2002

National Transportation Safety Board

ANNUAL REPORT

to Congress

Foreword

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

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

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

In 1967, Congress consolidated all transportation agencies into a new Department of Transportation (DOT) and established the NTSB as an independent agency, placed within the DOT for administrative purposes. In creating the Safety Board, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of safety in the transportation system than the individual modal agencies working separately. Since 1967, the Board has investigated accidents in the aviation, highway, marine, pipeline, and railroad modes as well as hazardous materials transportation-related accidents.

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

- for independent investigative oversight to ensure public confidence in the transportation system;
- to concentrate on the most significant and life-threatening safety issues; and
- to maintain an aviation database so that trends can be identified and projected.

In 1996, Congress assigned the Board the additional responsibility of coordinating Federal assistance to the families of aviation accident victims. In 2000, the Safety Board embarked on a major initiative to increase employee technical skills and make its investigative expertise more widely available to the transportation community by establishing the NTSB Academy.

The NTSB is the model for a government agency that works well and costs only pennies for each American.

The George Washington University Virginia campus was selected as the academy's home. Since its inception, the NTSB has investigated more than 114,000 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 almost 12,000 safety recommendations pertaining to the various transportation modes to more than 1,300 recipients. Because the Board has no authority to regulate the transportation industry, its effectiveness depends on its reputation for conducting thorough and accurate investigations and for producing timely, well-considered recommendations to enhance transportation safety.

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

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Most Wanted Safety Recommendations

The Safety Board uses its Most Wanted transportation safety improvements list to focus attention on Board recommendations that have the most potential to save lives and to highlight recommendations with the greatest impact on transportation safety. On May 14, 2002, the NTSB issued an updated list of 12 safety improvement goals covering all modes of transportation. Issues highlighted on the Most Wanted list:

Child occupant protection. Protect our youngest citizens and reduce the leading cause of death for children by

- requiring booster seats;
- making vehicle back seats more child friendly;
- developing funding for child passenger safety education;
- requiring restraints for infants and small children on airplanes; and
- requiring personal flotation devices for children.

Human fatigue in transportation operations. Help eliminate fatigue as a causal factor in transportation accidents by studying the relationship between fatigue and accidents within the transportation industry and updating each industry's applicable regulations; and modifying hours-of-service regulations.

Automatic information recording devices. Improve the quality and quantity of investigative data available by

- requiring devices on commercial vehicles that will automatically record relevant information;
- requiring cockpit imaging recording systems; and
- requiring maintenance of flight data recorders; and improving railroad event recorder crashworthiness standards.

Airframe structural icing. Improve the de-icing capability of aircraft and prevent accidents by

- revising icing criteria and certification testing requirements;
- researching and developing on-board aircraft ice protection and detection systems; and
- providing minimum maneuvering airspeed information.

Explosive mixtures in fuel tanks on transport-category aircraft. Prevent a potentially catastrophic aviation accident by preventing the operation of transport category aircraft with explosive fuel-air mixtures in the fuel tank; and developing long-term solutions to prevent explosive mixtures in fuel tanks on transport category aircraft.

Airport runway incursions. Prevent runway incursions before a catastrophic accident occurs by providing for safer control of aircraft on the ground.

The Safety Board's Most Wanted list focuses attention on issues that have the most potential to save lives.

Positive train control systems. Mandate the installation of automated systems to stop trains when crewmembers make signal or speed mistakes or are incapacitated.

Commercial truck and bus safety. Reduce fatalities and injuries associated with commercial truck and bus crashes by

- modifying commercial carrier rating standards;
- enhancing occupant safety; and
- increasing vehicle crashworthiness standards.

Primary seat belt enforcement. Make our roadways safer and reduce the leading cause of transportation deaths and injuries by increasing the number of people who wear seat belts through stronger enforcement laws.

Youth highway safety. Toughen and enforce minimum drinking and driving laws, and enact laws mandating a provisional license system and nighttime restrictions for young novice drivers.

Recreational boating safety. Enhance safety on our increasingly crowded waterways by strengthening legislative, enforcement, and educational programs to prevent boating accidents.

