, held 43 coalition meetings, gave 12 speeches at media events and conferences, and conducted 27 other advocacy activities.

States continue to recognize the need to improve recreational boating safety. At least nine States considered proposals to strengthen boating-while-impaired laws, to require children to wear a lifejacket while on a boat, or to establish boater education requirements. Washington and Minnesota adopted boating safety measures and action continues in Massachusetts and Wisconsin.

The Safety Board continued to actively encourage adoption of measures consistent with its recommendations, through testimony to State legislatures and numerous appearances before industry groups. Many of these groups adopted resolutions in support of Safety Board recommendations and asked their membership to support State legislation.

In addition to these 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 22 separate accident investigations in 2005, and testified before the New York City Council on its investigation into the *Staten Island Ferry* accident.

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. Subsequent legislation also authorized 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 are 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 the International Civil Aviation Organization (ICAO), by sending accredited representatives to participate in investigations of cases that involve U.S. interests.

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 transportation by air of U.S. citizens and other travelers around the world.

The Safety Board also investigates about 2,000 aviation accidents and incidents annually. These investigations can result in safety improvements that have far-reaching effects. 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 given 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 causes 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. Seven divisions comprise the headquarters office and 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.

For most of the almost 2,000 commercial and general aviation accident/serious incidents investigated each year, a regional investigator, from one of the 10 NTSB regional offices, serves as the investigator-in-charge. However, when the Safety Board is notified of a major aviation accident, it launches a go-team from headquarters, 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 and staff specialists in as many as 14 different specialties.

The Office of Aviation Safety has 83 investigators and 43 support staff. In 2005, it launched on 16 major domestic investigations and 17 foreign accident investigations. The office completed four major reports and continued work on seven other major reports.

Additional specialty areas may be added as required by the investigation. 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 group chairmen to coordinate information for their part of the investigation, from on-scene activities through adoption of the final report.

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 firsthand access to specialized information. For example, the manufacturer is the best source of information on the design of the specific aircraft being investigated. The Board also makes use of outside laboratories and research facilities whenever needed.

A public hearing may be convened, generally within a year of an 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 analyzes the investigative record and identifies 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. Regional investigations will frequently identify safety issues that can correct safety problems before they result 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. Accredited NTSB 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 the ICAO.

Completed Major Aviation Investigations

First Officer's Failure to Apply Proper Techniques for Crosswind Landing Causes Federal Express Flight 647 Crash in Memphis, Tennessee

On May 17, 2005, the Safety Board determined that the probable cause of the crash on December 18, 2003, of a Federal Express cargo aircraft while landing at Memphis International Airport was the first officer's failure to properly apply crosswind landing techniques to align the airplane with the runway centerline and to properly arrest the airplane's descent rate before touchdown. The captain's failure to adequately monitor the first officer's performance and command or initiate corrective action during the final approach and landing contributed to the accident, the Board said.



Two crewmen and five non-revenue Federal Express pilots were on board the airplane. The first officer and one non-revenue pilot received minor injuries while the plane was being evacuated after the accident.

The investigation found that the first officer had demonstrated unsatisfactory performance during proficiency checkrides at a previous employer and at Federal Express. During her career at Federal Express, she had two unsatisfactory proficiency checkrides. The investigation was unable however, to directly link her previous deficiencies to her actions on the day of the accident. During the accident flight, the captain was serving as both check airman and pilot in command; he was expected to continually monitor the first officer's performance while at the same time being responsible for the overall safe conduct of the flight. After the accident and as a result of several other accidents and incidents, the Federal Express Flight Operations Directorate developed an Enhanced Oversight Program to improve air safety through early identification of pilots who exhibit deficiencies during training or checkrides.

The main landing gear of the Boeing MD10-10F collapsed after the crash and the right wing caught fire. Flight crew and jumpseaters attempted to evacuate using the L1 door slide; however, the slide separated from the airplane while it was inflating. Therefore, everyone on the aircraft was forced to exit the airplane through the cockpit window. During the evacuation and while people were still on the plane, at least 13 pieces of personal baggage were thrown from the airplane. Federal Express issued guidance after this accident requiring pilots involved in an accident to evacuate in the most expeditious manner possible, without salvaging their baggage.

As a result of this accident, the Safety Board made four recommendations to the FAA:

- Require all Part 121 air carrier operators to establish programs for flight crewmembers who have demonstrated performance deficiencies or experienced failures in the training environment that would require a review of their whole performance history at the company and administer additional oversight and training to ensure that performance deficiencies are addressed and corrected.

- Amend the emergency exit training information contained in the flight crew and cabin crew sections in the FAA's *Air Transportation Aviation Inspector's Handbook* to make the emergency exit door/slide training described in the flight crew section as comprehensive as the cabin crew emergency training section of the principal operations inspector handbook.
- Verify that all Part 121 operators' emergency door/slide trainers are configured to accurately represent the actual airplane exit door/slide and that their flight crew emergency exit door/slide training provides the intended hands-on emergency procedures training as described in 14 *Code of Federal Regulations (CFR)* Section 121.417, to include pulling the manual inflation handle.
- Inform all air traffic control tower controllers of the circumstances of this accident, including the need to ensure that aircraft rescue and firefighting vehicles are not delayed without good cause when en route to an emergency and the need to relay the number of airplanes.

Captain's Failure to Execute Proper Techniques Causes Executive Airlines Accident While Landing in San Juan, Puerto Rico

On September 7, 2005, the Safety Board determined that the probable cause of a May 9, 2004 accident involving an Executive Airlines airplane that crashed while landing at Luis



Munoz Marin International Airport San Juan, Puerto Rico, was the captain's failure to execute proper techniques to recover from bounced landings and his subsequent failure to execute a go-around. As a result of the accident, the Safety Board recommended that the FAA require all airlines to incorporate bounced landing recovery techniques in their flight manuals and to teach these techniques during initial and recurrent training.

On the day of the accident, Executive Airlines flight 5401 was doing business as an American Eagle flight from Mayaguez, Puerto Rico, to San Juan. During the landing, the airplane bounced twice before coming to a complete stop on a grassy area about 217 feet from the runway's centerline and about 4,317 feet beyond the runway. The captain was seriously injured. The first officer, two flight attendants, and 16 of the 22 passengers received minor injuries. Damage to the aircraft was substantial.

During its investigation, the Safety Board also learned that the left aileron surface position data recorded by the accident airplane's flight data recorder were invalid, even though the aircraft was modified on August 7, 2001, with position sensors and associated hardware required by a supplemental type certificate (STC). The Safety Board issued two recommendations to the FAA asking for replacement of aileron sensors installed in accordance with the STC (ST01310NY) and calling for a review of all flight data recorder systems that have been modified by an STC to ensure that the sensors provide reliable data.

Major Ongoing Aviation Investigations

Helicopter Crash off the Coast of Galveston, Texas

(This report was adopted by the Board on 3/7/06)

The Safety Board is investigating the crash of an ERA Aviation, Inc., Sikorsky S-76A twin-engine turbine-powered helicopter (N579EH) that occurred on March 23, 2004, in the Gulf of Mexico. The aircraft, chartered by Unocal of Houston, Texas, departed Scholes International Airport near Galveston, Texas, for the High Island A-557 refueling platform, and then an offshore drilling ship. The two crewmembers and eight passengers aboard were killed.

Convair 589 Cargo Plane Crash near Cincinnati, Ohio

(This report was adopted by the Board on 5/2/06)

The Safety Board is investigating the crash of a cargo aircraft near Cincinnati, Ohio, on August 13, 2004. Air Tahoma flight 185, a Convair 580 (NV586P), reported engine trouble before crashing onto a golf course short of runway 36R of Cincinnati/Northern Kentucky International Airport. One crewmember was killed; the other was seriously injured.

Pinnacle Airlines Crash in Jefferson City, Missouri

The Safety Board is investigating an accident involving a Pinnacle Airlines Canadair CL-600-2B19 regional jet that crashed in a residential area in Jefferson City, Missouri, on October 14, 2004. The airplane was destroyed by the impact forces and a post-crash fire. The two crewmembers were killed.

Jetstream 32 Accident in Kirksville, Missouri

(This report was adopted by the Board on 1/24/06)

The Safety Board is investigating the crash of a twin-engine turboprop airliner in Kirksville, Missouri. The British Aerospace Jetstream 32, operating as American Connection flight 5966, crashed on approach to the Kirksville Regional Airport on October 19, 2004. The aircraft carried two crewmembers and 13 passengers; there were two survivors.

Business Jet Services Accident in Houston, Texas

On November 22, 2004, a Gulfstream G-1159A (G-III), N85VT, operated by Business Jet Services, crashed while on approach to Houston Hobby Airport, Houston, Texas. The airplane was on an instrument landing system approach to the runway when it struck a light pole adjacent to a roadway and crashed into a field. The airplane was destroyed by impact forces and fire. The two pilots and one flight attendant on board were killed.



Presidential Airways, Inc., Turboprop Crash near Bagram, Afghanistan

On November 27, 2004, a CASA 212 twin-engine turboprop airplane, operated by Presidential Airways, Inc., of Melbourne, Florida, was destroyed when it collided with terrain about 80 miles west of Bagram, Afghanistan. The certificated airline transport pilot and copilot, flight mechanic, and three passengers were killed.

On December 4, 2004, the Transitional Islamic Government of Afghanistan requested, through the Embassy of the United States, that in accord with ICAO Annex 13, the Safety Board be delegated to conduct the investigation. Parties to the investigation are the FAA, the United States Air Force Safety Center, the United States Army Safety Center, and Presidential Airways, Inc.

Bombardier Challenger CL-600 Crash in Teterboro, New Jersey

On February 2, 2005, a Bombardier Challenger CL-600 corporate jet N370V operated by Platinum Jet Management, Fort Lauderdale, Florida, impacted a fence, two cars, and a warehouse off the departure end of a runway during an aborted takeoff attempt from Teterboro Airport, Teterboro, New Jersey. A post-crash fire ensued. The pilot and copilot sustained non-life-threatening serious injuries. A flight attendant on board sustained minor injuries. All eight passengers also survived the accident with minor injuries. Two occupants of the cars suffered serious injuries.



Crash of Cessna Citation 560 in Pueblo, Colorado

On February 16, 2005, a Cessna Citation 560 N500AT crashed while on approach to the Pueblo Memorial Airport, Pueblo, Colorado. The two flight crewmembers and six passengers were killed, and the airplane was destroyed by impact and a post-crash fire. The accident site was an open field approximately four miles east of the runway. The airplane was owned and operated by Circuit City Stores, Inc., of Richmond, Virginia, using the aircraft management services of Martinair. Parties to the investigation are the FAA, Cessna, and Martinair.

Runway Overrun by Southwest Airlines flight 1248

On December 8, 2005, Southwest Airlines flight 1248, a Boeing 737-700, overran the runway at Chicago Midway Airport, Chicago, Illinois. The airplane departed the end of the runway and rolled through a blast fence and a perimeter fence and onto a roadway. The airplane came to stop after striking two automobiles. There were four minor injuries among the 98 passengers and five crewmembers on board, one ground fatality, and eight other ground injuries among the occupants of the two automobiles. Instrument meteorological conditions prevailed at the time due to snow.



Chalks Ocean Airways Crash Off Miami, Florida

On December 19, 2005, at 2:39 p.m. eastern standard time, a Grumman Mallard G73T (N2969), operated by Flying Boat, Inc., as Chalks Ocean Airways flight 101, crashed into a shipping channel adjacent to the Port of Miami shortly after takeoff. The aircraft, a seaplane, had departed from the Miami Seaplane Base, and taken off from the shipping channel with two crewmembers and 18 passengers (including three infants). The scheduled flight was destined for Bimini, Bahamas, operating under the provisions of 14 CFR Part 121. All 20 occupants suffered fatal injuries. Visual meteorological conditions prevailed at the time of the accident. The examination of the right wing root found indications of a fatigue crack in the aft wing lower spar cap.



In 2005, the Office of Aviation Safety regional staff initiated 1,927 investigations, completed 2,335 and continues work on 885 investigations.

Regional Aviation Operations

In 2005, the regional offices initiated 1,927 accident investigations and 128 serious incident and accident investigations, involving mostly commercial operations, and completed 2,335 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. The investigator, 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. A brief report, including the probable cause of the accident, becomes available on the agency website after the cause is determined.

Completed Regional Aviation Investigations

In the Alaska Region

Boeing 747 Rapid Decompression near Anchorage, Alaska

On December 5, 2004, a Boeing 747 operated by Nippon Cargo Airlines under 14 CFR Part 129, en route to Narita, Japan, from Anchorage, Alaska, had a rapid decompression at 30,000 feet above mean sea level, and made an emergency landing at Ted Stevens Anchorage International Airport. Investigation by a regional investigator disclosed a large tear in the forward pressure bulkhead along a rivet line. A portion of the bulkhead was excised and forwarded for metallurgical examination by Boeing and the NTSB Materials Laboratory in Washington, DC, in January 2005.

The examination revealed a fatigue failure in the bulkhead material next to the rivet line. As a result of the finding, Boeing issued a revised service bulletin calling for increased inspections of the bulkhead, and the FAA subsequently issued an airworthiness directive making the inspections mandatory for all operators.

The Board determined that the probable cause of the incident was the fatigue failure of the pressure bulkhead.

Boeing 747 In-flight Fire near Anchorage, Alaska

On December 29, 2004, a Boeing 747 operated by Polar Air Cargo under 14 CFR Part 121 had an in-flight fire in the No. 4 engine during initial climb after takeoff from Ted Stevens Anchorage international Airport. The crew declared an emergency and returned to the airport without mishap. A regional investigator examined and partially disassembled the engine in January and February 2005. During the examination, he discovered hot spots next to a high-pressure fuel line. He removed the fuel line and sent it to the NTSB Materials Laboratory. X-ray mapping of the tube disclosed improper silver brazing of the attachment ferrules. As a result of the investigation, Pratt and Whitney, the engine manufacturer, sent an all-operators bulletin calling for a one-time inspection of the fuel line and its fittings, as well as reiterating the proper method to attach the fuel line.

The Board determined that the probable cause of the accident was the failure of the fuel line fitting.

Aerospatiale AS-350BA Helicopter Air Tour Crash near Juneau, Alaska

On July 25, 2005, an Aerospatiale AS-350BA operated by Temsco Aviation as a 14 CFR Part 135 air tour flight made a hard emergency landing following a loss of engine power and related engine fire shortly after takeoff from the Juneau Airport. The seven people aboard were not injured. Post-accident inspection by a regional investigator and parties to the investigation discovered a severed power drive shaft in the No. 1 engine module, which resulted in an engine over-speed and destruction of the engine's turbine blades. The power shaft was severed when a retaining clip inside the power drive shaft housing loosened and impinged on the high-speed, rotating power shaft.

The Board determined that the probable cause of the accident was the loss of engine power due to the separation of the power output shaft.

de Havilland DHC-3 Air Tour In-flight fire near Ketchikan, Alaska

On July 28, 2005, a float-equipped de Havilland DHC-3 airplane, operated by Promech Air, Ketchikan, Alaska, as a 14 CFR Part 135 Air Tour flight, had an in-flight fire in the cabin that resulted in serious injuries to the pilot. Despite his burn injuries, the pilot was able to land the airplane on the ocean outside Ketchikan without any injuries to the 10 passengers aboard. The regional investigator determined that the source of the fire was a small fuel line that went through the engine firewall into a fuel pressure gauge in the instrument panel. Examination by the NTSB Materials Laboratory disclosed that electrical arcing had perforated the line.

The Board determined the probable cause of the accident was a fuel line leak due to electrical arcing, and inadequate maintenance.

In the Central Mountain Region

Air Ambulance Flight in Dodge City, Kansas

On February 17, 2004, a Beech B90 (N777KU) operated by Ballard Aviation, Inc., as EagleMed 4, was destroyed by impact with terrain and post impact fire approximately seven nautical miles west of Dodge City Regional Airport, Dodge City, Kansas. The pilot, flight nurse, and flight paramedic were killed. Night visual meteorological conditions prevailed for the 14 CFR Part 91 emergency medical services positioning flight, which departed Wichita Mid-Continental Airport, Wichita, Kansas, about 2:15 and was en route to Dodge City. The flight was on an instrument flight rules flight plan, but the pilot cancelled the instrument flight plan at an altitude of about 12,000 feet above mean sea level approximately 34 nautical miles east of the Dodge City airport and proceeded under visual flight rules.



The Board determined that the probable cause of the accident was the pilot's failure to maintain clearance with terrain due to pilot fatigue (lack of sleep).

Cessna Citation 750 Landing Gear Failure in Jackson Hole, Wyoming

On August 18, 2004, a Cessna Citation 750 business jet (known as the Citation Ten), operated by NetJets, Inc., experienced a failure of its right main landing gear during landing rollout at Jackson Hole Airport in Jackson, Wyoming. Both flight crewmembers and their two passengers were uninjured. The airplane did not sustain substantial damage; therefore, the NTSB investigated it as an incident. Preliminary data indicated that the right main landing gear trailing link suddenly fractured on landing rollout from a normal landing.

Fractured pieces of the landing gear were sent to the Board's Materials Laboratory for a detailed examination.

The Board determined that the probable cause of the accident was the failure of the right main landing gear trailing link due to fatigue cracking initiated by an undetected manufacturing defect. A contributing factor was the improper plating process by unknown manufacturer personnel.

Canadair CL-600 Crash in Montrose, Colorado

On November 28, 2004, a Canadair CL-600 corporate jet (N873G) owned by Jet Alliance/Air Castle Corporation and operated by Global Aviation as Glow Air flight 73, impacted a



fence and terrain off the departure end of a runway during takeoff from the Montrose Regional Airport, Montrose, Colorado. A post-crash fire ensued. The pilot, copilot, and one passenger were killed. A flight attendant on board sustained critical burn injuries. Two other passengers, NBC Sports President Dick Ebersol and his son, survived the accident with non-life-threatening injuries.

The Board determined that the probable cause of the accident was the flight crew's failure to ensure

that the airplane's wings were free of contamination that accumulated while the airplane was on the ground, which resulted in an attempted takeoff with upper wing contamination and a subsequent inadvertent stall and collision with the ground. A factor contributing to the accident was the pilots' lack of experience in flying during winter weather conditions.

Beech King Air E-90 Air Ambulance Crash in Rawlins, Wyoming

On January 11, 2005 a twin-engine Beech King Air E-90 airplane (N41WE), operated as a 14 CFR Part 91 air ambulance positioning flight by Mountain Flight Services, Inc., impacted terrain and was destroyed during an instrument approach into the Rawlins Municipal Airport, Rawlins, Wyoming. The pilot, flight nurse, and a flight nurse-in-training were all killed. One person, a medic, survived with serious injuries.

The Board determined that the probable cause was the pilot's inadvertent flight into adverse weather (severe icing) conditions and his inability to control the airplane on the approach, resulting in a stall and the airplane subsequently impacting rising, mountainous terrain. Factors contributing to the accident included self-induced pressure to accomplish the mission and inadequate planning for the forecast icing conditions.

In the South Central Region

Piper PA-32 Accident in Mineral Wells, Texas

On August 4, 2004, a privately owned Piper PA-32 single-engine airplane (N3352W) impacted power lines and exploded near an airport in Mineral Wells, Texas. The pilot and his

passenger were both killed, and the airplane was destroyed. About two-thirds of the town of Mineral Wells was without electrical power as a result of the accident.

The Board determined that the probable cause of the accident was the pilot's failure to maintain aircraft control, resulting in an inadvertent stall. Contributing factors included the pilot's failure to maintain airspeed, the low altitude, and the powerline.

Beech T-34 In-flight Breakup near Montgomery, Texas

On December 7, 2004, a Beech T-34 single-engine airplane (N141SW) was destroyed following an in-flight breakup while maneuvering near Montgomery, Texas. The instructor pilot and student were both killed. The airplane was being operated by Texas Air Aces. According to ground witnesses, the right wing of the airplane separated in flight as the airplane was performing "upset training" maneuvers. The airplane was then observed spiraling straight down until it hit a rural road. The wing was later located in a heavily wooded area in a national forest. This accident was the second fatal T-34 in-flight breakup associated with Texas Air Aces. The previous accident occurred on November 19, 2004.

The Board determined that the probable cause of the accident was the in-flight separation of the left wing and left horizontal stabilizer as a result of extensive and widespread fatigue cracking throughout the wing carry-through structure and rear spar, and fatigue cracking in the forward spar of the left horizontal stabilizer.

In the Northeast Region

Beech 200 King Air Crash in Martinsville, Virginia

The Safety Board investigated the October 24, 2004, crash of a twin-engine turboprop Beech 200 King Air (N501RH), registered to Hendricks Motorsports, Inc., which impacted mountainous terrain while executing a missed non-precision approach to runway 30 at the Blue Ridge Airport, Martinsville, Virginia. Both flight crewmembers and all eight passengers were killed. The accident airplane was holding for another airplane to complete the approach to runway 30. Following the uneventful landing of the first airplane, air traffic controllers at Greensboro Approach Control cleared the accident airplane to begin the localizer-only approach. During the approach, the accident airplane was allowed to switch to the local airport frequency for landing. A few minutes later, the accident airplane came back on to the Greensboro Approach frequency and reported that it had performed a missed approach. The Greensboro Approach controllers acknowledged, and no further radar or radio contact was made with the accident airplane.

The Board determined that the probable cause of the accident was the flight crew's failure to properly execute the published instrument approach procedure, including the published missed approach procedure, which resulted in controlled flight into terrain. Contributing to the cause of the accident was the flight crew's failure to use all available navigational aids to confirm and monitor the airplane's position during the approach.

In the Southeastern Region

Messerschmitt-Bolkow-Blohm BO-105 Helicopter Crash near Santa Rosa Beach, Florida

The Safety Board is investigating an accident that occurred on October 20, 2004, involving a Messerschmitt-Bolkow-Blohm BO-105 helicopter (N916SH), operated by Metro Aviation,

Inc., as an emergency medical service aircraft, which impacted water and sank in the Choctawahatchee Bay near Santa Rosa Beach in the Florida Panhandle. The pilot, flight nurse, and paramedic on board were killed.

The Board determined that the probable cause of the accident was the pilot's spatial disorientation and in-flight loss of control of the helicopter after encountering night instrument meteorological conditions, resulting in a collision with water during the resultant uncontrolled descent. A factor in the accident was the pilot's decision to attempt the flight when instrument meteorological conditions were forecast for the area.

Beech B-55 Baron Crash in Atlanta, Georgia

The Safety Board is investigating an accident on October 19, 2004, involving a twin-engine Beech B-55 Baron (T-42A; N322WW), registered to and operated by J & R Aircraft, Inc., which collided with the ground and burst into flames behind an automotive repair shop near the Martin Luther King Center in Atlanta, Georgia. The private-instrument-rated pilot and his passenger were killed. The airplane was substantially damaged.

The Board determined that the probable cause of the accident was the pilot-initiated flight into known adverse weather conditions (thunderstorms), which resulted in a loss of control and subsequent in-flight collision with the ground.

Eurocopter AS350D Air Ambulance Crash near Falkner, Mississippi

On January 5, 2005, a Eurocopter AS350D (N350RM), registered to and operated by Rocky Mountain Holdings LLC as an air ambulance positioning flight, crashed near Falkner, Mississippi. The helicopter was destroyed and the commercial-rated pilot (sole occupant) was killed. The Board determined that the probable cause of the accident was the pilot's improper decision to attempt visual flight rule flight into known instrument flight conditions and failure to maintain altitude clearance, resulting in an in-flight collision with trees and the ground.

Ongoing Regional Aviation Investigations

In the Alaska Region

de Havilland DHC-2 Air Tour Crash near Talkeetna, Alaska

On March 7, 2005, a de Havilland DHC-2, operated by Fly Denali, of Talkeetna, Alaska, as a 14 CFR Part 135 Air Tour flight with four people aboard, experienced in-flight flutter of the wings while on a sightseeing tour of Denali (Mt. McKinley) that resulted in structural damage to the airframe. The flight landed successfully, but subsequent examination by a regional investigator and engineers from the FAA Aircraft Certification Office in Anchorage disclosed that a catastrophic failure of the wing was imminent. NTSB staff and the FAA are working with de Havilland on specifics regarding appropriate airfoil rigging standards, tolerances, and instructions for maintenance personnel.

MD-11 In-flight Smoke in Cockpit

On April 28, 2005, a McDonnell Douglas MD-11, operated by World Airways under 14 CFR Part 121, was en route to Seattle, Washington, from South Korea when the crew elected to divert to Anchorage due to an electrical smell and smoke in the cockpit. An inspection of the aircraft by a regional investigator discovered that the recently mandated hardened cockpit entry door from the cabin was not functioning correctly. The investigation found burnt and melted wires adjacent to the door's locking solenoid, indicating that the solenoid was overheating, and that the wiring bundles were installed improperly. Discussions between the NTSB investigator and the door manufacturer and the operator have resulted in modified installation procedures and inspections.

Taylorcraft F-19 Crash near Fairbanks, Alaska

On April 30, 2005, a Taylorcraft F-19, operated under 14 CFR Part 91 as a personal flight, crashed at Fairbanks, Alaska, following a loss of engine power and subsequent loss of control after departure from the Chena

Marina Airport. The pilot was fatally injured, and the sole passenger received serious injuries. During the investigation, it was discovered that the pilot's shoulder harness failed where the V portion of the shoulder webbing was sewn to the single attachment/anchor strap. The shoulder/seat harness material was an aftermarket installation and carried no markings as to the manufacturer or the manufacturing specifications of the webbing. This investigation has led the FAA to review other shoulder harness/seat belt installations in older aircraft, and in conjunction with the NTSB, is researching the extent of seat and shoulder harness failures and installation procedures in older aircraft.



Cessna Citation Crash near Fort Yukon, Alaska

On September 30, 2005, a Cessna 550 Citation, operated by the University of North Dakota as an experimental meteorological/atmospheric test aircraft under 14 CFR Part 91, crashed near Fort Yukon, Alaska, following a complete loss of engine power in both engines due to ice ingestion. The crew was flying in support of an icing certification program for a helicopter manufacturer, which had a helicopter in the area, and was seeking appropriate icing conditions to test its helicopter. The airplane was equipped with special ice and atmospheric monitoring equipment for scientific research and the Cessna crew intentionally sought icing conditions. The crew was able to make a successful off-airport landing with only minor injuries to the four people aboard when the engines could not be restarted. The airplane was damaged beyond economical repair. The ongoing investigation is focusing on crew resource management, training, and operational and dispatch oversight.

In the Mid-Atlantic Region

Eurocopter EC-123 Air Ambulance Helicopter Crash in the Potomac River

On the January 10, 2005, a Eurocopter EC-135 helicopter (N136LN), operating as a 14 CFR Part 91 air ambulance positioning flight by LifeNet/Air Methods, crashed into the Potomac River during cruise flight just south of the Woodrow Wilson Bridge near Oxon Hill, Maryland. The pilot and paramedic were killed. The flight nurse survived with serious injuries.

Swearingen SA266 Crash at Teterboro, New Jersey

On May 31, 2005, a Swearingen SA226 twin-engine turboprop airplane (N22DW), privately owned and operated by the pilot, impacted terrain just short of the runway and spun to the right during landing at the Teterboro Airport in New Jersey. The airplane's right side caught fire and the airplane was substantially damaged. The pilot/owner, who was the sole occupant, received serious injuries. According to witnesses, the pilot had aborted a takeoff from Nantucket Island before the accident flight due to a problem with the right engine. The engine was observed by witnesses to "sputter." The pilot then took off again from Nantucket and proceeded to Teterboro. During the flight, he reported that he was having engine problems. As he was landing, witnesses observed that he was "right wing low." The investigation is ongoing.

Midwest Express Airlines Flight 490 Loss of Pitch Control near Kirksville, Missouri

On May 12, 2005, in Kirksville, Missouri, a Boeing 717-200 (N910ME), operating as Midwest Express Airlines flight 490, experienced a loss of pitch control after encountering severe weather while climbing through 23,000 feet. The flight crew declared an emergency, and the airplane was subsequently recovered at an altitude of 13,000 feet about 10 minutes after the initial upset. The airplane diverted to Kirksville and landed uneventfully. There were no injuries to the captain, first officer, two flight attendants, or 75 passengers.

Agusta A109 Emergency Medical Services Helicopter Crash near Bradford, Pennsylvania

On October 8, 2005, an Agusta A109 helicopter, operated by CJ Systems, Inc., as an emergency medical services flight by the name of LifeStar, impacted terrain about five miles from the Bradford Regional Airport, Bradford, Pennsylvania. The helicopter was destroyed by impact forces and a post-crash fire. The commercial pilot, the sole occupant, was killed.

In the Southwest Region

Firefighting Lockheed P-3B Crash near Chico, California

On April 20, 2005, a Lockheed P-3B air tanker airplane (N926AU), owned and operated by the Aero Union Corporation, Chico, California, crashed immediately following a fire retardant training drop near Chico. All three crewmembers were killed, and the airplane was destroyed by fire and impact forces. According to representatives of the Aero Union Corporation, the accident flight was the seventh of the day for the accident airplane and was conducting qualification checks on the pilot and copilot, who were scheduled to conduct firefighting operations in California during the upcoming fire season. Aero Union's chief pilot was the third crewmember.

Jet Blue Airlines Flight 292 Incident over Los Angeles, California

On September 21, 2005, Jet Blue Airlines flight 292, an Airbus A320 (N536JB), landed at Los Angeles International Airport, with the nose wheels cocked 90 degrees. The airline transport pilot licensed captain, first officer, three flight attendants, and 139 passengers were not injured.

The flight crew observed illumination of a caution light upon retracting the landing gear after takeoff. The flight diverted to Long Beach, California. During a flyby for a visual check of the gear, it was determined that the nose gear was cocked 90 degrees. The crew flew for several hours to burn fuel to reach a safe landing weight, and then diverted to Los Angeles International Airport. The pilot held the nose gear off the ground as long as possible. Both nose gear tires collapsed during the landing roll, and about half of the two wheels were ground off. The investigation is focusing on the design of the nose landing gear.

Aerospatiale AS350BA Sightseeing Helicopter Crash near Haena, Kauai

On September 23, 2005, an Aerospatiale AS350BA (N355NT), registered to Jan Leasing LLC of Las Vegas, Nevada, and operated by Heli USA Airways as a 14 CFR Part 135 sightseeing flight, collided with the ocean about 600 yards off the coastline near Haena, on the island of Kauai, Hawaii. The helicopter sank in about 60 feet of water. The commercial pilot and two of the five passengers received minor injuries. The remaining three passengers were killed.

The pilot reported that the weather was clear as the flight entered Waimia canyon, where he noted some clouds but was able to maneuver into and out of the canyon before following the steep and scenic cliffs of the Na Pali coastline. The helicopter impacted the water. A Coast Guard helicopter picked up the surviving pilot and two passengers, along with a deceased passenger, from rough seas. Two other deceased passengers later washed ashore. This was the seventh flight of the day for this pilot in the same helicopter. No reported mechanical problems were reported with the helicopter for those flights. The pilot had been flying with Heli USA for about seven weeks. About one hour after the accident, another Heli USA air tour helicopter made an emergency landing at a nearby beach due to adverse weather conditions.

Eurocopter AS-350-B3 EMS helicopter crash in Apache Junction, Arizona

On December 14, 2004, a Eurocopter AS-350-B3 (N971AE) operating under the call sign Air-Evac II, collided with terrain while attempting a night landing at Apache Junction, Arizona. The helicopter was operated by Petroleum Helicopters, Inc., under the provisions of 14 CFR Part 91. The commercial pilot and a medical crewmember both received serious injuries; a flight nurse received fatal injuries. The helicopter was destroyed. The air medical flight originated at a local base of operation and was positioning for a patient recovery to a hospital. Visual meteorological conditions prevailed and a company flight plan had been filed.



Witnesses reported that the helicopter over-flew the landing zone in right turns, then approached from the northeast. During the final approach, the helicopter was observed to become unstable. It rolled right on the longitudinal axis about 30 degrees, then left about the same, then right about 45 degrees, pitched nose up to the left, and descended while rotating left. The helicopter impacted the parking lot nose down on the left side. The left skid was destroyed and the right skid was intact. The engine continued to run after impact and was subsequently stopped by the fire department's spraying foam into the engine air inlet.

The ongoing investigation is focusing on the operability of the hydraulic control system. As a result of the investigation, the airframe manufacturer has developed a guard for critical cockpit hydraulic system switches to preclude inadvertent deactivation of the system.

Air France Boeing 747-400 Cabin Electrical Component Overheat and Smoke Event

On March 12, 2005, Air France flight 62, a Boeing 747-400, F-GISE, had smoke in the cabin while descending through flight level 200 on descent into Los Angeles, California. Air France was operating the airplane as a scheduled international passenger flight under the provisions of 14 CFR Part 129. There were no injuries to the crew or passengers. The flight departed Paris, France, as a nonstop to Los Angeles. Visual meteorological conditions prevailed, and an instrument flight rules flight plan had been filed.

The operator reported that a passenger notified a cabin attendant of smoke emanating from under seats 64 K and L. The cabin attendant stated that she discharged one fire extinguisher on the affected area, and the smoke stopped. Examination of the area found a scorched reading light generator under the seats. The light generator unit was burned and the circuit board area appeared scorched. The investigation is ongoing to determine the reason for the unit overheated and the adequacy of the design and installation for fire prevention.

Cessna T210L In-flight Breakup near Tranquility California

On April 7, 2005, a Cessna T210L (N8126L), broke up in flight and impacted terrain near Tranquility, California. The airplane was operated by the private pilot under the provisions of 14 CFR Part 91. The pilot and two passengers on board were fatally injured and the airplane was destroyed. Visual meteorological conditions prevailed, and a flight plan had not been filed. The flight originated at Santa Rosa Airport, California, with an intended destination of Scottsdale, Arizona.

Preliminary radar data indicated that the airplane had been cruising at 13,400 feet and traveling in a southeasterly direction when the radar track turned abruptly to the right and radar contact was lost. The wreckage spread over one half mile. The investigation is ongoing and focuses on the adequacy of the weather information provided to the pilot and the pilot's training and certification.

Eurocopter EC120B helicopter Fuel Control Unit Diaphragm failure

On July 13, 2005, a Eurocopter EC120B (N266SD), operating as Star 6, lost engine power and collided with terrain near Fair Oaks, California. The Sacramento County Sheriff's Department was operating the public use helicopter under the provisions of 14 CFR Part 91. The commercial pilot and the observer sustained fatal injuries, and the observer trainee sustained serious injuries. The helicopter was destroyed. The local flight departed Mather, California, under visual meteorological conditions, and no flight plan was filed.

The police observer transmitted a distress call and within minutes, several people reported that they had just witnessed a possible helicopter crash. Witnesses reported hearing a pop and observed flames and smoke coming from the exhaust of the helicopter just before the impact. A grass fire consumed the hillside above the accident site.

Post-accident examination revealed a total loss of the engine's free turbine blades and low rotational energy of the main rotor blades at the time of impact. The investigation discovered a hole in the constant Delta P diaphragm in the fuel control unit that allowed the engine to dramatically over-speed. An audit of fuel control overhaul procedures disclosed the possibility that a number of fuel control units may have left the factory with the Delta P diaphragm incorrectly installed. As a result of the investigation, the manufacturer issued a mandatory service bulletin to correct this problem and also instituted a redesign of the diaphragm.

Eurocopter AS 350BA Air Taxi Helicopter In-flight Separation of Tail Rotor System

On July 12, 2005, a Eurocopter AS350BA (N4064F) experienced the separation of its tail rotor blade assembly and gearbox during cruise flight. The accident occurred about six miles southeast of Kapaau, on the Big Island of Hawaii. Sunshine Helicopters, Inc., Kahului, Hawaii, operated the helicopter during the positioning flight that was performed under the provisions of 14 CFR Part 91. Visual meteorological conditions prevailed, and a company flight plan was filed. The helicopter was substantially damaged, but the commercial pilot was not injured. No passengers were on board. The flight originated at a remote off-airport site in a valley near the north shore of the Big Island.

The pilot reported that while cruising over a valley at 500 feet above ground level and at 90 knots, he experienced a high-frequency vibration that lasted about five seconds. This was followed by a bang, whereupon the helicopter violently reacted by yawing and pitching, and with a right roll over 90 degrees. The pilot stated that after recovering from the unusual attitude, he realized that he had lost tail rotor control. After slowing to about 60 knots, he reestablished adequate control to fly to the Kona International Airport, where he performed an autorotative descent to an uneventful landing. This investigation remains ongoing to determine the cause of the tail rotor system separation.

Air India Boeing 747-400 Tire failure and Wheel Disintegration on Takeoff

On December 19, 2005, the four right main body landing gear tires on a Boeing 747-400, Indian registry VT-AIM, operating as Air India flight 136, blew during takeoff from Los Angeles International Airport, California. The tireless wheels in contact with the runway began disintegrating. The fuselage was punctured in multiple locations and one hydraulic system was damaged. More shrapnel damage to the airplane from the disintegrating wheels occurred during the emergency landing after the crew dumped enough fuel to return to Los Angeles. Air India was operating the airplane under the provisions of 14 CFR Part 129. The captain, first officer, a relief captain, 14 flight attendants, and 256 passengers were not injured; the airplane sustained substantial damage. The flight was originating at the time and was destined for Frankfurt International Airport, Germany. Visual meteorological conditions prevailed and an instrument flight plan was in effect.

The investigation is ongoing to determine the reason for the simultaneous failure of four tires on the same landing gear truck.

Lear Jet 35A Air Taxi flight crash while landing at Truckee Tahoe, California

On December 28, 2005, the flight crew piloting a Learjet, model 35A (N781RS) experienced an in-flight loss of control and descended into the ground on short final approach to runway 28 at the Truckee-Tahoe Airport, Truckee, California. The airplane was owned and operated by RSB Investments, Inc., Washington, Pennsylvania (d.b.a. Skyward Aviation). The airplane was destroyed during the impact and post-crash fire. The airline transport-certificated captain and the commercial-certificated first officer sustained fatal injuries. Instrument meteorological conditions prevailed at the time, and an instrument flight rules flight plan had been filed. The purpose of the flight was to reposition the airplane



to Truckee in order to pick up passengers awaiting transportation to another location. The accident flight was performed under the provisions of 14 CFR 91 as a position flight to pick up revenue passengers for a flight under 14 CFR Part 135.

Several witnesses in the vicinity of the airport reported observing the airplane as it approached Truckee from the north. According to the witnesses, when they first observed the airplane it was flying in a southerly direction toward runway 19. The airplane flew over the airport and turned left (eastbound), thereby entering the left traffic pattern downwind leg for runway 28. The witnesses further reported observing the airplane turn onto the base and final approach legs for runway 28, while continuing to increase its left bank angle to nearly 90 degrees before the airplane descended to ground impact.

In the Northwest Region

Augusta A109 II Emergency Management Services Helicopter Crash near Edmonds, Washington

On September, 29, 2005, an Augusta A109 II helicopter (N655GS) operated by Airlift Northwest as an emergency management services positioning flight, impacted the waters of Puget Sound near Edmonds, Washington. The helicopter was destroyed and the three occupants, a pilot and two flight nurses, were killed. Local authorities in Edmonds received reports from residents living near the coastline that they heard a low-flying helicopter and then a noise. They also reported poor visibility, low ceilings, and rain at the time of the accident. No reports of any problems were radioed by the crew before the accident. When the helicopter did not arrive at Arlington as expected, a search was started and floating debris was spotted in the water by Coast Guard personnel.

*In the South Central Region**Sikorsky S-76A Helicopter Accident in the Gulf of Mexico near Sabine, Texas*

On September 7, 2005, a Sikorsky S-76A twin-engine helicopter (N90421) operated by Houston Helicopters, was on a 14 CFR Part 135 on-demand air taxi flight with 10 passengers on board when it experienced an in-flight fire while in cruise flight over the Gulf of Mexico about 25 miles south of Sabine, Texas. The helicopter ditched into the water, rolled over, and sank in 50 to 70 feet of open water. Both crewmembers and all 10 passengers escaped before the helicopter sank. Four of the occupants received serious (burn) injuries, and the other eight occupants received minor injuries. The occupants remained in the water for about seven hours, at night, until they were spotted by a Coast Guard helicopter.

*In the North Central Region**Two Northwest Airlines Aircraft Collide on Ground in Bloomington, Minnesota*

On May 10, 2005, Northwest Airlines Flight 1495, a Douglas DC-9 airplane (N763NC), taxied into the aft portion of the right wing of Northwest Airlines flight 1849 (N368NB), an Airbus A319 airplane, on the ramp at the Minneapolis-St. Paul International Airport. Both airplanes were substantially damaged, and the crew of the DC-9 received minor to serious injuries. Several passengers and ground crew also received minor injuries.

According to reports from Northwest Airlines and the FAA, the DC-9 was taxiing into the gate, having landed uneventfully after a precautionary landing due to a hydraulic system failure. The Airbus A319 had just pushed back from the gate when the accident occurred. Immediately following the accident, both airplanes were evacuated. The passengers and crew aboard the DC-9 went out the aft stairs in the tail of the DC-9, while the passengers in the Airbus went out the forward left emergency exit slide.

Regional Jet Veers across Field and Runway at Milwaukee, Wisconsin

On March 11, 2005, a Bombardier CL-600-2B19 (N8932C), operated by Pinnacle Airlines as Flagship 2823, received substantial damage when it veered off the left side of runway 1L (9,690 feet by 200 feet, concrete) at the Milwaukee/General Mitchell International Airport, Milwaukee, Wisconsin. The captain, first officer, flight attendant, and nine passengers were uninjured. The 14 CFR Part 121 domestic passenger flight departed LaGuardia International Airport, New York, on an instrument flight plan, and night instrument meteorological conditions prevailed at the time of the accident.

International Aviation Accident Investigations

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

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 had departed

Port Sudan for Khartoum but was returning to land after the pilot reported that 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.

Flash Airlines Boeing 737 Crash in Sharm El Sheikh, Egypt

(A final report was issued in March 2006)

On January 3, 2004, a Flash Airlines Boeing 737-300 crashed into the Red Sea after departing from Sharm El Sheikh Airport, Egypt. The airplane was destroyed and all 133 passengers and 15 crewmembers on board were killed. The NTSB is assisting in the investigation, being led by the Egyptian Civil Aviation Authority.

Georgian Express Crash into Lake Erie

(A final report was issued in April 2006)

On January 17, 2004, Georgian Express Flight 126, a Cessna Caravan 208B, departed Pelee Island, Ontario, en route to Windsor, Ontario. Nine passengers and one crewmember were on board. Shortly after takeoff, the aircraft struck the ice-covered surface of Lake Erie, killing all 10 occupants. Although the investigation by the Transportation Safety Board of Canada is ongoing, factual information suggests that the aircraft's weight was a factor in the accident. The weather at the time was conducive to airframe icing.

MK Airlines Boeing 747 Crash in Nova Scotia, Canada

(A final report was issued in June 2006)

The Safety Board is assisting the Transportation Safety Board of Canada with its investigation of an October 14, 2004, accident involving an MK Airlines Boeing 747-200F. The airplane crashed during takeoff from Halifax International Airport, Halifax, Nova Scotia, Canada, on October 14, 2004. All seven crewmembers on board were killed.

China Eastern Crash at Baotou Airport, People's Republic of China

On November 21, 2004, a China Eastern Airlines Bombardier/Canadair CRJ-200, equipped with U.S.-manufactured General Electric engines, crashed shortly after takeoff from the Baotou Airport, People's Republic of China. The six crewmembers and 47 passengers were killed, and there were also two ground fatalities. The airplane was destroyed. The NTSB is assisting in the investigation, which is being conducted by the General Civil Aviation Authority of the People's Republic of China.



Lion Air MD-82 Crash in Solo, Java, Indonesia

On November 30, 2004, a McDonnell Douglas MD-82 airline jet, Indonesian registration PK-LMN, operated by Lion Air as flight JT538, crashed during landing at the Adi Sumarmo Airport in the city of Solo, Java, Indonesia. Of the 146 passengers and seven crewmembers aboard, 31 passengers and one pilot were killed. Over 100 passengers and crew were injured, some seriously. Heavy rain and winds prevailed at the time of the accident, which occurred during night conditions. The flight had departed from the capital city of Jakarta (about 310 miles northwest of Solo), with an en route stop in the east Java town of Surabaya before heading to Solo.

Kam Air Boeing 737 Crash near Kabul, Afghanistan

(A final report was issued in February 2006)

The Safety Board sent a team to Kabul, Afghanistan, to assist that nation's government in its investigation of the crash of Kam Air flight 904, a Boeing 737-200, on February 3, 2005. The airliner was flying from Herat to Kabul when it went down with the loss of all 104 passengers and crew, after reportedly being diverted from Kabul airport due to a snowstorm. Six American citizens were among the passengers.



Air Transat Airbus A310 Accident near Varadero, Cuba

The Safety Board is assisting the Transportation Safety Board of Canada in its investigation of an accident that occurred on March 6, 2005, in which an Air Transat Airbus A310-308 (C-GPAT) that lost most of its rudder in flight while en route from Cuba to Quebec City, Canada. There were no fatalities.



Air France Airbus 340 Crash in Toronto, Canada

On August 3, 2005, the Safety Board sent a team of specialists to assist in the investigation of the August 2, 2005, accident of an Air France Airbus 340 airplane on landing at Toronto's Pearson Airport. There were no fatalities. The team was led by a senior NTSB investigator as the U.S. accredited representative and included NTSB specialists in aircraft engines and survival factors, plus an investigator from the FAA.