Marine post-accident drug and alcohol testing. Strengthen regulations related to post-accident testing for drugs and alcohol use.

One issue area, Pipeline Excavation Damage Prevention, was removed from the list, while a new issue area, Marine Post-Accident Drug and Alcohol Testing, was added because the Safety Board is concerned that lack of clarity of regulations and lack of enforcement has resulted in a disregard of the Coast Guard's regulations and contributed to the growth of misconceptions and misinformation about post-accident testing.

Eleven recommendations were removed from the 2001 list:

- Education on the need for children to ride in the back seat (Acceptable Action);
- On-board recording devices for commercial trucks (Unacceptable Action);
- Recording devices for rapid transit cars (Acceptable Action);
- Fatigue educational material for transportation personnel (Acceptable Action);
- Fatigue awareness for transit employees (Acceptable Action);
- Establishment of child restraint fitting stations (Acceptable Action)
- Underground mapping standards to prevent excavation damage and periodic reviews of excavation damage prevention programs in the states (Acceptable Action); and
- Legislation requiring the use of personal floatation devices while operating a personal watercraft (Acceptable Action);

The Board also revised existing recommendations in the areas of Airframe Structural Icing, Explosive Mixtures in Fuel Tanks, and Automatic Recording Devices. Some of the revisions address:

- Minimum maneuvering airspeeds for various airplane configurations and conditions of flight, including operating in icing conditions;
- Long-term solutions to explosive mixtures in fuel tank on transport category aircraft;
- Cockpit imaging recording systems;
- Maintenance of flight data recorders; and
- Railroad event recorder crashworthiness standards.

Four of the 12 recommendation issue areas have been on the list since its inception in 1990. The Board continues to investigate accidents in these original issue areas of recreational boating safety standards, runway incursions, positive train control, and operator fatigue where the intent of the recommendations has not been met.

The NTSB and Congress

The NTSB provided testimony to Congressional committees seven times during calendar year 2002. Below is a summary of testimony provided by Safety Board Members and staff. Complete copies of NTSB testimony are available on the Board's website at www.ntsb.gov/speeches.

Robert Chipkevich, Director of the Board's Office of Railroad, Pipeline and Hazardous Materials Investigations, testified twice before the House of Representatives in calendar year 2002 regarding pipeline safety -- on February 13, 2002, before the Committee on Transportation and Infrastructure, Subcommittee on Highways and Transit, and on March 19, 2002, before the Committee on Energy and Commerce, Subcommittee on Energy and Air Quality. Mr. Chipkevich's testimony discussed pipeline integrity, data collection, excavation damage, and qualification and training requirements. Although progress is being made on three of the issues, the Board believes insufficient progress has been made on the qualification and training requirements for personnel who operate our nation's pipelines.

On March 14 and July 25, 2002, Chairman Marion C. Blakey testified before the House Committee on Transportation and Infrastructure, Subcommittees on Aviation and Railroads, and the Senate Committee on Commerce, Science, and Transportation, regarding reauthorization of the National Transportation Safety Board. The Chairman's testimony discussed Safety Board activities and summarized two changes the Board requested to its authorizing authority – priority in marine accident investigations similar to that in all other modes of transportation and clarification of family affairs responsibilities following intentional criminal acts. The Safety Board's reauthorization request also provided for budget and personnel resource levels to sustain the NTSB's Academy.

Chairman Blakey testified before the House Committee on Appropriations, Subcommittee on Transportation and Infrastructure regarding the NTSB 's fiscal year 2003 budget request on April 11, 2002. The testimony summarized Board activities for the previous year, and our request for $73.8 million and 432 full-time equivalent positions. This figure included $3.4 million for employee pension and benefit costs that were previously covered by the Office of Personnel Management.

In addition, Chairman Blakey testified twice on railroad safety. On June 6, 2002, she testified before the Committee on Transportation and Infrastructure, Subcommittee on Railroads, House of Representatives, and on July 10, 2002, she testified before the Committee on Commerce, Science, and Transportation, Subcommittee on Surface Transportation and Merchant Marine. The Chairman's testimony summarized the Board's concerns regarding three railroad areas: positive train separation, track safety, and grade crossing safety.