Helicopter Crash near New Site, Sudan

(A final report was issued in July 2006)

On August 4, 2005, the Safety Board dispatched a team of investigators to assist in the investigation of the crash of an MI-172 Russian-built helicopter near the village of New Site, Sudan on July 30, 2005 that claimed 13 lives. At the request of the U.S. Department of State, the NTSB sent a five-person team headed by a senior NTSB investigator who had participated in investigations in Sudan twice previously. Sudan's First Vice President, John Garang, and all 12 others aboard perished

Sikorsky S-76 Helicopter Crash in the Baltic Sea off the Coast of Tallinn, Estonia

On August 10, 2005, the Safety Board dispatched a team of investigators to assist the Aircraft Accident Investigation Department of Estonia in the investigation of a Sikorsky S-76 helicopter crash into the Baltic Sea off the coast of Tallinn, Estonia that killed 14, including two Americans. The four-member team included an NTSB investigator-in-charge as the U.S. accredited representative and NTSB specialists in operations and engineering, an investigator from the FAA, and the aircraft manufacturer.

Helios Airways Flight ZU522 Crash near Marathon, Greece

A team of Safety Board investigators arrived in Athens on August 15, 2005, to assist the Air Accidents Investigation and Aviation Safety Board of Greece in its investigation of an accident involving Helios Airways flight ZU522, a Boeing 737. The four-member team, headed by an NTSB investigator-in-charge as the U.S. accredited representative, included NTSB specialists in systems, operations, and structures; an investigator from the FAA; and investigators from the aircraft manufacturer.

Mandala Airlines Boeing 737 Accident in Medan, Indonesia

On September 5, 2005, a Mandala Airlines B737-200, registration PK-RIM, crashed after takeoff from runway 23 at the Medan-Pollonia airport, Medan, Sumatra, Indonesia into an urban residential area. Five crew members and 112 passengers were on board. The crew and 96 passengers, along with 44 persons on the ground, were fatally injured; 16 passengers survived.



The flight was destined for Soekarno-Hatta International

Airport, Jakarta, Indonesia. The NTSB, representing the state of manufacture of the aircraft and engines, provided an accredited representative and technical advisors in powerplants and airworthiness, in addition to advisors from airframe and engine manufacturers.

Cessna 208B Turboprop Cargo Airplane Crash in Winnipeg, Canada

On October 6, 2005, a Cessna 208B turboprop airplane, Canadian registration C-FERS, operating as a commercial cargo flight by a Federal Express feeder company (Morningstar Aviation), impacted terrain in Winnipeg, Canada, following an uncontrolled descent. The pilot, the sole occupant, was killed, and the airplane was destroyed by impact forces and a post-crash fire.

On the morning of the accident, the pilot received only a printed weather briefing (text package) and she telephoned the flight information center to receive a verbal briefing. The verbal briefing forecast moderate icing southeast of the airport. The text data contained no icing information.

After departing Winnipeg, the airplane was cleared to climb to 9,000 feet and instructed to turn right, directly to Thunder Bay, Ontario. About four minutes after taking off, the pilot radioed that she needed to return immediately to the airport because of icing. The airplane's maximum altitude was 2,300 feet msl. The airplane impacted on railroad tracks, inverted and with little forward movement.

The investigation is being led by the Transportation Safety Board of Canada. The NTSB dispatched a senior air safety investigator as the U.S. accredited representative. The Cessna Aircraft Company and the FAA also sent representatives as part of the U.S. team.

Bellview Airlines Boeing 737 Crash in Lagos, Nigeria

The Safety Board is assisting in the investigation of a crash of a Bellview Airlines Boeing 737-200 in Lagos, Nigeria, on October 23, 2005. The four member NTSB team was headed by a senior investigator as the U.S. accredited representative. Investigators from the aircraft manufacturer, Boeing, and the engine manufacturer, Pratt & Whitney, were part of the team.

Malaysian Airline System Boeing 777 Sudden Pitch Up and Loss of Control

On August 2, 2005, a Boeing 777-200, registered in Malaysia as 9M-MRG and operated by Malaysian Airline System, experienced a pitch up about one-half hour after takeoff from Perth, Australia. The event occurred as the flight was climbing through 36,000 feet and while the aircraft was on autopilot. During the pitch up, the aircraft climbed to 41,000 feet and the indicated airspeed dropped from 270 knots to 158 knots. The stick shaker and the stall-warning indicator activated during the event. The flight crew regained control of the airplane and the flight landed uneventfully back at Perth. The Safety Board assigned an accredited representative, a systems engineer, and a system safety engineer to the investigation. The investigation found a fault in the autopilot system software.

On August 29, 2005, the FAA issued emergency Airworthiness Directive 2005-18-51, which superseded an earlier airworthiness directive. It stated that operators should install a previous software version within 72 hours in their Boeing 777 aircraft. It also stated that faulty data could cause anomalies in Boeing 777 primary flight controls, autopilot, pilot displays, autobrakes, and autothrottles.

TANS Boeing 737 Crashed on Approach to Pucallpa, Peru

On August 23, 2005, a Boeing 737-200, Peruvian registry OB-1809-P, operating as Aerolinea Transportes Aereos Nacionales de Selva (TANS) Peru flight 204, was destroyed when it impacted trees and swampy terrain while approaching Captain FAP David Abenzur Rengifo Airport, Pucallpa, Peru. The captain, first officer, two flight attendants, and 41 passengers were fatally injured. Two flight attendants were seriously injured, and 53 passengers incurred minor to serious injuries. Instrument meteorological conditions prevailed, and the flight was operating on an instrument flight rules flight plan from Jorge Chavez International Airport, Lima, Peru, to Pucallpa.

The accident occurred during a thunderstorm, in daylight hours. The Safety Board sent an accredited representative accompanied by representatives from Boeing and Pratt & Whitney.

West Caribbean Airways MD-82 Crash in Venezuela

On August 16, 2005, a West Caribbean Airways MD-82 crashed near Machiques, Venezuela. The eight crewmembers and 152 passengers on board were fatally injured, and the airplane



was destroyed. The airplane was being operated as a charter flight from Panama City, Panama, to Fort de France, Martinique. The Safety Board sent an accredited representative accompanied by three Safety Board technical specialists and by representatives from Boeing and Pratt & Whitney.

Cessna 208 Crash Near Moscow, Russia

On November 19, 2005, a Cessna 208B, Aruba registration P4-OIN, was destroyed when it impacted terrain while on approach to Domodedovo International Airport, Moscow, Russia. The two Russian-certificated pilots and six passengers were killed. Instrument meteorological conditions prevailed and an instrument flight rules flight plan had been filed for the personal flight, which was operating in icing conditions at the time of the accident. The accident is under investigation by the Interstate Aviation Commission of Russia, with assistance from the Safety Board. The aircraft was equipped with both a cockpit voice recorder and a flight data recorder. This is the first accident involving a Cessna 208 series in which flight data recorder information has been available to accident investigators.

Public Hearings and Forums

Pinnacle Airlines Accident in Jefferson City, Missouri, June 13-15, 2005

Beginning on June 13, 2005, the Safety Board held a three-day public hearing on the 2004 Jefferson City, Missouri, accident involving a Bombardier Regional Jet operated by Pinnacle Airlines.

On October 14, 2004 a Bombardier CL-600-2B19 (N8396A) operated by Pinnacle Airlines (doing business as Northwest Airlink) flight 3701 crashed in a residential area in Jefferson City, Missouri, about three miles south of the city airport. The airplane was destroyed by the impact forces and a post-crash fire. The two crew members were killed. There were no passengers on board and no injuries on the ground. The flight was a repositioning flight from Little Rock, Arkansas, to Minneapolis-St. Paul, Minnesota.

NTSB Member Deborah A. P. Hersman chaired the hearing, which focused on the aircraft and engine certification, and on operator and FAA oversight of flight operations and crew training. Witnesses testified from Bombardier Aerospace, Pinnacle Airlines, General Electric, and the FAA.

Office of Highway Safety

Highway transportation accidents have a significant impact on American society. The Federal Highway Administration (FHWA) reported that vehicle miles traveled increased in 2004 to 2.96 trillion, up from 2.88 trillion in 2003. According to NHTSA, a total of 42,636 people died in highway crashes in 2004, essentially the same number as died in 2003 (42,643). Because of the relative stability of the number of fatalities and the increase in miles traveled, the fatality rate per 100 million vehicle miles traveled dropped to 1.46 in 2004, down from 1.48 in 2003. NHTSA estimates the economic cost of an average roadway fatality at \$977,000 and the cost associated with a critically injured crash survivor at \$1.1 million. This equates to an economic impact of motor vehicle crashes on America's roadways of \$230.6 billion a year, or an average of \$820 for every person living in the United States.

The Safety Board is charged with investigating highway accidents, determining their probable or root cause, and making recommendations to prevent them from happening again. Changes in highway or vehicle design, driver training, occupant protection, and regulatory oversight are frequently recommended. In 2005, the Safety Board did important work regarding the effectiveness of driver education programs, the interaction of highway design and pavement friction oversight, tire tread depth requirements for heavy trucks and buses, the design and crashworthiness of motorcoach seats, the effectiveness of temporary median barriers, and the effectiveness of State snow removal programs.

Completed Major Highway Investigations

Operator Fatigue Causes Motorcoach Accident near Tallulah, Louisiana

On April 19, 2005, the Safety Board determined that the probable cause of a fatal accident involving a 49-passenger motorcoach was the motorcoach driver's operation of the bus in a reduced state of alertness due to fatigue. The driver's fatigue was the result of his chronic insomnia and poor quality sleep.



The accident occurred on October 13, 2003, when a Neoplan USA Corporation 49-passenger motorcoach traveling eastbound on Interstate 20 near Tallulah, Louisiana, drifted rightward from the travel lanes and onto the shoulder, where it struck the rear of a Peterbilt tractor semitrailer, which was stopped on the shoulder. Eight

of the 14 passengers on board were killed. The motorcoach driver and six passengers received serious injuries. The Peterbilt driver was not injured.

In 2005, the Office of Highway Safety's 28 staff members initiated 33 investigations, completed 31 dockets, issued four major reports, and continued work on 29 investigations.

The Board found that the need for sleep varies among individuals and that losing as little as two hours of sleep a night can negatively affect alertness and performance. Fatigue can also result in degraded judgment, decision-making, and memory, slowed reaction time, lack of concentration, fixation, and irritability. The Board found that this was a fatigue-induced accident, although some facts were not typical of such a scenario.

For instance, the accident occurred in the late morning, not a time of day likely to induce sleepiness. The driver had not been on duty for an excessive time when the accident occurred. Also, the driver's 72-hour history showed that he had the opportunity to obtain sufficient sleep during the three nights preceding the accident. Considering the driver's pre-accident behavior, which was indicative of drowsy driving, and documented medical conditions and sleep problems including chronic insomnia, chronic pain, mild obstructive sleep apnea, and a history of interrupted sleep, the Board concluded that the motorcoach driver's operation of the bus in a reduced state of alertness due to fatigue as a result of his chronic insomnia and poor quality sleep was the probable cause of the accident.

Contributing to the cause of the accident was the failure of Alpha Trucking, Inc., to perform vehicle maintenance and to provide safety management controls, which resulted in the accident tractor semitrailer being parked on the interstate shoulder with a smoking brake. The report states that Alpha Trucking's vehicle maintenance was consistently deficient as evidenced by the habitual and progressive mechanical neglect found in roadside inspections and the Board's post-accident investigation. As a result, the Board found that Alpha Trucking, Inc., misused the motor carrier vehicle self-inspection program by failing to employ the services of a qualified inspector and by misrepresenting the completion of vehicle repairs, thereby compromising the safety of the traveling public. Accordingly, the Board recommended that the FMCSA conduct a study on the safety effectiveness of the self-inspection and certification process used by motor carriers to comply with annual vehicle inspection requirements and take corrective action, as necessary.

During the Tallulah crash sequence, many passenger seats did not remain secure in their original positions in the passenger compartment, even in the space outside the impacted area. Consequently, the Board determined that inadequate seat anchorage hardware used by Neoplan USA Corporation failed during the accident and resulted in more severe injuries to passengers. The Board found that no performance standards are in place for motorcoach seat anchorages and that some anchorage systems may be inadequately designed to withstand crash forces. As a result of the investigation, the Safety Board recommended that NHTSA develop performance standards for passenger seat anchorages in motorcoaches.

Another reason the seats did not remain in their original positions during the accident was that several of the T-bolts that fastened the seats to the stainless-steel floor track had been incorrectly installed or maintained. Improperly secured motorcoach passenger seats are not likely to be identified during commercial vehicle inspections because no criteria or procedures are available for the inspection of motorcoach passenger seating anchorage systems. Therefore, the Board recommended that the FMCSA and the American Association of Motor Vehicle Administrators develop a method for inspecting motorcoach passenger seat anchorages and revise their inspection standards and procedures.

Roadway Design, Wet Pavement, and Minimum Tread Depths Cause Motorcoach Accident near Hewitt, Texas

On July 12, 2005, the Safety Board determined that roadway design, wet pavement, and the condition of the tires were factors that led to the crash of a motorcoach, killing seven people.



On February 14, 2003, a Central Texas Trails, Inc., motorcoach traveling on Interstate 35 near Hewitt, Texas, ran off the road, crossed the median, and collided with a Chevrolet Suburban traveling in the oncoming lane. Heavy rain, fog, and haze in the area had reduced visibility at the time of the accident. As the motorcoach driver approached the crest of a hill, he noticed that traffic was stopping

ahead for a previous accident. He began to brake and move from the right lane to the left lane to avoid the stopped cars, but another car moving into the left lane at the same time forced the bus driver to brake hard. The rear of the bus skidded and the driver lost control. Five motorcoach passengers, the Suburban driver, and one passenger were killed in the accident.

The Board's investigation determined that the wet pavement at the accident site, combined with Interstate 35's roadway geometry and a speed limit (70 mph) that exceeded the road's design speed, did not provide drivers with enough time to react and stop their vehicles, or avoid a collision. The Board recommended that the FHWA issue guidance to its field offices describing the inadequate stopping sight distance that can occur on roadways where hills exist along with low coefficients of friction and speeds higher than the design speed. The Board also identified the benefits of using variable speed limit signs to reduce speeds in inclement weather and recommended that the FHWA provide guidance on their use.

The Board recommended that the State of Texas inventory such highway locations and develop a plan to repave or make other improvements to the roadway. In another recommendation to Texas the Board recommended the installation of variable speed limit signs at locations where wet weather could produce a stopping distance greater than the sight distance.

The roadway was not the only factor contributing to the motorcoach's loss of control. The Board determined that the low, but legal, tread depth of the rear tires was unable to channel the water from between the tires and the roadway, further reducing the available friction. Parts of the wet highway in the accident location had a coefficient of friction of between 0.16 and 0.20, whereas icy surfaces are range from 0.12 to 0.25. The Board recommended that the FHWA conduct research on the interaction between commercial vehicle tires and wet pavement surface to determine minimum frictional quality standards and tire requirements.

Research and testing have shown that placing tires with greater tread depths on the front axle of a vehicle creates an inherent safety problem in passenger vehicles, and would probably have the same effect on commercial vehicles. Yet Federal regulations require that the front tires of commercial vehicles have a greater tread depth than the rear tires. Therefore, the

Safety Board recommended that the NHTSA conduct testing on commercial vehicles to determine the effects of different tread depths, and recommended that the FMCSA change the tread depth requirements to reflect the test results.

The Board's report noted that the Texas Department of Transportation's Pavement Management Information System does not adequately identify roadways where hazardous conditions exist when the pavement is wet. Therefore, the Board also recommended that the Texas Department of Transportation revise its Wet Weather Accident Reduction Program to better identify areas where surface conditions and roadway geometry lead to dangerous conditions.

Multiple Factors Cause SUV/Tractor-Trailer Median Crossover Accident That Kills Yale Students in Fairfield, Connecticut

On November 16, 2005, the Safety Board adopted a report on the investigation into two collisions on Interstate 95, the second of which killed four Yale University students. The accident sequence began about 4:50 a.m. on January 17, 2003, near Fairfield, Connecticut, when a Freightliner tractor flatbed semitrailer slid out of control on a turn, entered the highway median, partially overrode a barrier, and collided with two oncoming vehicles. About 11 minutes later, an SUV carrying nine Yale University students crashed into the semitrailer that was encroaching into the travel lane. The driver and three passengers in the SUV were killed; the surviving occupants were seriously injured.



The Board determined that the probable cause of the first collision was the Freightliner's loss of lateral stability, probably due to the operator driving too fast for conditions and to the presence of black ice on the roadway. Contributing to the accident was the inadequate treatment of the roadway by the Connecticut Department of Transportation in response to inclement weather. The Board also cited the State's failure to install a median barrier capable of preventing crossovers by heavy vehicles.

The probable cause of the second collision was determined to be the SUV driver's failure to identify and avoid the flatbed semitrailer due to fatigue, in conjunction with the distraction from the median crossover accident in the opposite lanes.

Examination of the vehicles and toxicological testing of the drivers led the Board to conclude that neither mechanical conditions nor alcohol or drugs contributed to the cause of the accidents. However, fatigue in the early morning hours was judged to be a more likely contributor to the subsequent accident involving the SUV, as the driver's sleep schedule during the week of the accident appeared to be determined largely by fraternity rush activities. Photometric tests indicated that reflective tape on the semitrailer should have been visible in sufficient time for the SUV driver to take evasive action. Consequently, the Board decided to take new steps to contact student organizations to emphasize the dangers of driver fatigue.

Finding that the condition of the road was a factor in the accident, the Board recommended that the Connecticut Department of Transportation develop a comprehensive program for treating highways in accord with prevailing weather conditions. Further, noting that the semitrailer had collided with and overridden a 32-inch portable concrete barrier system, the Board recommended that the American Association of State Highway and Transportation Officials establish specifications for the use of high-performance barriers that are capable of redirecting the movement of heavy trucks.

The Board also found that the likelihood of survival would have been significantly improved if the SUV had been occupied by a maximum of five persons, rather than nine, and if all occupants had been wearing seatbelts. Only the driver and the front passenger were belted. The Board reiterated a recommendation to the Governor and legislative leaders of Connecticut urging the enactment of stricter laws governing primary enforcement of seatbelt use.

Four-fatal Driver Education Car Accident in Belgrade, Montana, Leads to Public Forum and Recommendations on Improving Driver Education

The Board conducted a Public Forum in October 2003 that was sparked by an accident on a rural two-lane road near Belgrade, Montana, in January 2003 in which a tractor-trailer 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.

In this forum, noting that automobile crashes are the leading cause of death among 15 to 20 year-olds, the Board examined need to reevaluate the elements of driver education programs used throughout the United States. The Safety Board determined that although various approaches to driver education are used in the United States and Europe no systematic evaluation has determined which components are effective in teaching safe driving skills. Consequently, there is little guidance for developing an appropriate curriculum or establishing requirements for novice driver education.

The Board made recommendations to the U.S. Department of Education and NHTSA to review current driver education training programs and determine the instructional tools, training methods, and curricula that are consistent with the identified best teaching methodologies and then implement those best practices into a model driver education training curriculum.

The Board also determined that the half-century-old formula of 30 hours of classroom training followed by six hours of behind-the-wheel training was established arbitrarily and is probably inadequate to teach teenagers the skills necessary to drive safely on today's roadways. Further, the Board concluded that driver training must take into account research results that show how teenagers learn and the behavioral environment in which teenagers typically function. As a result, the Board recommended that the Department of Education and NHTSA work together to determine the optimum sequencing, in conjunction with graduated driver licensing qualifications, for educating teenagers on safe driving skills both in the classroom and behind the wheel.

The October 2003 forum examined the extent to which driver education is used, its effectiveness, and shortcomings, and what can be done to improve it. Participants in the forum included NHTSA, State government representatives, safety and consumer associations, groups offering driver education, teachers, students, and researchers.

Ongoing Major Highway Investigations

Overweight Truck Brake Failure Accident in Glen Rock, Pennsylvania

(This report was adopted by the Board on 2/7/06)

The Safety Board 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.

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

(This report was adopted by the Board on 2/7/06)

The Safety Board 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 six-lane divided highway when he swerved 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.



Traffic Slowed for Toll Booth Accident near Hampshire, Illinois

(This report was adopted by the Board on 4/18/06)

The Safety Board continues to investigate an October 2003 accident near Hampshire, Illinois that involved a shuttle bus with 20 elderly passengers, three tractor-trailers, and a pickup



truck. The accident occurred as the vehicles were slowing about one-half mile from a toll plaza on Interstate 90 (Northwest Tollway). The bus was struck from behind by a faster moving truck as the bus slowed while approaching the queue for the toll plaza. The collision subsequently involved the other vehicles. As a result of the accident, eight occupants of the bus were fatally injured, six occupants received serious injuries, and six occupants received minor injuries. The other drivers received minor or no injuries.

Three Tanker Truck Rollover Accidents

The Safety Board continues to investigate and uncover the similarities between three accidents involving tanker trucks carrying gasoline on exit/entrance ramps.

One of the accidents occurred in Elkridge, Maryland, in January 2004. The accident involved a fully loaded gasoline tank truck southbound on Interstate 895. As the tanker reached the overpass bridge at Interstate 95, it left the right side of the highway, mounted the right bridge rail, and plunged 30 feet to the roadway below. As the tanker impacted the median and northbound travel lanes of Interstate 95, an explosion and large fire ensued. Several vehicles traveling northbound on Interstate 95 drove into the fire. When the fire was extinguished, two tractor semitrailers, a passenger car, and a pickup truck were observed in their final rest positions at the accident scene. The 64-year-old driver of the tank truck and three other drivers were killed.

Another occurred on December 22, 2004, in Arlington, Virginia, when a 2001 Freightliner tractor in combination with a 9,200-gallon-capacity tanker semitrailer carrying approximately 8,500 gallons of gasoline failed to negotiate the curve on an exit ramp on Interstate 395. At the time of the accident, the driver was en route to make a local gasoline delivery. The 2001 Freightliner and tanker combination unit rolled over on its right side and released its cargo of gasoline, which ignited. The postcrash fire consumed the 2001 Freightliner and tanker combination unit and fatally injured the driver. No other persons were injured in the accident.

Finally, on February 11, 2005, in Davie, Florida, a tanker truck with 9,000 gallons of gasoline overturned on an entrance ramp to the Florida Turnpike. The ramp was an increasing radius ramp, which means the curve of the ramp got tighter and sharper as the driver progressed through the turn. The truck rolled onto a Mercury Sable station wagon with four occupants, and both vehicles slid into the outside guardrail next to the left shoulder. The cargo tank was breached and a fire ensued, eventually burning both vehicles completely. The truck driver exited the vehicle but received burn injuries when the fire ignited. After the fire started, the right front passenger of the Mercury exited the vehicle and was on fire. He ran to a pond on the outside

of the guardrail and jumped in. As a result of the collision and fire, all four occupants of the Mercury received fatal injuries and the truck driver received severe injuries.