State and Local Government Outreach

In her first public appearance as Chairman of the National Transportation Safety Board, Marion Blakey emphasized to the Governors' Highway Safety Association that much more needs to be done if we are to make our citizens truly safe when they travel on our roadways. With that statement, she reaffirmed the Safety Board's commitment to work with the states to reduce the frequency of drunk, distracted and dangerous drivers on highways. Chairman Blakey identified five areas that must be addressed by the states in order to reach these individuals – hardcore drinking drivers, teen drivers, commercial drivers, primary enforcement laws, and child passenger safety.

In order to address these challenges, the Safety Board Members and staff continued to be vocal advocates for its recommendations; to actively participate in alcohol, occupant and child restraint coalitions; and to examine safety issues as they arise during accident investigations and studies. This led to development of a Safety Board state outreach initiative, announced in September 2002, in which the five Board Members each agreed to take responsibility for advocacy in 10 states. This initiative includes meeting with state officials and departments, as well as public advocacy groups, to promote state action related to Safety Board recommendations. Other activities have included speaking at public events; targeting print, radio, and television media; and establishing contacts with important state groups.

The Safety Board works with state and local governments to promote its recommendations and programs.

Member John Goglia made the first of the state visits, to Massachusetts, in October. This special emphasis program enabled the Board to continue its outreach to the states, with 25 personal appearances. Additionally, the Board contacted all 50 states to seek information on state activities that would enable it to close outstanding recommendations.

Improving transportation safety continues to be a priority in the states, as indicated by the numerous state safety programs, and the hundreds of bills considered by state legislatures. Many states considered measures that would address the Safety Board's occupant protection, graduated licensing, and impaired driving recommendations. Washington enacted primary safety belt enforcement, and six states enacted proposals to require children to use booster seats in motor vehicles after outgrowing child safety seats. The legislatures also considered hundreds of measures addressing impaired driving in 2002. At least 16 states considered measures addressing hardcore drinking drivers. Among the most visible impaired driving proposals were those to lower the allowable blood alcohol limit to 0.08 percent and prohibit open containers of alcohol in motor vehicles, in order to comply with TEA-21 requirements. States also continued to upgrade their teen driver licensing laws, by enacting improved graduated licensing requirements.

In addition to these direct advocacy activities, the Board continued to routinely inform key state officials of significant Safety Board accident investigation activities, from initial launch to final adoption of reports and recommendations. The Board provided information to the states on 16 separate accident investigations in 2002.

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. Recent legislation also authorized the Board to investigate accidents involving public use (government) aircraft, except those operated by the armed forces and intelligence agencies.

The Board is also authorized to conduct safety studies of transportation problems. A safety study goes beyond the single accident investigation to examine a safety problem from a broader perspective. Because of the international nature of the air transportation industry and of the leading role of the United States in the development of aviation technologies, the Safety Board's investigation of domestic accidents and participation in foreign investigations is essential to the enhancement of aviation safety worldwide. The Board fulfills U.S. obligations with regard to foreign accident investigations, established by treaty under the auspices of ICAO, by sending accredited representatives to participate in investigations in cases where U.S. interests are involved.

These typically concern accidents involving U.S. airlines in foreign territories or U.S.- manufactured aircraft or major components (e.g., engines) operated and/or used by foreign carriers. U.S. manufacturers and operators rely heavily on the Board to facilitate their access to foreign accident investigations. The safety issues that arise in these investigations often have wide-reaching implications for the aviation industry.

Foreign governments often request the assistance of NTSB analysts and laboratory specialists in their investigations. The Board's major aviation accident reports, safety recommendations, and accident statistics are disseminated worldwide and have a direct influence on the safety policies of foreign aviation authorities and airlines. The NTSB's role in international civil aviation safety has a direct impact on ensuring the safe transportation by air of U.S. citizens and other travelers around the world. The Board's role also ensures the high quality of U.S.- manufactured aviation products operated worldwide.