School Bus Accident in Liberty, Missouri

The Safety Board continues to investigate a school bus accident that occurred on May 9, 2005, in Liberty, Missouri. A 2000 Thomas 83-passenger school bus, driven by a 45-year-old female with 53 elementary school-aged children onboard, was traveling southbound on State Highway 291 on a descending grade approaching the intersection with State Highway 152. The speed limit was 45 mph dropping to 40 mph on the descending grade to the intersection. The driver reported losing braking ability on the bus and began to swerve between lanes trying to avoid a collision with other southbound vehicles on Highway 291. The bus eventually left the roadway, ran onto the right shoulder, and struck a light pole. The bus continued south through a right-turn-only lane, crossed the westbound lanes on Highway 152, and entered the eastbound lanes, striking a 2003 Lincoln and a 2001 GMC pickup truck. The school bus struck the Lincoln on the driver's door, pushing it into the GMC. The three vehicles moved in a southerly direction together into a drainage ditch on the southwest corner of the intersection. The collision resulted in fatal injuries to the drivers of the Lincoln and the GMC. Forty-eight children and the bus driver received injuries ranging from minor to critical.

Rear-End Collisions in Slow Traffic from Prior Accident near Sulphur Spring, Texas

The Safety Board continues to investigate a collision that occurred in June 2004 near Sulphur Springs, Texas. The accident involved a tractor double-trailer that collided with the rear of an SUV that was stopped in the right-hand traffic lane in a queue of vehicles on Interstate 30. Traffic had slowed and stopped at that location after troopers of the Texas Department of Public Safety detoured traffic around the site of a fatal accident that had occurred an hour and a half earlier and was under investigation. Traffic had been rerouted from the highway to parallel service roads around the scene of the single-vehicle accident that blocked both the eastbound and westbound lanes of Interstate 30. The force of the collision pushed the SUV forward, into and under the rear of the trailer of another truck, which was in turn pushed forward into the rear of a second SUV and then another truck. A fire erupted involving the first SUV and one of the trucks. All four occupants of the first SUV and the driver of the first tractor double-trailer were killed. The occupants of the other vehicles received minor injuries.

Construction Zone Accident in Chelsea, Michigan

The NTSB continues to investigate a collision that occurred in July 2004 in Chelsea, Michigan, involving two tractor-trailers and an automobile in a construction zone on Interstate 94. One of the tractor-trailers and the automobile were moving slowly as part of a line of vehicles slowed by an earlier minor traffic accident in a highway construction zone. Another tractor-trailer failed to slow in time for the traffic ahead, swerved to the right, and struck the first tractor-trailer which then struck the automobile. The driver of the tractor-trailer that failed to slow was killed. The other drivers received minor injuries. The collision occurred in a 25-mile-long highway construction zone, where construction was occurring at several bridges, spaced miles apart. This was the fourth fatal collision in four months (one each month) since April 2004 in this construction zone.

Median Crossover Accident in Sherman, Texas

The NTSB continues to investigate a collision that occurred in September 2004 on U.S. Highway 75 in Sherman, Texas. The accident involved a tractor-trailer that veered left,

entered a 30-foot-wide earthen median, continued across the median, and entered the opposing lanes, where it collided with an SUV and a pickup truck. After the collision, the truck and the SUV came to rest in the grass on the far side of the roadway and a fire ensued, engulfing the truck and the SUV. The pickup remained in the travel lanes. The driver and four occupants of the SUV and the driver and four occupants of the pickup truck were killed. Two passengers in the pickup truck sustained serious injuries, and the truck driver sustained minor injuries.

Motorcoach Rollover near Turrell, Arkansas

The Safety Board continues to investigate an accident that occurred in October 2004 on Interstate 55 near Turrell, Arkansas. The accident involved a single vehicle, a 47-passenger motorcoach driven by a 67-year-old male, transporting 29 passengers to a casino in Tunica, Mississippi. Witnesses following the vehicle before the incident estimated that the motorcoach had been traveling about 70 mph. At exit 23A, the vehicle veered right and entered a grassy area between the exit and entrance ramps. The motorcoach began to rotate clockwise, striking an exit sign. It overturned, slid, struck an earthen drainage ditch, and rolled over.

The roof of the vehicle separated from the body on the left side, remaining connected (hinged) on the right side. As the vehicle began to roll over, the roof opened up, allowing passengers to be thrown from the now open-topped vehicle. The vehicle traveled 67 feet after striking the drainage ditch and came to rest upside down, with the roof lying on the ground (top side down) and still hinged on the right side of the vehicle. The vehicle had no passenger seat belts, and the driver was not wearing his seat belt. Fourteen passengers and the driver were killed; 15 others were injured.

Motorcoach/Bridge Accident in Alexandria, Virginia

The Safety Board continues to investigate an accident that occurred in November 2004 on the George Washington Parkway in Alexandria, Virginia, involving a motorcoach that struck an overpass, injuring nine students and severely damaging the bus's roof. The tour bus was transporting 27 students from Baltimore-Washington International airport to Mount Vernon as part of a tour of Washington. At the time of the accident the driver was talking on his cell phone.



Motorcoach Accident near Dallas, Texas

The Safety Board is investigating a fire aboard a motorcoach carrying elderly evacuees away from the predicted path of Hurricane Rita that occurred on September 23, 2005. The 1998 MCI 54-passenger motorcoach, operated by Global Limousine, Inc., was traveling north on Interstate 45 when it became engulfed in flames in Wilmer, Texas. The motorcoach was carrying 44 passengers and the driver. The passengers were from an assisted-living facility in Bellaire, Texas, and many needed to be carried or assisted onto the motorcoach by firefighters

or nursing staff. The driver, six nursing-staff passengers, the parent of one of the nursing staff, and 14 patient-passengers escaped the fire. Twenty-three patients, most of whom were not ambulatory, died in the fire.

Motorcoach Accident near Osseo, Wisconsin

The Safety Board is investigating two separate accidents that occurred at about 2:00 a.m. on October 16, 2005, on Interstate 94 near Osseo, Wisconsin. The first accident was a single-vehicle rollover involving a truck tractor-semitrailer combination unit. The combination unit was traveling at a driver-reported speed of 66 mph, when the unit departed the right-hand travel lane and paved shoulder at an approximate 3-degree angle. The shoulder was grooved with rumble strips. The unit entered the earthen, sloped roadside and traveled approximately 535 feet. Next, the driver steered to the left, and the combination unit reentered the pavement, overturned onto its right side, and slide to a stop, where it blocked both lanes and shoulders of westbound Interstate 94.

The second accident involved a motorcoach that collided with the wreckage of the first accident. The motorcoach was carrying a group of marching band members returning from a competition and had completed approximately 195 miles of the return trip. The accident bus was westbound in the right-hand lane traveling at highway speed when it came over a rise and collided with the wreckage from the first accident. There were no pre-crash skid marks. At the time of the accident, the weather was clear, there was no highway lighting, and the pavement was dry. Both vehicles sustained extensive damage. The bus driver and four passengers were fatally injured. Thirty occupants received minor to serious injuries and 10 occupants were not injured. The truck driver received minor injuries.

Highway/Rail Grade Crossing Accident in Elmwood Park, Illinois

The Safety Board is investigating a highway/rail grade crossing accident that occurred on November 23, 2005, in Elmwood Park, Illinois. A Metra commuter train was traveling northbound approaching the railroad grade crossing at W. Grand Avenue in Elmwood Park, Illinois. The train, which had departed about 20 minutes earlier from Union Station in Chicago, comprised a locomotive and six passenger cars and was on an express run to Antioch, Illinois, traveling at a speed of 70 mph. The railroad grade crossing at W. Grand Ave. contains three tracks, and is situated so that the tracks cross the four-lane roadway diagonally, at an angle of about 29 degrees. The crossing is protected by a combination of gates and cantilever mounted flashing warning lights, and also uses signs warning motorists with the message, "Long Crossing Do Not Stop On Tracks." The train's engineer reported that as the train neared the crossing, he observed multiple vehicles stopped on the tracks in front of him. He put the train into an emergency stop but collided with 6 of the stopped vehicles. One of the vehicles became engulfed in a post-crash fire. Secondary impacts resulted from the first 6 vehicles being displaced by the impact with the train, and colliding with other vehicles on the roadway. In all, 17 vehicles were involved in the crash. Three train passengers reported injuries, and seven vehicle occupants received injuries ranging from critical to minor.

Office of Marine Safety

The NTSB investigates major marine accidents (except accidents involving only public vessels) occurring on the navigable waters or territorial sea of the United States, or involving a vessel of the United States, under regulations prescribed jointly by the Safety Board and the Coast Guard. Major accidents are those involving the loss of six or more lives; the loss of self-propelled vessels of over 100 gross tons; property damage exceeding \$500,000; and serious threats to life, property, or the environment from hazardous materials. The NTSB also investigates certain accidents involving public and nonpublic vessels, and accidents that involve significant issues relating to Coast Guard safety functions.

In cases of catastrophic accidents or problems of a recurring nature, the Safety Board also investigates vessel safety issues where the States have primary jurisdiction, such as accidents to recreational and commercial boats operating solely within State waters. The NTSB is investigating the tragic capsizing of the *Ethan Allen* on Lake George, New York, in October 2005. The Board is also focusing on State boating safety issues such as operator education and use of lifejackets by children. In 2005, the Safety Board investigated the sinking of the uninspected charter fishing boat *Sydney Mae II*, in which three people who were not wearing lifejackets died. Similarities to the 2003 fatal capsizing of the *Taki-Too* off the Oregon coast prompted the Board's special attention to boats operating in hazardous conditions.

In past years, the Safety Board has conducted marine accident investigations involving U.S. flag ships in locations as distant as the Persian Gulf and the South China Sea. However, in 2005 there were no major overseas marine accidents requiring investigation by the Board. The most remote investigation conducted in the past year involved the Malaysian bulk carrier *Selendang Ayu*, which ran aground at Unalaska Island in the Aleutians.

Because of the international nature of the marine transportation system and the large percentage of foreign flag cruise and cargo ships operating from U.S. ports, the Safety Board's investigation of accidents involving both domestic and foreign flag vessels is essential to the enhancement of marine safety worldwide. The Safety Board fulfills U.S. obligations with regard to foreign accident investigations, established under the auspices of the International Maritime Organization, by serving as a U.S. representative to marine accident investigations involving foreign flag vessels operating from U.S. ports. In 2005, the Bahamian vessel *Norwegian Dawn* was struck by an unusually large wave in the Atlantic Ocean during a voyage between Miami and New York, injuring four persons and damaging the ship. The NTSB investigation revealed that despite crew caution and good seamanship, the sea remains a potentially dangerous and unpredictable environment.

Marine accidents are investigated by NTSB headquarters staff—professional investigators who include licensed master mariners, marine engineers, naval architects, and human performance and survival factors specialists.

Marine accident reports contain in-depth analyses of the accidents under investigation, findings of probable cause or causes, and safety recommendations that seek to prevent similar accidents or that address major deficiencies in the marine transportation system. 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.

In 2005, the 16 members of the Office of Marine Safety investigated three new accidents, completed six reports, and continued work on seven accident investigations.

Completed Marine Investigations

Assistant Captain's Unexplained Incapacitation and Lack of Effective Ferry Operating Procedures Leads to Allision of Staten Island Ferry Andrew J. Barberi with Maintenance Pier in New York Harbor

On October 15, 2003, the Staten Island Ferry *Andrew J. Barberi*, owned and operated by the New York City Department of Transportation (NYC DOT), was at the end of a regularly scheduled trip from Manhattan to Staten Island when it struck a maintenance pier at the Staten Island Ferry terminal. Fifteen crewmembers and an estimated 1,500 passengers were on board. Ten passengers died and 70 were injured in the accident. An eleventh passenger died two months later as a result of injuries sustained in the accident. On March 8, 2005, the Safety Board determined that the probable cause of this accident was the assistant captain's unexplained incapacitation and the failure of the NYC DOT to implement and oversee safe, effective operating procedures for its ferries.



At the time of the accident, the assistant captain was at the controls, the senior mate was seated in the aftmost section of the pilothouse reading a newspaper, and no one else was in the pilothouse at the ferry's Staten Island end. The assistant captain was reported to have been upright but unresponsive to his surroundings and to the visual cues of the impending allision for an estimated one to two minutes before the accident. The cause of the assistant captain's unresponsiveness to cues that clearly indicated an impending impact could not be determined.

Because the assistant captain and his physician omitted from the form used for Coast Guard medical evaluations critical details regarding the assistant captain's medical condition and medication use, the Board concluded that the Coast Guard had no opportunity to evaluate his fitness to maintain his mariner's license. (Both the assistant captain and his physician later pled guilty to knowingly submitting false medical information to the Coast Guard.) Nevertheless, the Safety Board noted shortcomings in the Coast Guard's system of medically evaluating mariners, and it issued two safety recommendations to the Coast Guard to overhaul its regulations and procedures to better evaluate the medical fitness of applicants for mariners' licenses.

The Board determined that contributing to the cause of the accident was the captain's failure to exercise his command responsibilities on the *Andrew J. Barberi* to ensure the safety of its operations, and the NYC DOT's failure to implement and oversee safe and effective operating procedures for its ferries. As a result of the investigation, the Board made several recommendations to the NYC DOT, including that it require its licensed pilots to provide proof of compliance with Coast Guard medical certification requirements, and also that it adhere to its October 2005 target for implementing a comprehensive safety management system. The Safety Board also recommended that the Coast Guard seek legislative authority to require all U.S.-flag ferry operators to implement safety management systems, and once

obtained, require all U.S.-flag ferry operators to do so, and it recommended that States operating public ferries and the Passenger Vessel Association encourage public ferry operators to voluntarily request application of the Federal requirements for implementing a safety management system, if not already in place.

Master's Decision to Cross Bar During Hazardous Conditions Leads to Capsizing of Small Passenger Vessel Taki-Too Off the Oregon Coast

On June 14, 2003, the small passenger vessel *Taki-Too* capsized after it crossed the Tillamook Bay bar at the entrance to the Pacific Ocean. The accident claimed the lives of



11 of the 19 persons on board the vessel. The Safety Board determined that the probable cause of the accident was the master's decision to attempt to cross the bar despite the hazardous sea state that existed at the time. Contributing to the severity of the accident was the failure of the master to ensure that he and all others on board had donned lifejackets before crossing the bar, and the ineffectiveness of the enforcement of regulations

that require vessel masters (in this case, the master of the *Taki-Too*) to have passengers wear lifejackets before attempting a hazardous bar crossing.

Because of the sea conditions, the Coast Guard had posted rough bar advisories and prohibited recreational boats and uninspected small passenger vessels from transiting the bar that day. The restrictions did not apply to inspected charter vessels like the *Taki-Too*, which was one of five vessels that approached the bar about the same time. The *Taki-Too* master watched three vessels cross before attempting to take his vessel across the bar. None of his passengers was wearing a lifejacket

The Safety Board noted that Federal regulations require airlines to develop operating specifications that strictly delineate the conditions under which their aircraft will be allowed to operate. By contrast, no such requirement applies to owners of small passenger vessels. It therefore recommended to owners and operators of charter fishing vessels operating out of Tillamook Bay that they develop and implement go/no-go policies, based on risk-management principles, regarding transiting bars and inlets. Pending implementation of such a Coast Guard regulation, the Board recommended that the National Marine Charter Association urge its members operating within Coast Guard-designated surf stations and regulated boating areas on the West Coast to implement such policies regarding transiting bars and inlets.

Although the Coast Guard has a regulation requiring vessel masters to compel passengers to wear lifejackets during hazardous conditions, the Safety Board found that this regulation is rarely enforced, and the Board believes a revision of the regulations is required. The Board recognizes that a regulatory change affecting all bars and inlets may not be warranted, and noted in its report that sea conditions at West Coast inlets are more severe than conditions at East Coast inlets. Therefore, the Board recommendations dealing with mandatory lifejacket use were directed to West Coast operations. The Safety Board recommended that the Coast

Guard require passengers of such vessels operating within Coast Guard designated surf stations and regulated boating areas on the West Coast to wear lifejackets while transiting bars and inlets where rough bar warnings are in effect.

*Inadequate Communication among Submarine Crewmembers and Poor Decision by Submarine Commander Causes Collision Between U.S.S. **Greenville** and Japanese Vessel **Ehime Maru** Near Pearl Harbor, Hawaii*

On October 19, 2005, the Safety Board released its investigative report on the February 9, 2001, collision between the U.S.S. *Greenville*, a U.S. Navy nuclear submarine, and the *Ehime Maru*, a Japanese motor vessel. The *Greenville* crew was performing an emergency surfacing maneuver for civilians on board as part of the Navy's Distinguished Visitor Program when the submarine struck the Japanese ship while it was en route to fishing grounds south of Oahu, Hawaii. The collision resulted in the sinking of the *Ehime Maru*. Of the 35 people on board the Japanese vessel, nine died and 10 were injured.

The Safety Board determined that the probable cause of the accident was the inadequate interaction and communication among senior members of the submarine's combat systems team, which resulted in the failure of the crew to perform proper contact analysis and to adhere to procedures for moving to periscope depth. These failures, ultimately resulted in the commanding officer's decision to order an emergency surfacing maneuver. Contributing to the cause of the accident was the failure of the crew, in particular the commanding officer, to adequately manage the civilian visitors so that they did not impede operations. Contributing to the loss of life was the rapid flooding and sinking of the *Ehime Maru*, which occurred when the submarine's rudder tore through the fishing vessel's lower deck spaces.

*Failure to Recognize Effects of Course Change Causes Grounding of Alaska Marine Highway System Ferry **LeConte** Near Sitka, Alaska*

On May 10, 2004, the Alaska Marine Highway System ferry *LeConte*, en route to Sitka, Alaska, from Angoon, Alaska, ran aground on Cozian Reef about 30 miles north of Sitka. Visibility was clear. One passenger received minor injuries, and the vessel was extensively damaged in the accident.

The *LeConte* was proceeding north-northwesterly before it was to complete a planned turn to the west. Just before the turn, a tug towing a freight barge was observed proceeding easterly along the same route, requiring the *LeConte* to change course to avoid a potential collision, and it ran aground.

The Safety Board determined that the probable cause of the accident was the failure of the master and the chief mate to recognize that the course the chief mate selected would cause the vessel to pass over the reef. The chief mate was determined to have lost awareness of the navigation situation because of fatigue from significant sleep deficit caused by work accomplished off watch, in addition to his standing a six-hour watch routine.

*Heavy Weather Damages Bahamas-Flag Passenger Vessel **Norwegian Dawn** in the Atlantic Ocean*

On April 16, 2005, the Bahamas-registered passenger vessel *Norwegian Dawn* suffered heavy-weather damage about 120 miles east of Charleston, South Carolina, while returning to New York on the last leg of a regularly scheduled roundtrip cruise between New York and

Miami, Florida. Four passengers received minor injuries, and several cabins were extensively damaged. The investigation of the accident, which occurred in international waters, was carried out by the Bahamas Maritime Authority with the assistance of the Safety Board.

The vessel was en route from Miami to New York when the crew received forecasts of storm and gale conditions along its intended route. Wind speeds from the north at up to 40 knots were predicted, with waves between 14 and 28 feet high and higher waves along the main axis of the Gulf Stream. The master notified both passengers and crew of the forecast conditions, altered the vessel's course over the next 10 hours, and slowed its speed from 15 to 7 knots. Two cabins were damaged and the occupants injured when the vessel was struck by particularly large waves. The vessel diverted to Charleston, South Carolina, on April 16, to disembark passengers and to undergo temporary repairs, and then continued to New York.

The Safety Board determined that the probable cause of the damage to the *Norwegian Dawn* and of the injuries suffered by its passengers was waves breaking over the bow during the ship's unavoidable encounter with severe weather and heavy seas.

Small Passenger Vessel Sydney Mae II Sinks Near Winchester Bay, Oregon

On September 19, 2005, the uninspected small passenger vessel *Sydney Mae II* sank in the Pacific Ocean at the entrance to the Umpqua River near Winchester Bay, Oregon. Of the five individuals on board, two survived, two died and were recovered, and one is missing and presumed dead. None of the passengers was wearing a lifejacket at the time of the accident.

The Safety Board determined that the probable cause of the accident was the captain's decision to closely approach the Umpqua River bar during hazardous conditions. Contributing to the loss of life was the captain's failure to ensure that passengers were wearing lifejackets during hazardous conditions, as required by 46 CFR 26.03-2.

The *Sydney Mae II* accident was of particular interest to the Safety Board because of its similarity to the earlier capsizing on the *Taki-Too* near Tillamook Bay, Oregon. Tragically, both accidents resulted in the loss of life because the vessel operators failed to require passengers to wear lifejackets during hazardous conditions. The Safety Board issued three recommendations to the Coast Guard in its final report of the *Taki-Too* accident investigation, two of which addressed issues similar to those found in this accident—small passenger vessels transiting waterways during hazardous conditions, and passengers wearing lifejackets during hazardous conditions.

Ongoing Marine Investigations

Boiler Ruptures on Cruise Ship Norway in Miami, Florida

The Safety Board is investigating the May 25, 2003, boiler rupture aboard the Norwegian Cruise Line passenger ship *Norway*. The rupture occurred while the ship was moored in Miami, Florida, with 2,135 passengers and 911 crewmembers on board. Eight crewmembers were killed and 19 others injured in the accident. All passengers were evacuated safely.

At the time of the rupture, three of the Norway's four main propulsion boilers were in normal-in-port operating status, supplying steam to electrical generators and auxiliary equipment. No maintenance was being carried out on any of the boilers at the time. About an hour after docking one of the operating boilers suddenly ruptured, sending hot water and steam into the engine room and into passageways and cabins damaged by the rupture. The rupture caused extensive damage to the boiler, the boiler room, and to accommodation spaces three decks above the boiler. Issues of concern in this investigation include the adequacy of the maintenance, repair, and inspection of the boilers on board the *Norway* and of surveys by the vessel's classification society.

Pontoon Water Taxi Lady D Capsizes in Baltimore, Maryland

(This report was adopted by the Board on 3/7/06)

On March 6, 2004, the small passenger vessel, *Lady D*, a pontoon water taxi operating in Baltimore Harbor, encountered a rapidly developing storm with high winds. The vessel, carrying two crewmembers and 23 passengers, began to roll in the waves. The intensity of the rolling increased, and the pontoon vessel heeled to starboard and capsized. The vessel was destroyed, five passengers died, four passengers suffered serious injuries, and 10 passengers and two crewmembers sustained minor injuries as a result of this accident.



Post accident vessel stability tests revealed that the load carried by the *Lady D* on the day of the accident exceeded the safe capacity of the vessel. Coast Guard data indicate that, nationwide, about 270 commercial pontoon vessels with a combined capacity of 9,000 occupants transport passengers on protected waters. The Safety Board determined that early action was warranted because the design of most pontoon-style small passenger vessels makes them particularly susceptible to capsizing when they are operated in an overloaded condition. Therefore, on December 20, 2004, the Board issued an advance safety recommendation urging the Coast Guard to take immediate action to restrict the possibility that the occupant weight will exceed a vessel's proof test weight.

Engine Fire Destroys Passenger Ferry Express Shuttle II in Port Richey, Florida

(This report was adopted by the Board on 4/4/06)

On October 17, 2004, the small passenger vessel *Express Shuttle II*, with three crewmembers onboard, was returning from ferrying 78 passengers to the offshore casino vessel *Royal Casino I*, when the crewmembers saw smoke coming from the engine spaces. The vessel had just lost power to both engines and the Master was turning it toward the nearby shore to beach the vessel. A crewmember then reported to the master that the fire was out of control. The crew's firefighting efforts could not contain the fire. They prepared to abandon ship and were rescued by a passing recreational boat. One crewmember suffered smoke inhalation and was

taken to a hospital for observation. Firefighters ran fire hoses from shore to a sheriff's boat, which shuttled equipment and personnel to the burning vessel. The *Express Shuttle II* was extensively damaged by the fire and declared a total loss. The Safety Board is investigating the company's maintenance procedures and the crew's firefighting training and experience.

*Malaysian-Registered Freighter **Selendang Ayu** Grounds Off Unalaska Island in the Aleutians*

(This report was adopted by the Board on 9/26/06)

On December 8, 2004, the Malaysian-registered vessel *Selendang Ayu* was en route from Seattle, Washington, to Xiamen, China, when it lost propulsion in the Bering Sea, about 60 nautical miles northwest of Umnak Island in the Aleutians. It drifted for two days, and subsequently broke in half after grounding 0.7 nautical mile off the north shore of Unalaska Island. The vessel, which had a crew of 26, had taken on about 60,000 tons of soybeans and about 1,000 tons of heavy fuel in Seattle for the transit to China. Most of the fuel and cargo was lost in the days following the breakup. While conducting rescue operations, a Coast Guard helicopter crashed, killing six crewmembers from the freighter. The Safety Board is investigating the cause of the vessel's loss of propulsion and the subsequent events that led to the grounding.

*Tour Boat **Ethan Allen** Capsizes on Lake George, New York*

(This report was adopted by the Board on 7/25/06)

The Safety Board is investigating the October 2, 2005, capsizing of the tour boat Ethan Allen on Lake George in the Adirondack Mountains of upstate New York. The 40-foot, Plexiglas-enclosed tour boat capsized suddenly, claiming the lives of 20 elderly passengers. Investigators, who continue to examine documents and test equipment to try to determine the cause of the accident, have considered design and construction, modifications to the original design, handling characteristics, maintenance, passenger weight and distribution, and other factors.

Office of Railroad, Pipeline and Hazardous Materials Safety

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 commuter rail systems, often over tracks owned by freight railroads. In addition, rail transit systems transport millions of commuters to and from major metropolitan areas each day.

Freight railroads own and maintain their own infrastructure, including 140,800 miles of track, with the associated bridges, buildings, repair shops, and switching facilities. Forty percent of the Nation's freight, more than any other mode, moves by rail each year. Railroads move about 30 million carloads each year, including over 1.7 million carloads of hazardous materials. Rail freight, particularly intermodal, is continuing an upward trend.

Since 1967, Congress has assigned the primary responsibility for railroad accident investigation to the NTSB. As with the other surface modes, the Safety 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 Federal Railroad Administration (FRA). In order to use its resources most efficiently, the Board has established accident investigation criteria to help highlight accidents that involve significant safety issues.

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 life-saving issues.

Completed Significant Rail Investigations

Broken Rail Causes Canadian National Railway Freight Train Derailment and Hazardous Materials Release near Tamaroa, Illinois

On February 9, 2003, a northbound Canadian National freight train, traveling about 40 mph, derailed 22 of its 108 cars in Tamaroa, Illinois. Four of the derailed cars released methanol; the methanol from two of these cars fueled a fire. Other derailed cars contained phosphoric acid, hydrochloric acid, formaldehyde, and vinyl chloride. About 850 residents were evacuated from the area within a three-mile radius of the derailment, which included the entire village of Tamaroa. No one was injured during the derailment, although one

In 2005, the 39 Office of Railroad, Pipeline, and Hazardous Materials Safety staff members launched on 12 accidents, completed 11 reports, and continued work on 12 investigations.

contract employee was injured during cleanup activities. Damages to track, signals, and equipment and clearing costs associated with the accident totaled about \$1.9 million.

The Safety Board determined that the probable cause of the derailment was the Canadian National's placement of bond wire welds on the head of the rail just outside the joint bars, where untempered martensite associated with the welds led to fatigue and subsequent cracking that, because of increased stresses associated with known soft ballast conditions, rapidly progressed to rail failure.

Failure to Secure a Locomotive Causes Multiple Highway/Railroad Grade Crossing Collisions in Queens, New York

On March 10, 2004, the crew of a Long Island Rail Road train, assigned to reposition equipment in various locations, left a locomotive unattended with only its air brakes



applied. The locomotive was left on a descending grade in the Fresh Pond yard of the New York & Atlantic Railway in Queens, New York. The locomotive rolled away and traveled through the yard and onto the Bushwick Branch of the New York & Atlantic Railway where it passed over seven passive grade crossings and struck numerous vehicles before coming to a stop. Four occupants of three struck vehicles were seriously injured. A fire occurred when the locomotive came to a stop, after

its collision with the last two vehicles. The Long Island Rail Road estimated equipment damages of \$83,000; the New York & Atlantic Railway estimated minimal damages.

The Safety Board determined that the probable cause of the multiple highway/railroad grade crossing collisions was the failure of the Long Island Rail Road conductor and assistant conductor/brakeman to secure the locomotive when they left it unattended on a descending grade.

Failure of Insulated Joint Bars Causes Union Pacific Railroad Freight Train Derailment and Hazardous Materials Release near Pico Rivera, California

On October 16, 2004, an eastbound Union Pacific Railroad freight train derailed three locomotives and 11 cars near Pico Rivera, California. Some of the derailed cars struck nearby residences. Small amounts of hazardous materials were released from transported cargo. An estimated 5,000 gallons of diesel fuel were released from the locomotive fuel tanks when they ruptured during the derailment. About 100 people were evacuated from the area. There were no injuries to area residents, the train crew, or emergency response personnel. The Union Pacific Railroad estimated monetary damage at \$2.7 million.

The Safety Board determined that the probable cause of the derailment was the failure of a pair of insulated joint bars due to fatigue cracking. Contributing to the accident was the lack of an adequate on-the-ground inspection program for identifying cracks in rail joint bars before they grow to critical size.

Crewmembers' Neglect of Wayside Signal System Causes Train Collision near Kelso, Washington

On November 15, 2003, a northbound Union Pacific Railroad train, consisting of 3 locomotives and 90 empty cars, struck a southbound Burlington Northern Santa Fe Railway Company train, consisting of three locomotives and 32 loaded cars, near Kelso, Washington. The Burlington Northern Santa Fe Rail train was struck about seven container platforms behind the locomotives, which derailed five cars. The striking Union Pacific train had its three locomotives and 15 of its cars derail as a result of the collision. Both members of the Union Pacific crew were seriously injured; the two Burlington Northern Santa Fe crewmembers did not sustain any injuries. The railroad in the area of the accident is owned by the Burlington Northern Santa Fe and is used jointly by the Burlington Northern Santa Fe and the Union Pacific. About 2,800 gallons of fuel were released from the ruptured fuel tanks of the Union Pacific locomotives. A nearby train crew extinguished a minor fire. Estimated damages were \$2.7 million.

The Safety Board determined that the probable cause was the Union Pacific crewmembers' neglect of the information conveyed by the wayside signal system because they were asleep. The engineer's and conductor's respective health conditions in combination with irregular work schedules contributed to the accident. The lack of a positive train control system was also a contributing factor.

Remote-Control Operator's Failure to Control Railcars Causes Derailment, Chemical Leak, and Evacuation in East St. Louis, Illinois

On September 21, 2004, an Alton and Southern Railway Company remote-control train derailed during switching operations at the east end of the Gateway Hump Yard in East St. Louis, Illinois. The remote-control operator was unable to control the speed of the train as it crested the hump. The train collided at 9.6 mph with a tank car containing vinyl acetate. During the collision and subsequent derailment, vinyl acetate leaked from two tank cars. The cargo from both cars caught on fire. About 140 people from the surrounding neighborhood were evacuated, and work at the hump yard was suspended. No injuries were reported.

The Safety Board determined that the probable cause of the accident was the inability of the remote-control operator to control the speed of the cars being switched as they crested the hump because the weight of the cars exceeded the braking capability of the remote control locomotives. Contributing to the accident was the failure of the Alton and Southern Railway Company to have weight limits and adequate hump operation procedures in place for maneuvering heavy strings of cars over the hump.

Canadian National's Failure to Maintain and Inspect Its Track Causes Amtrak Derailment near Flora, Mississippi

On April 6, 2004, northbound National Railroad Passenger Corporation (Amtrak) train 58 (City of New Orleans) derailed on Canadian National railroad track near Flora, Mississippi.



The entire train, consisting of one locomotive, one baggage car, and eight passenger cars, derailed near milepost 196.5 while traveling about 78 mph. The train was carrying 61 passengers and 12 Amtrak employees. The derailment resulted in one fatality, three serious injuries, and 43 minor injuries. The equipment costs associated with the accident totaled about \$7 million.

On July 26, 2005, the Safety Board determined that the probable cause of the accident was the failure of Canadian National to properly maintain and inspect its track, resulting in a rail shift and the subsequent derailment of

the train, and the FRA's ineffective oversight to ensure the proper maintenance of the track by the railroad.

To the FRA, the Board recommended emphasizing to track inspectors the importance of enforcing a railroad's continuous welded rail program, and establishing an audit and enforcement program to verify that Amtrak complies with initial and periodic emergency preparedness training for all crewmembers system wide. To Canadian National, the Board recommended establishing an audit program to verify that employees follow the current written track maintenance and inspection procedures, including rail anchoring requirements and specifically maintaining the preferred rail laying temperature. To Amtrak, the Safety Board recommended that Amtrak, within 90 days, develop a schedule for training employees who have not received emergency preparedness training.

Locomotive Engineer's Failure to Control a Train Causes a Collision with a Maintenance Building in San Antonio, Texas

On November 10, 2004, a Union Pacific Railroad train collided with a track car mover and four refrigerated boxcars that were parked at Crystal Cold Storage track in San Antonio, Texas. The engineer lost radio communication with the conductor, who was controlling the train movement, and failed to stop the train in time to avoid the collision. An employee of a rental car company was killed when one of the parked cars was pushed over a pair of wheel stops and into the Crystal Cold Storage maintenance building. A Crystal Cold Storage employee was injured while he was unloading frozen food from one of the parked boxcars. Damages totaled \$308,637.

The Safety Board determined that the probable cause of the accident was the failure of the engineer to stop the train, as required by Union Pacific's radio communication operating rules.

Locomotive Engineer's Failure to Obey Signal Indications Leads to Derailment in Chicago, Illinois

On October 12, 2003, a westbound Northeast Illinois Regional Commuter Railroad (Metra) train derailed its two locomotives and five passenger cars as it traversed a crossover near 48th Street in Chicago, Illinois. The train derailed at a speed of about 68 mph; the maximum authorized speed through the crossover was 10 mph. There were about 375 passengers and a crew of three on board. As a result of the accident, 47 passengers were transported to eight local hospitals. Of these, 44 were treated and released, and three were admitted for observation. Damages from the accident exceeded \$5 million.



The Safety Board determined that the probable cause of the accident was the locomotive engineer's loss of situational awareness minutes before the derailment because of his preoccupation with certain aspects of train operations that led to his failure to observe and comply with signal indications. Contributing to the accident was the lack of a positive train control system at the accident location.

To the FRA, the Board recommended developing guidelines for locomotive engineer simulator training programs that go beyond developing basic skills and teach strategies for effectively managing multiple concurrent tasks and atypical situations; and requiring train crews to call out all signal indications over the radio, including clear signals, at all locations that are not equipped with automatic cab signals with enforcement or a positive train control system. To Metra, the Safety Board recommended the following: use locomotive engineer simulator training to go beyond developing basic skills and teach strategies for effectively managing multiple concurrent tasks and atypical situations; require train crews to call out all signal indications over the radio, including clear signals, at all locations that are not equipped with automatic cab signals with enforcement or a positive train control system; and install a positive train control system on its commuter train routes. To the FRA, the Board also reiterated a safety recommendation to develop and implement positive train control systems that include collision avoidance, and require implementation of positive train control systems on main line tracks, establishing priority requirements for high-risk corridors such as those where commuter and intercity passenger railroads operate.

Crew's Failure to Properly Align a Switch Leads to Train Collision in Graniteville, South Carolina

On January 6, 2005, a northbound Norfolk Southern Railway Company freight train, while traveling about 47 mph through Graniteville, South Carolina, encountered an improperly



lined switch that diverted the train from the main line onto an industry track, where it struck an unoccupied, parked train. The collision derailed both locomotives and 16 of the 42 freight cars of the striking train, as well as the locomotive and one of the two cars of the parked train. Among the derailed cars of the striking train were three tank cars that contained chlorine, one of which was breached and released chlorine gas. The train engineer and eight other people died as a result of chlorine gas inhalation.

About 554 people complaining of respiratory difficulties were taken to local hospitals. Of these, 75 were admitted for treatment. Because of the chlorine release, about 5,400 people within a one-mile radius of the derailment site were evacuated for several days. The total damages exceeded \$6.9 million.

The Safety Board determined that the probable cause of the accident was the failure of the Norfolk Southern train crew to return a main line switch to the normal position after completing work at the industry track. Contributing to the failure was the absence of any feature or mechanism that would have reminded crewmembers of the switch position and thus would have prompted them to complete this final, critical task before departing the work site. Contributing to the severity of the accident was the puncture of the ninth car in the train, a tank car containing chlorine, which resulted in the release of poisonous chlorine gas.

The Board made four safety recommendations to the FRA: (1) Require that, along main lines in nonsignaled territory, railroads install an automatically activated device, independent of the switch banner, that will, visually or electronically, compellingly capture the attention of employees involved with switch operations and clearly convey the status of the switch both in daylight and in darkness. (2) Require railroads, in nonsignaled territory and in the absence of switch position indicator lights or other automated systems that provide train crews with advance notice of switch positions, to operate those trains at speeds that will allow them to be safely stopped in advance of misaligned switches. (3) Require railroads to implement operating measures, such as positioning tank cars toward the rear of trains and reducing speeds through populated areas, to minimize impact forces from accidents and reduce the vulnerability of tank cars transporting chlorine, anhydrous ammonia, and other liquefied gases designated as poisonous by inhalation. (4) Determine the most effective methods of providing emergency escape breathing apparatus for all crewmembers on freight trains carrying hazardous materials that would pose an inhalation hazard in the event of unintentional release, and then require railroads to provide these breathing apparatus to their crewmembers along with appropriate training.

Ongoing Rail Investigations

Employee Fatality on the Union Pacific Railroad in San Antonio, Texas

(This report was adopted by the Board on 5/23/06)

On Sunday, December 7, 2003, a Union Pacific Railroad conductor was struck and killed by two coupled locomotives at Union Pacific East Yard in San Antonio, Texas. The locomotives were being operated by remote-control technology and were under the conductor's control at the time of the accident. On this night, a second train crewmember was unavailable and the conductor was working alone. The conductor was in the foul of the track (within four feet of the rails) when he was struck. He was moving the locomotives from track 32 to yard track 3, where he was supposed to switch a cut of railroad cars. When the accident occurred, the locomotives, which were traveling about 10 mph, were moving back over the track they had just traversed, rather than over the route leading to the destination yard track.

Freight Train Collision in Carrizozo, New Mexico

On February 21, 2004, two Union Pacific freight trains collided in Carrizozo, New Mexico. The eastbound freight train, consisting of two locomotives and 78 empty auto carriers, struck the westbound train, consisting of four locomotives and 93 cars loaded with grain. The two crewmembers on the eastbound train were killed in the accident; the two crewmembers on the westbound train were not injured. Both engines and nine cars of the eastbound train derailed, while 11 cars of the westbound train derailed. A brief fuel fire occurred.

Freight Train Collision near Gunter, Texas

(This report was adopted by the Board on 6/13/06)

On May 19, 2004, two Burlington Northern Santa Fe Railway Company freight trains collided head-on near Gunter, Texas. The trains were traveling about 40 mph when the collision occurred. They were operating under track warrant control rules on non signaled single track. The collision resulted in the derailment of five locomotives and 28 cars. About 3,000 gallons of diesel fuel were released from the locomotives and resulted in a fire. The southbound train engineer was killed, and the southbound train conductor was airlifted to a hospital in Dallas with serious burns. The crewmembers on the northbound train were admitted to a local hospital. Estimated property damages exceeded \$2 million.



Collision Between a Union Pacific Railroad Freight Train and a Burlington Northern Santa Fe Freight Train in Macdona, Texas

(This report was adopted by the Board on 7/6/06)

On June 28, 2004, a westbound Union Pacific Railroad freight train traveling about 45 mph struck the side of the 63rd car of an eastbound Burlington Northern Santa Fe freight train traveling about 20 mph. The collision occurred on the Union Pacific's San Antonio Division, Del Rio Subdivision, near Macdona, Texas, and derailed the four locomotives and 19 cars in the Union Pacific train and 16 cars in the Burlington Northern Santa Fe train. A small fire resulted, and a loaded tank car was breached, resulting in the release of chlorine, a toxic gas. The area within a two-mile radius was evacuated.

Each train crew consisted of an engineer and a conductor. There were three fatalities: the Union Pacific conductor and two residents. More than 40 people, including the Union Pacific engineer, firefighters, and residents, were transported to area hospitals for treatment. Preliminary property damage and environmental cleanup costs exceed \$7 million. On April 26–27, 2005, the Safety Board held a two-day public hearing on this accident.

Washington Area Metropolitan Transit Authority Collision at the Woodley Park Station in Washington, D.C.

(This report was adopted by the Board on 3/23/06)

On November 3, 2004, two Washington Metropolitan Area Transit Authority Red Line trains collided at the Woodley Park/Zoo Station. The collision took place on the outbound track, on the Shady Grove side of the station. The struck train was a six-car train in revenue service, outbound in the direction of Shady Grove with about 70 passengers onboard. It had made a normal station stop at the Woodley Park/Zoo station. The striking train was a six-car train that was not in revenue service at the time. The collision resulted in a derailment; several cars were damaged and one car was destroyed. There were about 20



injuries and damage was estimated at \$1.5 million.

Train Derails After Impacting Debris from a Tunnel Collapse near Glencoe, Kentucky

On January 5, 2005, a southbound CSX Transportation train derailed after impacting debris from a tunnel collapse. The train originated at Rouge Yard in Detroit, Michigan, and was destined for Louisville, Kentucky. The derailment occurred about 40 feet inside the north portal of Eagle Tunnel at milepost T73.6 near Glencoe, Kentucky. The train consisted of two locomotives with 41 loaded automobile carriers. The crew, an engineer and a conductor, sustained non-life-threatening injuries that required medical attention. Both were treated and released. The lead truck of the first locomotive derailed on impact; the second locomotive did

not derail. The third through the eighth cars behind the second locomotive derailed, but all locomotives and cars remained upright. About 500 gallons of diesel fuel were released.

Man Drives Jeep onto Train Tracks to Cause a Derailment near Glendale, California

On January 26, 2005, a Metrolink Commuter train, consisting of one locomotive and four passenger cars, struck an unoccupied Jeep Cherokee near a public grade crossing. After striking the automobile, the train derailed and collided with a standing Union Pacific ballast train, which was tied down on a siding. No crew was on the Union Pacific train, which derailed and rolled onto its side. Because of the collision, the cars of the Metrolink train struck a passing westbound Metrolink train, which consisted of one locomotive and three passenger cars. Both trains, including all locomotives and passenger cars, derailed. There were 11 passenger fatalities.

The collision occurred north of the Los Angeles downtown area near West Chevy Chase Drive in Los Angeles County. The driver of the vehicle reportedly had intentionally placed his vehicle on the tracks to cause a collision. Moments before the train crash, he exited his vehicle. A short time later, the police apprehended him. Glendale law enforcement authorities are investigating.

Amtrak Train Derails near Home Valley, Washington

On April 3, 2005, an eastbound Amtrak train derailed near Home Valley, Washington. The derailment occurred on Burlington Northern Santa Fe track while the train was in a 3-degree curve with continuously welded rail and concrete ties. All the equipment remained coupled; however, some cars leaned approximately 45 degrees. Of the 105 passengers and nine crewmembers, 24 people received medical attention.

Canadian National Freight Trains Collide Head-on near Anding, Mississippi

On July 10, 2005, two Canadian National freight trains collided head-on near Anding, Mississippi. The southbound train consisted of two locomotives and 107 freight cars, including four tank cars carrying hydrogen cyanide and several other tank cars carrying hazardous materials. The northbound train consisted of four locomotives and 137 freight cars, including six tank cars carrying residual liquefied petroleum gas and other tank cars of hazardous materials. A fire resulted from the collision and engulfed the locomotives and several freight cars; the fire burned for several hours. Both train crews perished in the collision.

Two Union Pacific Trains Collide near Shepherd, Texas

(This report was adopted by the Board on 5/22/06)

On September 14, 2005, a southbound Union Pacific train struck a Union Pacific train parked on a siding track. The collision occurred in Shepherd, Texas, which is about 60 miles northeast of Houston. While the striking train was traveling from Pine Bluff, Arkansas, to Houston, Texas, it was diverted from the main track and onto the siding where it struck the parked train. Six cars derailed. Diesel fuel leaked from the locomotives. An engineer was fatally injured. Between 300 and 600 area residents living within a one-half mile radius were evacuated.

Commuter Train Derails and Strikes Bridge in Chicago, Illinois

On September 17, 2005, an eastbound Northeast Illinois Regional Commuter Railroad Corporation (Metra) train derailed one locomotive and five cars at milepost 4.7 near West 47th Street in Chicago, Illinois. The train was traveling about 69 mph and derailed as it traversed

a crossover routing the train from track 2 to track 1. The crossover had a prescribed operating speed of 10 mph. The train was being operated in the “push” mode from a cab control car at the lead end. The fourth car from the head end of the train struck a steel girder of the bridge that carried the tracks over 47th Street. Metra reported that there were 185 passengers on the train; 129 were injured and required medical attention. Of those, 38 required hospitalization, and two were fatally injured. Metra estimates that damages exceeded \$4 million.