Another aspect of the NTSB's mandate is to investigate more than 2,000 general aviation accidents and incidents annually. These investigations result in safety improvements that have far-reaching impact. In addition, the NTSB investigates accidents and incidents that are less complex and involve only property damage. Typically, NTSB investigations examine all factors surrounding an accident or series of accidents or serious incidents, thereby ensuring that regulatory agencies and the industry are provided a thorough and objective analysis of actual, as well as potential, deficiencies in the transportation system. Only then can solutions be proposed to correct deficiencies that may have caused an accident.

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

The office headquarters is located in Washington, D.C., with 10 regional offices located in Parsippany, New Jersey; Atlanta, Georgia; Miami, Florida; West Chicago, Illinois; Arlington, Texas; Denver, Colorado; Seattle, Washington; Gardena, California; Anchorage, Alaska; and

Washington, D.C. Seven divisions comprise the 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.

When the Safety Board is notified of a major aviation accident, it launches a go-team, which varies in size depending on the severity of the accident and the complexity of the issues involved. The team normally consists of an investigator-in-charge (IIC) and staff specialists in as many as 14 different specialties. Each staff expert leads a group of other specialists from government agencies, the industry, and first response teams as information is collected and analyzed. Safety Board staff members are designated as group chairmen to coordinate information for their part of the investigation from the on-scene activities through adoption of the final report. For the majority of the almost 2,000 commercial and general aviation accident/serious incidents investigated each year, a regional investigator, from one of the 10 NTSB regional offices, serves as the IIC.

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

The participation of other investigative parties (non-NTSB specialists) augments the Board's resources and allows first-hand access to specialized information. For example, the manufacturer is the best source of information on the design of the specific aircraft being investigated.

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

Safety recommendations resulting from major investigations generally are included in the final accident report, although recommendations can be issued at any time during the course of an investigation if an issue is determined by the Board to pose an immediate threat to safety. Regional investigations will frequently identify safety issues; in 2002, 34 safety accomplishments identified by regional investigators were implemented that corrected safety problems before they resulted in other accidents.

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

Completed Major Aviation Investigations

Because of the international nature of the air transportation industry and of the leading role of the United States in the development of aviation technologies, the Safety Board's investigation of domestic accidents and participation in foreign investigations is essential to the enhancement of aviation safety worldwide.

Crew Inputs Cause EgyptAir Flight 990 to Crash into Atlantic Ocean

EgyptAir flight 990, a Boeing 767-366ER, crashed into the Atlantic Ocean off the coast of Nantucket, Massachusetts on October 31, 1999. The scheduled flight was being operated from John F. Kennedy International Airport, New York, to Cairo International Airport, Cairo, Egypt. There were 14 crewmembers and 203 passengers. All on board were killed and the airplane was destroyed.

Because the crash occurred in international waters, the Egyptian government was initially responsible for the investigation under the provisions of Annex 13 to the Convention on International Civil Aviation. However, the Egyptian government delegated the conduct of the investigation to the NTSB under the provisions of the annex. The investigation into the cause of the crash was extensive and involved months of testing and research during which investigators evaluated various scenarios to determine the circumstances leading up to the crash.

On March 21, 2002, the NTSB determined that the probable cause of the crash was the airplane's departure from normal cruise flight and subsequent impact with the Atlantic Ocean as a result of the relief first officer's flight control inputs. The reason for the relief first officer's actions was not determined.

Cessna 335 Pilot's Spatial Disorientation Causes Accident in Hillsboro, Missouri

On October 16, 2000, a Cessna 335 airplane, operated by a commercial instrument rated pilot collided with the terrain near Hillsboro, Missouri. The pilot and two passengers were killed. The airplane was destroyed. Instrument meteorological conditions prevailed and the airplane was operating on an instrument flight plan. The business flight had departed the St. Louis Downtown Parks Airport (CPS), Cahokia, Illinois en route to New Madrid, Missouri. On board were the Governor of Missouri, his aide, and his son who was piloting the airplane. The pilot had received a weather briefing and filed an instrument flight rules flight plan with the automated flight service station prior to departing CPS. While en route to New Madrid, the pilot reported to air traffic control that the primary attitude indicator was not "reading properly" and he was trying to fly using the copilot's. The pilot then stated that they wanted to divert to Jefferson City where the weather was better. The airplane was in the process of diverting when the accident occurred.