Track Worker Is Fatally Injured When Struck by a Train near Laramie, Wyoming

On October 5, 2005, a Union Pacific track employee was fatally injured when a train struck him while he was walking between the tracks near Laramie, Wyoming. A train work crew was working on the south track when the employee in charge received a request to allow three westbound trains to enter the work crew’s area on the north track. The employee in charge granted permission to the trains. The trains were also given orders to limit their speed to 40 mph. The first train passed without incident. The second train struck and fatally injured the tamper machine operator, who was walking beside his machine. The striking train was traveling 38 mph.

Two Westbound Freight Trains Collide near Texarkana, Arkansas

On October 15, 2005, two westbound Union Pacific Railroad freight trains collided near Texarkana, Arkansas. A westbound intermodal train collided with the rear end of a stopped train. The collision resulted in the derailment of eight cars. When one tank car, containing the flammable gas propylene, was breached, the gas ignited. The fire damaged several homes. Authorities evacuated the surrounding area. One local resident had fatal injuries from a house fire. No train crewmembers were injured.

Commuter Train Collides with Six Vehicles at the Railroad Grade Crossing in Elmwood Park, Illinois

On November 23, 2005, a Metra commuter train collided with six stationary vehicles at the railroad grade crossing at West Grand Avenue in Elmwood Park, Illinois. The train, composed of a locomotive and six passenger cars, was on an express run to Antioch, Illinois, traveling 70 mph. The railroad grade crossing had three railroad tracks and four highway traffic lanes that crossed at an angle of about 29 degrees. The crossing was protected by a combination of gates and cantilever-mounted flashing warning lights and also had signs that warned motorists “Long Crossing Do Not Stop On Tracks.” The engineer put the train into emergency braking but the train collided with six of the stopped vehicles. One of the vehicles was burned in a post-crash fire. Secondary impacts resulted from the six vehicles that the train initially struck. In all, 17 highway vehicles were involved in the crash. Three train passengers and six highway vehicle occupants were injured.

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 are in the United States. Of these, 892 transmission and gathering operators operate 325,235 miles of pipeline, while 1,313

distribution operators have 1,152,548 miles of mainline and 759,655 miles of service line. In addition, 264 operators manage approximately 168,992 miles of hazardous liquid pipelines.

In 2004, gas transmission operators reported 121 incidents, with three injuries, one fatality, and property damages of \$67.7 million. Distribution operators reported 172 incidents, with 41 injuries, 18 fatalities, and property damages of \$39.3 million. Hazardous liquid operators reported 141 accidents, with 13 injuries, five fatalities, \$135.4 million of property damage, and about 3.7 million gallons of spilled product resulting in a net loss of 2.9 million gallons of product.

Completed Significant Pipeline Investigations

Supervisory Control and Data Acquisition (SCADA) Safety Study

SCADA systems are a type of industrial control system used to collect data and exercise control from a remote location. In the pipeline industry, SCADA systems are used to collect data from pipeline sensors in real time and display the data to people (controllers) who monitor the data from remote sites. Controllers, in turn, can use the SCADA system to input commands that remotely operate pipeline control equipment, such as valves and pumps. SCADA systems are widely in use in oil, gas, electricity, and municipal water systems.

For this study, the Safety Board examined the role of SCADA systems in the 13 hazardous liquid line accidents that the Safety Board investigated from April 1992 to October 2004. In 10 of these accidents, some aspect of the SCADA system contributed to the severity of the accident. The principal issue was the delay between a leak event and a controller's recognition of the leak and beginning efforts to reduce the effect of the leak. SCADA factors identified in these accidents include alarms, display formats, the accuracy of SCADA screens, the controller's ability to accurately evaluate SCADA data during abnormal operating conditions, the appropriateness of controller actions, the ability of the controller and the supervisor to make appropriate decisions, and the effectiveness of training in preparing controllers to interpret the SCADA system and react to abnormal conditions.

The Safety Board developed a survey to obtain data about the liquid pipeline industry's use of SCADA systems. In total, 87 percent of the control centers targeted by the survey responded. In addition to obtaining survey data, Board staff visited 12 pipeline companies that had operating SCADA systems. Board staff interviewed 69 people who developed and used SCADA systems for pipeline companies, including controllers, supervisors, and SCADA systems managers. In addition, Board staff examined the SCADA systems and reviewed their design and development with the company representatives who were responsible for the system's operation and maintenance. Board staff also reviewed SCADA-related job aids that controllers used during the course of their work. Based on information from accidents investigated by the Board, survey results, and site visit results, the Board's review of SCADA systems in the hazardous liquid pipeline industry uncovered five areas for potential improvement:

- Display graphics
- Alarm management
- Controller training
- Controller fatigue
- Leak detection systems

As a result of this study, the Safety Board issued five recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA).

Ongoing Pipeline Investigations

Home Gas Explosion in DuBois, Pennsylvania

On August 21, 2004, a gas explosion occurred in a house in DuBois, Pennsylvania. The explosion resulted in the death of two residents. The National Fuel Gas Company tested the



soil for the presence of natural gas. Natural gas readings were found to be as high as 100 percent at two locations; one was near the house's gas meter, the other was near a 2-inch-diameter plastic gas main in front of the house. The 2-inch plastic gas main was excavated, and a crack was found in a fusion joint in the pipe. Dry soil, which is indicative of a natural gas leak, was found around the fusion joint. The Pennsylvania Public Utility

Commission, the Pennsylvania State Police Fire Marshal, the National Fuel Gas Company, and McElroy Manufacturing Inc. are parties to the investigation.

Anhydrous Ammonia Pipeline Release in Kingman, Kansas

On October 27, 2004, anhydrous ammonia was released from an 8 inch diameter pipeline operated by Enterprise Products Operating, L.P. The release occurred about 6 miles east



of Kingman, Kansas, and flowed into Smoots Creek and the Ninnescah River. A substantial fish kill occurred. Nearly 200,000 gallons were released. Enterprise Products Operating L.P., PHMSA's Office of Pipeline Safety, Magellan Midstream Partners, L.P., the Kansas Department of Health and Environment, the Environmental Protection Agency, and the Kingman County Sheriff's Office, and the 3E Company are parties to the investigation.

Gas Line Explosion and Fire Destroys a Three-Story Apartment Building in Bergenfield, New Jersey

On December 13, 2005, a natural gas service line explosion and fire destroyed a three-story apartment building in Bergenfield, New Jersey. Three people were killed, and five were

treated for injuries. Initial reports indicate that excavation activities were ongoing at the site. The pipeline operator was the Public Service Electric and Gas Company.

Hazardous Materials Safety

Chemicals affect every sector of the economy and are an essential contributor to the Nation's standard of living, including the production of synthetic fabrics, lifesaving medicines, packaging materials, adhesives and paints, automobile parts, composite materials for aircraft, and fertilizers, to name a few. A 1998 study by the Research and Special Programs Administration (predecessor to PHMSA) estimated that more than 800,000 shipments of hazardous materials enter the Nation's transportation system each day. The Commodity Flow Survey, published jointly by the U.S. Department of Commerce and the DOT, reported that over 1.5 billion tons of hazardous materials were shipped by truck, rail, water, and air in the United States during 2002.

The impact of the transportation of hazardous materials is reflected in the data from hazardous materials incident reports submitted to PHMSA. In 2004, 14,740 incidents involving the release of hazardous materials were reported for all transportation modes. These incidents resulted in 13 fatalities, 289 injuries, and \$52.6 million in damages. The number of reported incidents, fatalities, and injuries fluctuates from year to year. Reported damages have also fluctuated, but displayed a significant upward trend during the 10-year period from 1995 to 2004. The \$52.6 million in reported damages for 2004 represent a 70 percent increase over the \$30.9 million in damages reported for 1995.

Completed Hazardous Materials Investigations

Fire Involving Lithium Batteries in an Aviation Cargo Container in Memphis, Tennessee

On August 7, 2004, a fire destroyed some freight that included lithium-ion batteries; the freight was in a unit load device at the Federal Express Corporation hub in Memphis, Tennessee. The unit load device had been raised on loading equipment and pushed about halfway onto an airplane bound for Charles de Gaulle Airport, Paris, France, when the loading personnel smelled smoke. They returned the smoking device to the loading equipment and lowered it to the ground. When Memphis fire department responders opened the device, a fire flared inside the container. The damage to the unit load device and the freight was estimated at about \$20,000. The airplane was a Boeing MD-11 that Federal Express operated as flight 0004.

The Safety Board determined that the probable cause of this fire was the failure of the unapproved packaging used by AC Propulsion, Inc., which was inadequate to protect the lithium-ion battery modules from short circuits during transportation.

Hazardous Materials Support of Completed Investigations in Other Modes

- Broken rail causes Canadian National Railway freight train derailment and hazardous materials release near Tamaroa, Illinois. (The accident summary is found in the Railroad section of this report.)
- Crew's failure to properly align a switch leads to train collision in Graniteville, South Carolina. (The accident summary is found in the Railroad section of this report.)

Hazardous Materials Support of Ongoing Investigations in Other Modes

Gasoline Cargo Tank Truck Loss of Control and Fire in Elkridge, Maryland

On January 13, 2004, a tractor/cargo tank semitrailer combination was southbound on Interstate 895 in Elkridge, Maryland, en route to Bethesda, Maryland, to deliver 8,800 gallons of gasoline. As the truck reached the overpass bridge at Interstate 95, it left the right side of the highway, mounted the bridge rail, and then plunged 30 feet to the median and northbound lanes of Interstate 95. An explosion and large fire occurred when the tank truck hit the highway. Two tractor semitrailers, a passenger car, and a pickup truck in the northbound lanes were caught in the fire. The drivers of the gasoline tank truck, one tractor-trailer, the passenger car, and the pickup truck were killed. The Hazardous Materials Division is evaluating the performance of the gasoline cargo tank in this accident.

Two Westbound Freight Trains Collide near Texarkana, Arkansas

On October 15, 2005, two westbound Union Pacific Railroad freight trains collided near Texarkana, Arkansas. A westbound intermodal train collided with the rear car of a stopped train. The collision resulted in the derailment of eight cars. One tank car, containing the flammable gas propylene, was breached and the propylene gas ignited. Authorities evacuated the surrounding area. The fire damaged several homes, and one local resident suffered fatal injuries from a house fire. No train crewmembers were injured. The Hazardous Materials Division is evaluating the effectiveness of emergency planning between the railroad and local emergency responders.

Motorcoach Fire near Wilmer, Texas

On September 23, 2005, as part of an evacuation in anticipation of Hurricane Rita, a 1998 MCI 54-passenger motorcoach traveled northbound on Interstate 45. In the motorcoach were 44 passengers and the driver. The passengers included 37 patients, most of whom were not ambulatory, from an assisted living facility in Bellaire, Texas. After the motorcoach had traveled for about 14 hours in heavy traffic, one of the right rear tires locked up and blew out. After the blown tire was changed, the motorcoach continued north for about 26 miles when the same wheel locked again. The driver pulled the vehicle to the right shoulder and saw flames coming from the right wheel well. As the passengers began disembarking, the motorcoach became engulfed in flames. Twenty-three patients, most of whom were not ambulatory, could not be evacuated from the vehicle and perished in the fire. The Hazardous

Materials Division is investigating whether the presence of 18 cylinders of compressed medical oxygen contributed to the intensity of the fire.

- Collision between a Union Pacific Railroad freight train and a Burlington Northern Santa Fe Freight Train in Macdona, Texas. (The accident summary is found in the Railroad section of this report.) The Hazardous Materials Division is evaluating the performance of railroad tank cars in this accident.
- Canadian National freight trains collide head-on near Anding, Mississippi. (The accident summary is found in the Railroad section of this report.) The Hazardous Materials Division is evaluating the availability and accuracy of information about the hazardous materials in the accident trains.

Public Hearings and Symposia

Positive Train Control Symposium, March 2–3, 2005

The Safety Board held a symposium to discuss an automated system to prevent train collisions, known in the industry as positive train control (PTC). The symposium was held at the NTSB Academy in Ashburn, Virginia.

The goal of the symposium was to reinvigorate the dialogue between industry and both State and Federal agencies on the issues relevant to the implementation of PTC. PTC has been on the Board's "Most Wanted" list of transportation safety improvements since its inception in 1990.

Then-Chairman Ellen Engleman Connors opened the forum. Board Staff led technical panel discussions that examined each major aspect of PTC systems including safety, efficiency, and operational issues. The rail industry, suppliers, and Federal and State organizations gave presentations highlighting their contributions and perspectives.

Collision Between a Union Pacific Railroad Freight Train and a Burlington Northern Santa Fe Freight Train in Macdona, Texas, April 26–27, 2005

The Safety Board held a two-day public hearing on the Macdona, Texas, accident that involved a collision of a Union Pacific Railroad train and a Burlington Northern Santa Fe train. (The accident summary is found in the Railroad section of this report.)

The collision resulted in the release of chlorine, a toxic gas. The area within a 2-mile radius was evacuated. Each train crew consisted of an engineer and a conductor. There were three fatalities: the Union Pacific conductor and two nearby residents. More than 40 people, including the Union Pacific engineer, firefighters, and residents, were transported to area hospitals for treatment. Preliminary property damages and environmental cleanup costs exceed \$7 million.

Then Member Richard Healing chaired the hearing, which focused on the issues of crew and employee participation in fatigue management; crew management systems; assessing employees reporting for duty; supervising employee performance on duty; and drug and alcohol testing programs. Witnesses from the FRA, the Union Pacific Railroad, the Brotherhood of Locomotive Engineers and Trainmen, and the United Transportation Union testified during the hearing.

Office of Research and Engineering

As accident investigations become more complex, investigators must 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 analyses of historic accident data, 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 Work Accomplishments

In 2005, the Office of Research and Engineering supported more than 250 accident investigations in all transportation modes. Prominent among this support were the office's efforts in regard to flight recorder and cockpit voice recorder processing, as well as the development of accident reconstructions to determine the trajectory and orientation of an accident vehicle and its occupants throughout the accident sequence. The office also finalized two safety studies in 2005.

Safety Studies/Reports Status

The Safety Studies and Statistical Analysis Division completed two major studies and two safety reports in the past year. These documents contained 14 recommendations: nine to the FAA and five to the PHMSA. Staff also drafted a safety recommendation letter based on the 2004 public forum "Personal Flotation Devices in Recreational Boating." The division also completed numerous statistical products, including two annual reviews of aviation accidents.

Safety Study of Supervisory Control and Data Acquisition (SCADA) Systems in Liquid Pipelines. The Safety Studies and Statistical Analysis Division, in conjunction with the Office of Railroad, Pipeline, and Hazardous Materials Investigations, conducted a study considering the industrial process control systems used by the liquid pipeline industry. Advances in computer technology have enabled nearly all pipeline operators to remotely monitor and operate their pipelines. The systems that pipeline companies use to perform these operations are collectively referred to as SCADA systems. The study documented the liquid pipeline control center's use of SCADA systems for the detection of pipeline leaks and mitigation of leaks once detected.

The methodology of this oversight study included a review of past accidents (10 of the last 18 liquid pipeline accidents investigated by the Safety Board involved SCADA safety issues), an industry survey (79 companies—87 percent—responded), and site visits to 12 pipeline control centers (to interview controllers, SCADA managers, and training personnel as well as to observe the control room, workstations, and SCADA system).

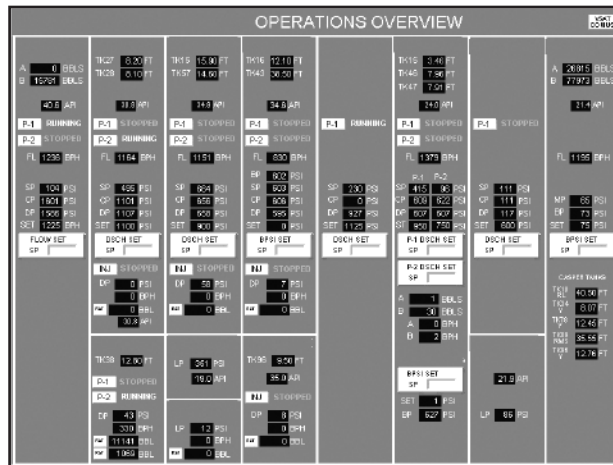
In 2005, the Office of Research and Engineering's 42 staff members develop two major safety studies and two annual reviews of accident data; completed 163 Materials Laboratory cases; examined 55 CVRs, 62 FDRs, and 8 rail event recorders; and supported more than 250 accident investigations across the modes.

The study, adopted on November 29, 2005, included five recommendations covering the issues of SCADA display graphics, alarm philosophy, controller training, fatigue data reporting, and computer-based leak detection systems.

Safety Study of Weather-Related General Aviation Accidents. The goal of this safety study was to better understand the risk factors associated with accidents that occur in weather conditions characterized by instrument meteorological conditions or poor visibility (“weather-related accidents”).

Working with regional investigators from the Office of Aviation Safety, staff collected flight, aircraft, weather, and pilot data on more than 200 accident and nonaccident flights. Data from 72 general aviation accidents and 135 nonaccident flights that occurred between August 2003 and April 2004 were included. All nonaccident pilots voluntarily consented to interviews and provided information about their flights, their aircraft, and details about their training, experience, and demographics. That information was compared with data that regional investigators collected about the accident flights as part of their normal investigations. Additionally, the FAA provided information about pilots’ practical and written test results and their previous accident/incident involvement.

The study revealed several pilot- and flight-related factors associated with increased risk of accident involvement, and the recommended approaches to mitigating those risk factors were discussed in the context of three issue areas: (1) ensuring a minimum level of proficiency for all pilots to recognize and safely respond to hazardous weather situations; (2) identifying and providing additional support for pilots whose performance history indicates an increased



A tabular representation of a pipeline system organizes information in columns based upon the information content. The tabular format was reported to assist controllers by grouping specific information according to operational characteristics, allowing controllers to quickly see certain parameters across the whole pipeline and easily compare the values of that parameter with the parameter at another location on the pipeline.



On February 11, 2004, about 2110 eastern standard time, a Piper PA-28-180, N6473J, collided with trees and the ground during approach to Bacon County Airport, Alma, Georgia. Instrument meteorological conditions prevailed. The private pilot, the pilot-rated passenger, and the rear-seated passenger received fatal injuries, and the airplane sustained substantial damage.

risk of weather-related accidents; and (3) providing general aviation pilots with additional guidance regarding sources of preflight weather information. The results were based on a statistical comparison of accident and nonaccident flights that allowed for the generalization of findings from this study to the wider population of general aviation pilots and flights that may be at risk for a weather-related accident.

Current Procedures for Collecting and Reporting U.S. General Aviation Accident and Activity Data. The Safety Board and others rely on the FAA General Aviation and Air Taxi Activity (GAATA) Survey flight hour estimates to calculate accident rates and statistics that form the basis for assessing general aviation safety in the United States. Congress, Government agencies, the aviation industry, and other researchers frequently cite accident rates when evaluating the need for safety initiatives. Valid activity data are necessary to compare the accident rates for different aircraft types and types of operations, to establish baseline measures that can be used to identify and track accident trends, and to assess the effectiveness of safety improvement efforts. Because of a critical need for accurate activity measures, and the perception of possible problems with current general aviation activity estimates, the Safety Board analyzed the methods currently used to produce those estimates. Based on the results of that analysis, the Safety Board developed a report and three associated recommendations to improve the activity reporting of general aviation operations.

Safety Report on the Treatment of Safety-Critical Systems in Transport Airplanes. The Safety Studies and Statistical Analysis Division continued work on a safety report on aircraft type certification. Systems that are critical to safe flight and continued airworthiness of transport-category airplanes have been the center of attention in several recent aviation accident investigations conducted by the Safety Board. The Board has in recent years investigated four major accidents where certification of a safety-critical system on a transport-category aircraft was an important issue: the rudder actuator in USAir flight 427, the center wing tank in TWA flight 800, the horizontal stabilizer jackscrew in Alaska Airlines flight 261, and the rudder system and vertical stabilizer in American Airlines flight 587. These four accidents resulted in 715 fatalities, accounting for 60 percent of the fatalities in air carrier operations that occurred in the years 1994-2001. Each of the investigations raised questions about the certification process used by the FAA to determine the airworthiness of the aircraft system.

Aviation Annual Reviews for Air Carrier and General Aviation. The Safety Board prepares annual statistical reports summarizing aviation accidents. The *Annual Review of Aircraft Accident Data for U.S. Air Carrier Operations* and the *Annual Review of Aircraft Accident Data for General Aviation Operations* graphically display accident data and include an analytical discussion of the data. During 2005, the annual reviews for calendar year 2001 were completed. In addition to the summary of the year's accident data, the general aviation annual reviews discuss a special topic of interest to general aviation. The 2001 review focused on accidents involving loss of control, which have historically accounted for the largest number of general aviation accidents.

NTSB Journal of Accident Investigation. The Safety Board published its first issue of the *Journal of Accident Investigation* in March 2005. The Board's objective for the journal is to provide the public with an exchange of ideas and information developed through its accident investigations in all modes of transportation. The journal contains research and technical articles on accident investigations that may be of interest to professionals in safety, accident investigation, engineering, and the behavioral sciences. The journal also includes short reports of major developments, news, events, research efforts, and announcements of upcoming courses, forums, symposia, and public hearings conducted by the Safety Board.

Accident Data and Public Records. Data specialists in the division continue to respond to requests for aviation accident information and research and completed over 350 data analysis requests in 2005. Some requests concerned the accident frequency of a particular aircraft model or air carrier, while others addressed particular types of accident events. The availability of accident data from 1962 to 1983 on the Safety Board website, combined with complete download and text search capabilities, now allows many researchers to complete their own analyses. This is particularly true for simple, straightforward analyses. More complex requests for aviation accident data, however, continue to be handled by the division's data specialists. The division also published monthly and annual U.S. civil aviation statistical information on the Safety Board's website.

Modifications to the Aviation Accident Database. As part of its mandate, the Safety Board is responsible for maintaining the U.S. Government's database of civil aviation accidents. During 2005, Safety Board staff members from the Office of Research and Engineering, along with staff from the Office of Aviation Safety and the Office of the Chief Information Officer, undertook to update and improve the Board's aviation accident data management system and the data fields it contains. As a result of that effort, the database and accident causal coding structure were redesigned to simplify data entry, facilitate aggregate analysis, impose greater consistency in the coding, and improve connections between the database and outside data sources. Pending modifications are scheduled to go into effect in fiscal year 2007.

Materials Laboratory

In 2005, the Materials Laboratory received 156 requests for assistance in evaluating parts and wreckage from accidents in all transportation modes. During the evaluation of metallic components, the Materials Laboratory found cases of brazing failure and improper welding, as well as more than 30 components and structures that had fractured as a result of fatigue cracks, all of which led directly to an accident. Multiple cases of worn, missing, or incorrectly assembled hardware were also documented. Perhaps of equal importance, laboratory examinations also showed that many components fractured or failed as a result of the accident, and thus were ruled out as being related to the accident cause.

Most of the Materials Laboratory's efforts were in support of aviation accidents, including foreign aviation accidents in Argentina, Colombia, Ecuador, Guyana, Hungary, Italy, the Netherlands, Estonia, Zambia, Nigeria, Japan, China, and Singapore. Staff also supported several significant nonaviation accident investigations. For example, the laboratory evaluated



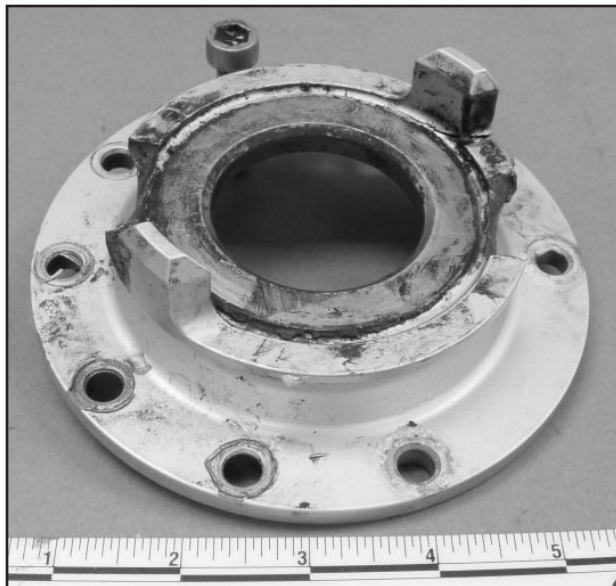
Damaged Airbus A310 rudder.

the punctured liquefied chlorine gas railroad tank car from the accident in Graniteville, South Carolina, on January 6, 2005, and compared the tank car material and crack features with tank cars involved in previous similar accidents.

Consistent with the transportation industry's increased use of composite materials, the Materials Laboratory participated in the investigation of several accidents involving these materials. The Materials Laboratory participated in the examination of the remnants of the composite rudder that separated from an Airbus A310 over Florida, finding no evidence of preexisting cracks in the small amount of structure that remained on the vertical stabilizer. Staff also discovered a compression buckling failure mode for two fractures of composite torsion-tension straps on helicopters, and documented an adhesive failure on the tail rotor blade from another helicopter.

One example of Materials Laboratory work is evaluation of the fractures on the nose landing gear upper support from the Airbus A320 that landed in Los Angeles with the nose landing gear wheels turned 90 degrees. The photograph below shows that two lugs on the

upper support fractured from the support's main body, allowing the nose landing gear wheels to turn independently of pilot inputs.



Overall view of the fractured and cracked nose landing gear upper support from an Airbus A320

Examination in the Materials Laboratory showed that the lug fractures were a result of fatigue cracking that initiated in the slot between two adjacent lugs. Shown below is a scanning electron microscope photograph of the fatigue striation pattern found on one of the lugs. The Safety Board issued recommendations to the FAA for inspection of the upper support and for changes to maintenance practices.

Vehicle Performance

Performance engineers conducted studies and analyses supporting several major and field investigations. These analyses covered airplanes, marine vessels, trains, road vehicles, and vehicle occupants. Staff launched to aircraft accidents in Teterboro, New Jersey, and to surface vehicle accidents in Arlington, Virginia, and Osseo, Wisconsin. Staff also provided aircraft performance support for accidents in Canada, Venezuela, Indonesia, and China.

American Connection Flight 5966. The Jetstream 32 airplane crashed on approach to Kirksville, Missouri. Because the flight data recorder was limited to five parameters, staff developed a simple simulation to derive the aircraft's flight path and basic parameters of interest during its approach to the airport and initial impact with terrain.

Executive Airlines ATR-72. The airplane bounced three times during landing, breaking the main landing gear and substantially damaging the left wing when it veered off the runway. Staff derived the flight path and loading on the landing gear during the bounces and produced an animation of the accident event.



Animation frame showing Executive Airlines ATR-72 during the landing at San Juan, Puerto Rico.

Bombardier Challenger, Teterboro, New Jersey. The Challenger airplane departed the runway and the airport after an aborted takeoff, striking cars on the road and a warehouse. Staff launched to the accident site and documented the on-scene evidence, including the path of the airplane after it departed the runway and airport property. Staff derived the time and distance of the airplane during the takeoff run and abort procedure, and through aircraft simulations examined alternative operational procedures.

Gulfstream III, Houston, Texas. This charter flight, which was scheduled to transport George H.W. Bush, crashed on approach to Houston Hobby Airport. Staff derived the trajectory of the airplane, created a Cockpit Voice Recorder / Flight Data Recorder (CVR/ FDR) correlation, and derived the position of the airplane relative to the instrument landing signal localizer and glideslope beams. Staff also examined the FAA radar-based minimum safe altitude warning system (MSAW), and examined possible errors in MSAW performance.

Runway Incursion, Boston Logan Airport. On June 9, 2005, an Aer Lingus A300 and a US Airways 737 departed on intersecting runways at Boston Logan Airport. Staff used FDR data and ground radar information to derive the relative locations and separation distances of the aircraft during the incident. The airplanes passed within 228 feet of each other, and only pilot action prevented a collision. Staff created an animation of the incident.



Caption - Animation frame showing Aer Lingus A300 passing over USAirways 737

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 2005 by developing detailed vehicle and occupant simulations.

Hampshire, Illinois, Shuttle Bus/Multiple Vehicle Accident. Eight occupants of a shuttle bus were fatally injured and 13 were injured when a tractor/semitrailer struck the rear of the shuttle bus, pushing it into the rear of a pickup truck. Staff performed simulations

and examined the crashworthiness and occupant protection strategies of two vehicles, a combination unit and a specialty bus, involved in the multivehicle collision. The collision examination showed that the tractor-trailer combination unit overrode the rear of the specialty bus because of incompatibilities between the two vehicles. Various potential improvements for both vehicles were addressed concerning structural design and occupant protection mechanisms.

Baltimore, Maryland—*Lady D* Water Taxi Accident. The pontoon vessel-type taxi capsized while crossing Baltimore Harbor during a squall. Using side-scan sonar wreckage recovery information, witness statements, passenger photos, and video, staff created an accident time history and vessel position timeline before and after the capsizing.

Aviation Accident Investigation Software. The Vehicle Performance Division's aircraft simulation tool was upgraded to include the capability to determine the aerodynamic effect of aircraft icing from an accident airplane's flight data recorder. This tool enhancement was developed during the Safety Board's participation in an accident investigation with the Civil Aviation Administration of China, the accident investigation agency of China.

Cockpit Voice Recorders/Flight Data Recorders

Staff engineers extracted, formatted, and analyzed data from 55 cockpit voice recorders (11 were foreign), 62 flight data recorders (13 were foreign), and eight rail recorders; staff also recovered data from 18 damaged global positioning system units and 26 digital cameras. The foreign recorders were received from countries all over the world, including Estonia, Nigeria, Uganda, Peru, Ecuador, Brazil, Indonesia, Afghanistan, and China. Recent investigations in the United States highlighted the need for recorded data on smaller commercial turbine-powered airplanes and rotorcraft.

The Safety Board participated in a proof-of-concept flight test with the FAA to determine the feasibility and limitations of installing a cockpit imaging system on a small turbine aircraft. The five-day flight test image data were compared with the aircraft's flight data and cockpit voice recorder to see if one stand-alone image recording system could adequately document the aircraft's instruments and cockpit environment.

The Safety Board is also midway through a two-year development cycle in writing the next-generation flight recorder readout software. This \$1.5 million contract will develop a government-owned software product that the Board will use to not only read out and analyze current aviation recorders, but also to process data from all modes of marine and surface accident event recorders. The development effort includes three distinct tasks. Task 1 is to develop the core data extraction, graphing, and analysis tool set. This portion of the project is about 90 percent complete. Task 2 developments are to write a common database storage solution that will organize and store all of the accident flight recorder and performance data. Task 3 developments are to create tools that will allow staff to use advanced statistical data-mining processes across multiple accident scenarios looking for subtle common events or causes. This entire project should be complete by January 2007.

The Safety Board recently took delivery of a new cockpit voice recorder transcription tool. This software tool adds to the capacity of the Board by providing for an easy-to-use tool for extracting the maximum amount of information from audio recordings. The new tool integrates the transcription and playback of audio data into one user-friendly interface. In addition, the tool provides for sophisticated audio and noise filtering to remove unwanted

sounds from the recordings. The tool also incorporates automated speaker identification of unknown phrases and incorporates a limited untrained speech-to-text generation feature that permits the computer to assist the operator in generating a transcript from the audio recordings. This \$600,000 development project was funded by the Department of Defense Technical Support Working Group counter terrorism taskforce.

Medical Factors

Staff provides medical consultation to accident investigators in all modes on about 100 accidents a year. Issues addressed in 2005 included insomnia and other sleep disorders, the use of multiple medications, the use of multiple illicit substances, hypoxia, and the use of psychoactive prescription medications.

The Office of Research and Engineering also supports the training of investigators, physicians, psychologists, and physiologists in the medical aspects of accident investigation and in 2005 made a number of presentations, including one to the Civil Aviation Administration of China.

The year 2005 was a banner year for accomplishments for operator medical certification issues in all passenger transportation modes:

- The Coast Guard has begun establishing a considerably improved program of occupational medical oversight of mariners, resulting directly from recommendations developed during investigation of the *Staten Island Ferry* accident in New York.
- The FAA and other national and international organizations are establishing ongoing and rigorous evaluation of the role of color vision in aviation, referencing the Safety Board's aeromedical investigation of a Part 121 cargo accident in Florida (involving a first officer with a significant color vision defect) as a stimulus to further study of the issue.
- The American Medical Association, the Federation of State Medical Boards, NHTSA, and others have responded positively to the Safety Board's report on the medical oversight of noncommercial drivers. Model practices have been developed for State licensing authorities regarding medical certification.
- In response to safety recommendations regarding commercial driver medical oversight, the FMCSA established a Medical Review Board to oversee the performance of and standards for medical examinations, and has begun the process of establishing requirements for a National Registry of Medical Examiners.
- The FRA received a contracted report regarding a medical certification oversight system for railroad operators, requested as a result of recommendations arising from the Safety Board's investigation of a fatal rail accident in Clarkston, Michigan, involving two crewmembers with obstructive sleep apnea. The report is currently under consideration by the FRA Railroad Safety Advisory Committee.

Finally, staff regularly addresses internal occupational health issues as part of the Board's Occupational Health and Safety Committee and in 2005, formalized an internal process of computer workstation ergonomic assessment, dramatically improving worker comfort and workstation efficacy, and achieving substantial savings in contracted workstation evaluations, unnecessary furniture costs, and worker's compensation claims.

Fire and Explosion Factors

Fire and explosion specialists supported marine, highway, and general aviation accident investigations and participated in the investigation of one major accident in 2005: the highway accident/fire near Wilmer, Texas, involving a motorcoach transporting evacuees from a nursing home during Hurricane Rita. Staff investigators also continued to support the investigation of an engine room fire on board a casino shuttle boat near Port Richey, Florida.

In addition to providing direct support to accident investigations, the fire and explosion staff was involved in enhancing the technical capabilities of the group for future challenges. One enhancement will be to demonstrate the ability of systems or component performance and response under various climatic conditions. The demonstrations will be accomplished through the use of an environmental chamber, a pressure vessel, and other testing equipment. Fire and explosion staff continued to pursue the issues of fuel tank inerting, fire detection and suppression in aircraft cargo compartments, and fire detection and suppression on board marine passenger vessels.

Finally, staff presented the fire and explosion section of the *Aircraft Accident Investigation* course in March 2005 at the Academy. Hands-on training was enhanced with the use of the TWA 800 reconstruction as well as other aircraft wreckage that was used in demonstrating the effects of in-flight fires.

Administrative Law Judges

Since 1967, the Safety Board has served as the “court of appeal” for certificate holders such as 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.

A certificate holder can appeal the Board’s decision to the U.S. Court of Appeals. The FAA also 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 the 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.

There were 439 aviation certificate appeals filed with the Board’s Office of Administrative Law Judges in 2005; 126 of these cases were from emergency orders. The Board’s judges held 83 hearings and closed 398 cases in 2005.

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 2005, the Board closed one marine case. There were two marine appeals filed with the NTSB.

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During 2005, 61 of the judges' decisions were appealed to the full five-member Safety Board for review. The Board decided 63 appeals, reversing the judges' decisions in three cases and remanding four cases for additional hearing on the merits. Thirteen of the Board's decisions were appealed to the U.S. Courts of Appeals, which rendered eight decisions in 2005. The Court affirmed the Board in one case and dismissed seven cases for procedural reasons.

Four EAJA applications were filed with the Board's administrative law judges in 2005, and five EAJA cases were decided by the judges. In 2005, five of the judges' EAJA decisions were appealed to the full Board, which issued rulings in five EAJA cases.

NTSB Academy

Background

2005 marked the first full year of operational experience on site in Ashburn, Virginia, for the NTSB Academy. Since the Academy became operational, the staff has focused on improving and expanding the existing programs. While this approach may have been prudent on a business development level, it required the use of NTSB investigative resources. The extent of the use of investigative resources clearly is a concern of Congress. In the Fiscal year 2006 appropriations for the NTSB, the Senate Appropriations Committee acknowledged the Academy's benefit in sharing accident investigation best practices with the broader transportation community. However, the committee also believed that the functions of the Academy should be secondary to the NTSB's core mission of accident investigation. As a result, the committee directed the NTSB to reduce the workforce hours at the Academy so that the NTSB's critical investigative responsibilities would in no way be negatively impacted by impending losses of full time employees. The committee also encouraged the NTSB to be more aggressive in covering the cost of the Academy through the authority to impose and collect fees for the Academy's services.

As a result of the direction provided by the Appropriations Committee, NTSB management has significantly revised the philosophical approach of the Academy and has developed a plan to concentrate on the Academy's ability to sustain and develop innovative and state-of-the-art training courses and programs, but not at the expense of NTSB investigative resources. Accordingly, the NTSB Academy will support the accident investigation mission of the NTSB and promote transportation safety by:

- Improving the quality of NTSB accident investigations through accident investigation technical training and instruction.
- Improving the effectiveness of NTSB staff through skill development instruction.
- Improving the efficiency and effectiveness of NTSB accident investigations by communicating lessons learned, sharing accident investigation techniques, and fostering the exchange of new ideas and experience among organizations that participate in NTSB investigations as parties and the broader transportation safety community.
- Providing a forum for instruction, outreach, and advocacy on issues relevant to the transportation safety community.
- Providing a facility for advanced laboratory and research activity.
- Using its high-quality training resources to facilitate Transportation Disaster Response programs, collaborative instruction with partner agencies, and other compatible activities.

In 2005, the Academy delivered 31 courses attended by more than 1,425 people, a 93 percent increase over those taught in 2004. Two new courses were planned for 2006; Conducting Effective Technical Presentations and Accident / Incident Report Writing for NTSB staff.

Fiscal year 2005 marked a peak in program offerings and in use of the Academy facility by outside organizations. The collection of tuition and fees for facility use made it possible for the Academy to recoup expenses incurred in the development and delivery of programs, allowed for limited program modifications and improvements in the future, and in the case of usage recoveries, offset portions of the building maintenance and equipment replacement costs that are anticipated within the next decade.

Definitions

Some of the terms have broader meanings than are typical. Those terms are clarified below.

Investigator—Any NTSB staff performing inherently investigatory duties at the NTSB or staff performing duties that directly impact the timeliness and efficiency of accident investigations. These duties include laboratory work, management of investigative processes, and report writing and editing.

Investigative Resources—Any contribution of work hours made by investigators, as defined above, to support Academy programs.

Program—Any instructor-led course activity that is presented to an audience. Included within the scope of this description are training programs, educational courses, discussion forums, and all associated curricula.

Module—Any section or block within a program that requires an instructor. Several modules are contained within any given program.

Contract Instructors—All instructors who received fees for their instructional services.

Volunteer Instructors—All instructors who received no fees for services, only travel reimbursement, if requested.

Support Staff Instructors—All NTSB instructors who are not investigators (nor fill any position that would affect the timeliness of an investigation).

Programs

In 2005, the first full year of on site operation, a total of 1,425 individuals attended 31 different Academy programs. Several programs were offered more than once during the year.

Title	Total Students
AVIATION	
Aircraft Accident Investigation	54
Survival Factors in Aviation Accidents	28
Survival Factors in Aviation Accidents	49
Industry Training for Airline Professionals	84
Industry Training for Airline Professionals	71
Major Investigation Protocol and Processes	15
Major Investigation Protocol and Processes	38
INTERMODAL	
Cognitive Interviewing	57
Investigating Human Fatigue Factors	72
Forensic Photography	21
Photodocumentation Series	21
Technical Photography	2
Advanced Accident Site Photography	2
Digital Image Processing	1
Conducting Effective Technical Presentations	21
PUBLIC AFFAIRS	
Media Training for Accident Investigators	18
Managing Communications During an Aircraft Disaster	81
RAIL	
Symposium: Positive Train Control	152
TRANSPORTATION DISASTER RESPONSE	
Family Assistance	77
Family Assistance	103
Family Assistance	66
Mass Fatality Incidents for Medicolegal Professionals	35
Emergency Responders	28
Airports	42
PARTNERSHIPS	
Civil Aviation Administration of China Aircraft Accident Investigation	23
Victim Assistance Rapid Deployment Team Training - FBI	24
Managing and Directing Safety Investigations - NASA	44
FBI/ERT and NTSB Joint Training	60
FBI/ERT and NTSB Joint Training	40
Department of Homeland Security - National Capital Region Family Assistance/Reunification Center Orientation and Planning	96
TOTALS	1425

Partnerships

Furthering its commitment to meeting the training needs of those in other areas of the government and the transportation and emergency response communities, the Academy continues to build upon the alliances and partnerships with Federal agencies and private organizations. Several new and innovative programs were launched with our partners in 2005.

Civil Aviation Administration of China

In January 2005, at the request of the Department of State and the Civil Aviation Administration of China, the NTSB delivered an eight day accident investigation training program. This program covered the processes and requirements of the NTSB to ensure a free flow of reliable information in the event of an accident in China involving a U.S. carrier or its citizens.

Federal Bureau of Investigation

The Academy, in partnership with the FBI Office for Victim Assistance, developed a course to help support the training needs of the new FBI Victim Assistance Rapid Deployment



Team (VARDT). The mission of the FBI VARDT is to form a core disaster management team that will respond both internationally and domestically to acts of violent crime and terrorism. These specialists will assist families and victims in a criminal/terrorist mass fatality incident. Acts of violent crime resulting in mass fatalities add a new dynamic to these assistance operations, and this course helped to prepare victim assistance specialists to work in this challenging environment. This course utilized

the NTSB Transportation Disaster Assistance model as a foundation for training the FBI VARDT.

In early 2005, leadership from the NTSB met with counterparts from the FBI's Evidence Response Team (ERT) to discuss how to increase the level of interagency coordination and communication at the accident site. (The FBI now responds to all major aviation accident sites, regardless of suspected cause.)

In July, the first of a series of NTSB/FBI ERT Joint Training sessions were held to address these issues. The FBI delivered to NTSB staff the first session (four days), in which evidence collection and chain of custody was discussed. In August, the roles were reversed as senior staff from the NTSB discussed the NTSB disaster response and investigation responsibilities and procedures related to FBI ERT operations.

National Aeronautics and Space Administration

The Academy continues to develop its relationship with NASA's investigative arm, the Engineering and Safety Center, which was established shortly after the Columbia accident.

Having already delivered a custom-designed course on managing independent accident investigations to this group in late 2004, the Academy will again share its resources and expertise through an updated presentation of the four-day course in late April 2006.

Department of Homeland Security

The NTSB's Office of Transportation Disaster Assistance, having established and managed Family Assistance Centers at a number of major aviation accident sites, has developed expertise that is viewed in the emergency response community as a resource for disaster assistance even outside the scope of transportation.

Department of Homeland Security contractors, including Dewberry and Associates, worked with the Office of Transportation Disaster Assistance to design a course that would demonstrate to emergency responders throughout the National Capital Region how to coordinate and implement a comprehensive family assistance and reunification system. This program educated participants in providing post-disaster assistance and reunification to the family members of those affected by a terrorist attack or civil emergency in the greater Washington, D.C. area.

The last day of this three-day program was dedicated to a disaster drill demonstrating how the assistance effort actually operates. The entire Academy campus was transformed into a working Family Assistance and Reunification Center. The drill focused on providing information to family members about their loved ones and facilitating the reunification of families in a secure and comfortable environment in the event of a terrorist attack or civil emergency.

Just two weeks after the exercise, Hurricane Katrina struck New Orleans, dramatically illustrating the value this program could have if something similar were to occur in the National Capital Region.

Continuing Relationships

Nongovernmental partnerships also have been developed, such as with the Airports Council International of North America and the Aviation Safety Alliance, in which each party contributed unique expertise to develop training targeted to meet specific, operational demands.

The following is a list of the organizations participating in alliances or partnerships with the NTSB Academy during 2005:

- Airports Council International of North America
- Air Transport Association
- Armed Forces Institute of Pathology
- Aviation Safety Alliance
- National Association of State Boating Laws Administrators (NASBLA)

Participants

Participants (students) in Academy programs comprise previous as well as potential future parties to NTSB 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.

Transportation safety is a global endeavor, and some of the participants in Academy programs are the NTSB's foreign counterparts, transportation accident investigation agencies from around the world, including those from developing countries. The number of foreign investigators attending Academy programs has increased each year that the Academy has offered courses.

The following foreign transportation accident investigation agencies sent a combined total of 81 investigators to Academy programs in 2005:

- Australian Army Aviation
- Bahamas Department of Civil Aviation
- Bermuda Police Services
- Brazil Department of Civil Aviation
- Danish Accident Investigation Board
- Dominican Republic Direccion General De Aeronautical Civil
- General Administration of Civil Aviation of China (CAAC)
- Nigeria Federal Ministry of Aviation Investigation and Prevention Bureau
- Panama Autoridad Aeronáutica Civil
- Taiwan Civil Aeronautics Administration
- Transportation Safety Board of Canada (TSB)
- United Kingdom Air Accidents Investigation Branch (AIB)

Approximately 170 participants from 34 foreign countries were represented at Academy courses, symposia, and partnerships in 2005. The countries were: Argentina, Australia, Austria, Bahamas, Bermuda, Brazil, Canada, China, Denmark, Dominican Republic, Finland, France, Germany, Guyana, Haiti, India, Israel, Jamaica (W. Indies), Japan, Kuwait, Lebanon, Mexico, The Netherlands, New Zealand, Nigeria, Panama, Qatar, Russia, South Africa, Sweden, Taiwan, Thailand, United Arab Emirates, and the United Kingdom.

Continuing Education Units

In October 2005, the Academy received authorization by the International Association for Continuing Education and Training (IACET) to award Continuing Education Units (CEUs). IACET, whose members include 650 businesses, government agencies, higher education institutions, nonprofit corporations, and individuals, is an association that authorizes select organizations to issue CEUs only when they can demonstrate a consistent adherence to strict adult education guidelines and protocols.

Many organizations and agencies use these credits for staff development and individuals use them to maintain professional certifications. The Academy now issues a certificate to participants upon successful completion of designated courses, and releases official transcripts affixed with the IACET seal.

Instructors

To provide the most descriptive explanation, this section distinguishes between investigators (numbers of people) and investigative resources (hours of work by investigators) used by Academy programs during 2005.

Use of Investigators

1. The Academy offered 31 programs.
2. An NTSB investigator provided some level of instruction in 14 of these 31 programs (45 percent).
3. An NTSB investigator presented 103 modules across the 14 programs.
4. Presentation of these 103 modules required the participation of 51 investigators.
5. These 103 modules represent 35 percent of the 295 total modules presented in Fiscal year 2005.

Use of Investigative Resources

1. Program preparation required 865 hours.
2. Program presentation required 259 hours.
3. In total, approximately 1,124 hours of investigative resources were used preparing and presenting programs. The NTSB recognizes that this total does not account for disruptions in the normal workday. Activities such as adjusting schedules to allow time for instruction, traveling to the Academy, program-related phone calls, and program after-action items are unquantifiable in an auditable fashion, but do affect the NTSB's investigative resources.

Use of Contract Instructors

1. The Academy offered 31 programs.
2. A contract instructor provided instruction in 15 of these 31 programs (48 percent).
3. A contract instructor presented a total of 28 modules in those 15 programs.
4. These 28 modules represent approximately 9 percent of the 295 total modules during FY 2005.

Use of Volunteer Instructors

1. The Academy offered 31 programs.
2. A volunteer instructor provided instruction in 15 of these 31 programs (48 percent).
3. A volunteer instructor presented a total of 111 modules in those 15 programs.
4. These 111 modules represent approximately 37 percent of the 295 total modules during 2005.

Use of Support Staff Instructors

1. The Academy offered 31 programs.
2. A support staff instructor provided instruction in 19 programs (61 percent).
3. A support staff instructor presented a total of 53 modules in those 19 programs.
4. These 53 modules represent approximately 19 percent of the 295 total modules during 2005.

Facility Use

A portion of the operating costs was recovered through user agreements established with a variety of governmental or transportation-related organizations.

The following organizations hosted events in 2005:

- Armed Forces Institute of Pathology
- Federal Bureau of Investigation
- Flight Safety Foundation
- Department of Energy (NEPA)
- Department of Homeland Security
- Department of Transportation
- Federal Highway Administration
- International Transportation Safety Association
- National Association of State Boating Law Administrators
- National Organization of Youth Services
- United Motorcoach Association
- U.S. Customs and Border Protection

Continuing Operations Agreements

The Academy facility provides the NTSB space to continue operations during emergencies. Space has been made available, for a fee, through interagency agreements with two other Federal agencies to ensure continued operations for their essential functions as well.

Learning Tools

In addition to the reconstruction of TWA 800 as a teaching tool, the Academy recently acquired a BAE Jetstream 41 (J-41) procedural trainer, which was donated by Leesburg Airport.

The trainer is a fully equipped mock-up of the J-41, with an interior that replicates an FAR Part 25-certificated turbo-prop regional aircraft, including an Electronic Flight Instrumentation System or “glass cockpit,” passenger service units, seats and restraints, interior and emergency lighting, and regulation placards.

The J-41, which has already been used in several courses, will allow the Academy to enhance training programs with new modules, such as simulations of emergency procedures and evidence documentation exercises.

Revenue

1. A total of \$492,287 in revenue was collected in tuition and fees from the 31 programs offered.
2. The 14 programs that required the time of an investigator for any portion of the instruction generated \$339,507, or 69 percent of the total revenue.
3. The remaining 15 programs, which required no investigative resources, generated \$152,780, or 31 percent of the total revenue.
4. A total of \$28,000 in revenue was collected in facility usage fees.
5. A total of \$57,500 in revenue was collected for the Interagency Continuing Operations Agreements.

The Academy's receipts were used to fund the direct costs of providing the programs. In addition, funds were used for maintenance of Academy equipment, telecommunications upgrades, supplies, and to finance a reserve for equipment replacement.

Office of Transportation Disaster Assistance

In 1996, Congress passed the Aviation Disaster Family Assistance Act, which 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. In 1997, Congress enacted the Foreign Air Carrier Support Act to ensure that foreign air carriers operating to the United States meet the same standards of 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, including 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 on repeatedly to assist in accidents in all transportation modes.

Primary tasks of the team on arrival at an 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 2005, TDA specialists launched and assisted on the following accidents:

Bombardier CL-600 Passenger Plane, Teterboro, New Jersey (0 fatalities)

Bombardier overran runway, crossed highway and impacted warehouse following aborted takeoff. TDA specialists coordinated with local and State law enforcement agencies to ensure that support for the passengers on the plane was available.

Cessna Citation 560 Crashed on Approach, Pueblo, Colorado (8 fatalities)

Assisted with on scene agency coordination with local, State, and company officials (Circuit City Corporation). Set-up FAC to assist the families of the victims. Assisted the coroner in coordinating victim recovery and positive identification efforts.

Beech E90 Accident, New Roads, Louisiana (5 fatalities)

Supported the investigator-in-charge with family assistance issues and provided victim identification support to the local coroner.

Helicopter Accident, Sudan, Africa (14 fatalities)

Conducted body examinations and injury assessment to help determine personnel on board. Worked with local government officials to write statements regarding identification process. Worked with U.S. State Department personnel to inform them of process and findings of examinations.

Grumman G-73 Mallard Seaplane In-flight Breakup, Miami, Florida (20 fatalities)

Coordinated family assistance activities with local Red Cross and Bahamian government representatives. Conducted family briefings. Provided guidance to medical examiner for victim identification issues. Interacted with airline personnel and insurance agency for family assistance support.

School Bus Involved In Head-On Collision With Trash Truck, Arlington Virginia (2 fatalities)

Provided assistant to local authorities regarding NTSB investigation.

Motorcoach Fire, Wilmer, Texas (23 fatalities, 22 injured)

Provided support to local authorities in family assistance issues. Supported the investigator-in-charge in witness interviews, particularly in interviewing those injured.

Motorcoach/truck accident, Osseo, Wisconsin (5 fatalities)

Provided support to local authorities in family assistance issues. Supported the IIC in witness interviews, particularly interviewing those injured.

Train Derailment/Hazmat Release, Graniteville, South Carolina (9 fatalities)

Assisted local authorities with family assistance issues. Provided support to the local coroner regarding victim information and next-of-kin notification. Conducted briefings to family members of the fatalities. Presented information to evacuated residents during town meetings.

Rail Grade Crossing Collision, Glendale, California (11 fatalities)

Provided family assistance support and guidance to local/State authorities and Metrolink personnel. Assisted NTSB investigators in collecting information. Aided interactions with local and Federal law enforcement agencies.

Metra Commuter Train Derailment, Chicago, Illinois (2 fatalities)

Provided family assistance and first responder support to Metra and local authorities.

Boat Capsizing, Lake George, New York (20 fatalities)

Provided family assistance support to local authorities. Conducted family briefings. Handled collection of next-of-kin contact information.

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 more effectively to transportation disasters. 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 course *Family Assistance During Transportation Disasters (TDA 301)* brings together leaders from many transportation disciplines to share knowledge and enhance family assistance operations following transportation disasters. NTSB transportation disaster assistance 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
- Forensic recovery and identification operations

This course was presented in February and August 2005 at the NTSB Academy. Professionals representing domestic and international air carriers, airport authorities, several government agencies, including foreign governments, private organizations, and airport authorities attended the two courses.

Transportation Disaster Response: A Course for Emergency Responders (TDA 402) was presented in April 2005 at the NTSB Academy. NTSB transportation disaster assistance specialists, grief and trauma specialists, Federal transportation officials, and other professionals presented a course focused on meeting both the immediate and long-term needs of airport first responders affected by transportation disasters. Topics included:

- Integrating Incident Command System and investigative processes during a transportation disaster
- Maximizing resources in site security and support staffing
- Responding to media inquires and managing press at the scene
- Communicating with the local community and families of the victims
- Providing assistance to family members
- Forensic aspects of recovery and identification
- Long-term issues facing the affected community following a major disaster

In April 2005, *Transportation Disaster Response—Airports (TDA 404)* was delivered to attendees from the airport industry. The course addressed the numerous challenges faced by airports and airlines in the first 12 hours following a major passenger aircraft accident,

and equipped participants with strategies and materials to plan and coordinate an effective response to assist the relatives and friends of accident victims. TDA staff led the course and assisted participants with planning issues unique to their airport. Topics in this course included:

- Understanding the unique response requirements for the two primary types of aviation disasters and how victims are affected by them
- Issues unique to accidents and incidents involving airlines with limited airport staff (or contracted airport staff)
- Determining who should be considered a “family member”
- Assisting with the immediate needs of family members in the first 12 hours after an accident
- Planning a Friends and Family Gathering Center and protecting family members’ privacy
- Transitioning family members from the Friends and Family Gathering Center to the airline-established Family Assistance Center
- Understanding the FBI’s role in criminal transportation accident investigations and family support services
- Employing strategies for effective communication with local and State responders, NTSB, FAA, FBI, airlines and airport tenants

In May 2005, a new course entitled *Transportation Disaster Response—Mass Fatality Incidents for Medicolegal Professionals (TDA 403)* was held at the NTSB Academy. This four-day course examined the principles of victim recovery and identification and associated family assistance procedures for successfully managing mass fatality incidents involving transportation related accidents. In addition to classroom presentations, participants conducted a simulated search and recovery exercise and took part in a mock disaster morgue operation. Course faculty included NTSB staff, forensic scientists, and local/Federal agency representatives with mass fatality response experience. Topics covered included:

- History and evolution of mass fatality incident response
- Roles of Federal agencies involved in transportation mass fatality response events
- Victim recovery and working with the FBI Evidence Response Team
- Theory and practice of victim identification, including the use of DNA technology
- Family assistance center operations and family briefings
- Management of personal effects
- Collection of antemortem data (medical, dental, DNA)
- Changes in procedures in criminal events
- Survival factors issues for the forensic responder
- Media relations in mass fatality events

Partnerships with Other Agencies

The NTSB and the Office of Transportation Disaster Assistance share memoranda of understanding with several other Federal agencies, including the American Red Cross, the Department of Homeland Security, the Department of Defense, the Department of State, the Department of Justice, and the FBI. Together, these agencies collaborate to support both the investigative and family assistance efforts at major accidents.

Following Hurricane Katrina, TDA staff provided input to the Department of Health and Human Services and the Department of Homeland Security in the areas of fatality management and family assistance. Staff also traveled to Baton Rouge, Louisiana to assist the Red Cross in training of disaster responders, and was asked by the Department of Health and Human Services to provide input into the operations of the Louisiana family assistance center.

The NTSB also became a partner in a newly established Fatality Management and Family Assistance Working Group. The group, comprised of staff of six federal agencies (Department of Health and Human Services, Department of Homeland Security, Department of Defense, FBI, Department of State, and NTSB), focused on providing a similar standard of care for fatality management and family assistance in mass disasters. The group will also serve as Federal subject matter experts in these areas, with the goal of improving policy and practice.

The Interagency Transportation Incident Program in New York City was formalized in 2005. The program was created to improve interagency cooperation in New York City in the event of another major transportation disaster. In 2005, the steering committee identified all of the key local agencies that would respond to a major transportation incident in New York City. Training of staff from these agencies took place over the year. The goal of the training was to enhance mutual understanding between local, State, and Federal agencies; share information regarding the needs of each agency during an investigation; and ensure that the needs of the NTSB investigation or TDA response are met in a timely manner.

Staff worked with the Department of Homeland Security's Disaster Mortuary Operational Response Team to finalize standard operating procedures for a response in support of the NTSB. TDA hosted a three-day meeting of 15 DMORT members at the NTSB Academy to examine existing protocols, make modifications, and draft new procedures.

In August 2005, TDA and Academy staff conducted a two-day training for the National Capital Region to help support the professional development and instruction of regional personnel in facilitating/leading the metropolitan community in communication and reunification in the event of a major disaster. The course explored practical approaches to effective disaster management and the tenets of directing resources to yield effective communication during disasters and presented nuances and innovative approaches to managing disaster response.

Staff also held two "Chicago" meetings this year. These meetings bring together the major air carrier family assistance personnel to examine responses and address concerns. Meetings were held in Chicago and Atlanta.

In addition, staff presented information to several groups, including:

- National Disaster Medical System annual conference
- American Academy of Forensic Sciences annual conference
- National Association of Medical Examiners annual conference
- American Red Cross (ongoing training)
- FBI Airport Liaison annual conference
- Department of Justice/Office for Victims of Crime annual conference
- National Center for Forensic Sciences
- Emergency Management Institute (division of DHS/FEMA)

Air carriers, airport agencies, and law enforcement personnel from:

- JetBlue Airways
- John F. Kennedy airport
- LaGuardia airport
- New York City Office of Chief Medical Examiner
- Logan airport
- San Francisco airport
- Grand Forks, North Dakota airport
- United airlines
- Baltimore-Washington International airport
- Southwest Airlines
- Charlotte airport

Member Profiles



MARK V. ROSENKER **ACTING CHAIRMAN**

Mark V. Rosenker of Virginia was designated by President George W. Bush as Vice Chairman of the National Transportation Safety Board on April 3, 2003 for a term of two years. He was sworn in as a Member of the Board on March 21, 2003, after Senate confirmation. On April 2, 2005, the President renominated him for a new five-year term as a Member, and re-designated him Vice Chairman for a two-year term ending April 1, 2007. In December of 2005, he was confirmed to his new term, which runs through December 31, 2010. Rosenker currently serves as Acting Chairman.

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.

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 by President Bush a member of the American Battle Monuments Commission (ABMC). After serving four years, Mr. Rosenker received the Commission's highest honor, the ABMC 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 Commander of the Air Force Reserve Command.

For his leadership role in recreational boating issues, the National Safe Boating Council presented Vice Chairman Rosenker their highest honor, the Confluence Award. This is traditionally given only to Members of Congress, and Vice Chairman Rosenker is one of the few representatives of the Executive Branch to be so honored.

Rosenker was the Board Member on scene for the Safety Board's investigations into the April 2004 derailment of Amtrak's City of New Orleans near Flora, Mississippi; the November 2004 crash of a charter jet aircraft in Houston, Texas (the plane was on its way to pick up former President George H.W. Bush for a flight to Latin America); the September 2005 derailment of a Metra commuter train in Chicago; the October 2005 capsizing of the passenger vessel Ethan Allen in Lake George, New York, which claimed 20 lives; the November 2005 grade crossing collision involving a Metra commuter train in Chicago; and the December 2005 crash of a seaplane in Miami, Florida that killed all 20 persons aboard. He also was part of the NTSB's Go Team for the June 2003 capsizing of the charter fishing vessel Taki-Too, near Garibaldi, Oregon, which took the lives of 11 of the 19 people aboard.



ELLEN ENGLEMAN CONNERS MEMBER

The Honorable Ellen Engleman Conners is one of five presidentially appointed members of the Board. An independent Federal agency, the NTSB is charged by Congress with investigating over 2000 accidents every year involving every U.S. civil aviation accident and significant accidents in rail, highway, marine and pipeline, and issuing safety recommendations.

In addition to her five-year term as Member, Engleman Conners recently completed her two-year term as Chairman during which time she:

- Focused on improving the performance and results of the NTSB by reducing costs and improving financial planning which resulted in the agency's clean audit for their first and second financial reviews; improving investment in human capital via development of a long-term strategic plan of critical skills and positions needed; instituting E-Gov measures including full webcast of all Board sunshine meetings; "cleaning up the record" through the SWAT efforts (Safety With A Team) resulting in the increased implementation of safety recommendations and the lowest number of open safety recommendations since 1975.
- Served as official spokesperson for the agency and was the on-scene spokesperson for the NTSB's investigations of the Staten Island Ferry and the Baltimore Water Taxi accidents; the public hearing of the airline crash in Charlotte, North Carolina; the Santa Monica, California, elderly driver crash into an open air market; the catastrophic release of anhydrous ammonia from rail tankers in Minot, North Dakota; and the air tanker crash in Chico, California.
- Provided Congressional testimony for the Senate Commerce Committee, the House Transportation and Infrastructure Committee, the House Subcommittee on Aviation, the Senate and House Appropriation Committees and the House Resources Committee.
- Served as the keynote speaker for the Airline Pilots Association, the Hudson Institute Board of Directors annual meeting, the International Society of Air Safety Investigators, the Columbia Club Harrison Award, the Flight Safety Foundation and the American Trucking Association among others.

Awards:

- U.S. Coast Guard Distinguished Public Service Award, the highest non-life-saving medal, for her work in leading the transition of the USCG from the Department of Transportation to the Department of Homeland Security.
- Secretary of Transportation 9/11 medal for her leadership of the Crisis Management Center.
- Aviation Week 2003 Laurel for her SWAT (Safety With a Team) program to resolve open safety recommendations issued by the NTSB.

Education:

- Master in Public Administration from the Kennedy School of Government at Harvard University.
- J.D. and B.A. from Indiana University.
- Admitted to the Indiana Bar, the Federal Court system, and APR accreditation from the Public Relations Society of America.

Navy Career:

- Serves as an officer in the U.S. Navy Reserve and is currently assigned to Chief of Information (CHINFO) at the Pentagon.
- Previous Experience:
- Administrator of the US DOT's Research and Special Programs Administration (RSPA) responsible for the Office of Pipeline Safety, the Office of Hazardous Material Safety, the Office of Emergency Transportation, the department's Crisis Management Center, the Volpe Transportation Center, and the Transportation Safety Institute.
- Transportation Security Administration's (TSA) representative to the initial Transition Planning Team for the proposed Department of Homeland Security.
- Led US DOT delegation to E.U. Ministers of Transport Meeting in Romania; Global Disaster Information Network Conference in Rome and the Civil Reserve Air Fleet (CRAF) program at NATO.
- President & CEO, Electricore, Inc., a research and development consortium for advanced transportation and energy technologies.
- Co-founder of Vitamin Angel Alliance, providing international medical relief for women and children.

Engleman Connors 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 March 24, 2003 and concluded on March 23, 2005.



DEBORAH A. P. HERSMAN MEMBER

Deborah A. P. Hersman was sworn in as the 35th Member of the National Transportation Safety Board on June 21, 2004.

Since her appointment to the Board, Member Hersman has been the Member on scene at five transportation accidents: the November, 2004 collision of two Washington Metro trains at the Woodley Park Station in Washington, D.C.; the January, 2005 Norfolk Southern Railway freight train collision and subsequent hazardous material release in Graniteville, South Carolina; the February, 2005 crash of an aircraft operated by Platinum Jet Management into an airport warehouse at Teterboro, New Jersey; the April, 2005 collision of an Arlington County school bus with a trash truck in Arlington, Virginia; and the July, 2005 head-on collision of two Canadian National Railway freight trains at Anding, Mississippi.

Member Hersman also participated in the investigation of the crash of an aircraft operated by Pinnacle Airlines in Jefferson City, Missouri, in October, 2004. Beginning June 13, 2005, she chaired a three-day public hearing on this accident.

Before joining the Board, Member Hersman was a Senior Professional Staff Member of the U.S. Senate Committee on Commerce, Science and Transportation from 1999 to 2004. Prior to that, she served as Staff Director and Senior Legislative Aide to Congressman Bob Wise of West Virginia from 1992 to 1999.

In her Senate position, Member Hersman was responsible for the legislative agenda, oversight and policy initiatives for surface transportation issues, including both the economic and safety regulation of passenger and freight railroads, truck and bus safety, pipeline safety, and hazardous materials transportation safety. She worked extensively on the Motor Carrier Safety Improvement Act of 1999, the Pipeline Safety Improvement Act of 2002, the Transportation Equity Act of the 21st Century, the Amtrak Reform and Accountability Act, and numerous transportation safety and security measures.

Member Hersman earned Bachelor of Arts degrees in Political Science and International Studies from Virginia Tech University in Blacksburg, Virginia, in 1992, and a Master of Science degree in Conflict Analysis and Resolution from George Mason University in Fairfax, Virginia, in 1999.

Member Hersman's term expires December 31, 2008.



KATHRYN O'LEARY HIGGINS **MEMBER**

Kathryn O'Leary Higgins was sworn in as the 36th Member of the National Transportation Safety Board on January 3, 2006.

Ms. Higgins brings 36 years of experience in the public and private sectors to her new appointment. She was most recently employed as President and CEO of TATC Consulting and was Vice President for Public Policy at the

National Trust for Historic Preservation from May 1999 to January 2004.

Member Higgins served as Deputy Secretary of the U.S. Department of Labor (July 1997-May 1999), Acting Chair of the National Endowment for the Arts, and Vice Chair of the Presidential Commission on U.S. Coast Guard Roles and Missions.

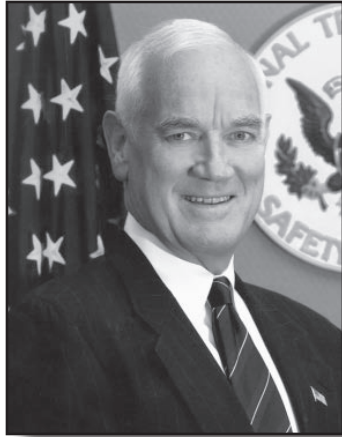
Ms. Higgins served in the White House (February 1995 – July 1997) as Assistant to the President and Secretary to the Cabinet. In that capacity she worked closely with the NTSB, DOT, FAA, and Coast Guard on a number of matters, including the 1996 ValuJet 597 and TWA 800 accidents, formulation and implementation of hazardous materials regulations, increasing inspector staffing, FAA reauthorization, and creation of the NTSB Office of Family Assistance. She was awarded distinguished service medals by the FAA and Coast Guard for her work.

Ms. Higgins served as Chief of Staff to the Secretary of Labor (January 1993-February 1995), Chief of Staff to Congressman Sander Levin (January 1986 – January 1993), and Senior Legislative Associate and Minority Staff Director with the U.S. Senate Labor and Human Resources Committee (January 1981 –January 1986).

Member Higgins was with the White House Domestic Policy Council, serving as Assistant Director for Employment Policy (May 1978 –January 1981). She began her career in 1969 as a Manpower Specialist with the Employment and Training Administration, U.S. Department of Labor.

Ms. Higgins came to Washington from Yankton, South Dakota and earned a Bachelor of Science degree from the University of Nebraska. She was married to the late William J. Higgins and is the mother of two sons, Liam and Kevan.

Ms. Higgins' term expires December 31, 2009



RICHARD HEALING FORMER 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 Federal Aviation

Administration.

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. 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 December 31, 2006. He left the Board in April 2005.