On June 5, 2002, the Safety Board determined that the probable cause of the accident was the pilot's failure to control the airplane while maneuvering because of spatial disorientation. Contributing to the accident were the failure of the airplane's primary attitude indicator and the adverse weather conditions, including turbulence.

Crew's Inability to See Runway in Darkness Causes Gulfstream III Accident in Aspen, Colorado

On March 29, 2001, a Gulfstream III, N303GA, owned by Airbourne Charter, Inc., and operated by Avjet Corporation of Burbank, California, crashed while on final approach to runway 15 at Aspen-Pitkin County Airport, Aspen, Colorado. The charter flight departed Los Angeles International Airport with two pilots, a flight attendant, and 15 passengers. The airplane crashed into sloping terrain about 2,400 feet short of the runway threshold. All on board were killed, and the airplane was destroyed.

On June 11, 2002, the Safety Board determined that the probable cause of the accident was the flight crew's operation of the airplane below the minimum descent altitude without visual reference to the runway. Contributing to the accident was the FAA's unclear wording of a Notice to Airmen (NOTAM) regarding the nighttime restriction of the VOR/DME-C approach to the airport. Also cited as contributing factors were the inability of the flight crew to adequately see the mountain terrain because of the darkness and weather conditions, the pressure from the charter customers for the captain to land the airplane, and the delayed departure of the airplane from California, causing the flight to arrive at sunset during the airport's nighttime landing restrictions.

The Safety Board's investigation determined that the flight crew descended below the minimum descent altitude even though the airplane maneuvers and comments on the cockpit voice recorder (CVR) indicated that neither pilot had established nor maintained visual contact with the runway or its environment; the flight crew did not discuss a missed approach after receiving a third report of a missed approach to the airport and a report of deteriorating visibility in the direction of the approach course; and a copy of the FAA issued a NOTAM on March 20, 2001, stating "circling not authorized at night for runway 15 at Aspen" had not been sent to the Aspen tower. Without knowledge of the NOTAM, the approach controller cleared the flight crew for the VOR/DME-C instrument approach procedure.

Following the accident, the FAA became concerned about potential pilot confusion regarding the wording of the NOTAM -- specifically, that pilots might infer that straight-in landings to runway 15 were authorized at night. On March 30, 2001, a revised NOTAM was issued stating "procedure not authorized at night."

Flight Crew's Excessive Airspeed Causes Southwest Airlines Flight 1455 Runway Overrun in Burbank, California

On March 5, 2000, Southwest Airlines flight 1455, a Boeing 737-300, N668SW, overran the departure end of runway 8 after landing at Burbank-Glendale-Pasadena Airport, Burbank, California. The airplane touched down at approximately 182 knots, and about 20 seconds later, at approximately 32 knots, collided with a metal blast fence and an airport perimeter wall. The airplane came to rest on a city street near a gas station off of the airport property. Of the 142 persons on board, two passengers sustained serious injuries; 41 passengers and the captain sustained minor injuries; and 94 passengers, three flight attendants, and the first officer sustained no injuries. The airplane sustained extensive exterior damage and some internal damage to the passenger cabin. During the accident sequence, the forward service door escape slide inflated inside the airplane; the nose gear collapsed; and the forward dual flight attendant jumpseat, which was occupied by two flight attendants, partially collapsed.

On June 26, 2002, the NTSB determined that the probable cause of the accident was the flight crew's excessive airspeed and flight path angle during the approach and landing. The Board also attributed the cause of the accident to the crew's failure to abort the approach when stabilized approach criteria were not met. Contributing to the accident was the air traffic controller's positioning of the airplane, which was too high, too fast, and too close to the runway threshold. As a result, no safe options existed for the flight crew other than a go-around maneuver. Furthermore, the Board found that had the accident flight crew applied maximum manual brakes immediately upon touchdown, the airplane would likely have stopped before impacting the blast fence.

The Safety Board issued recommendations asking the FAA to issue an airworthiness directive (AD) to require all operators of Boeing 737-300 through -500 series airplanes to replace

the slide cover latch brackets on forward slide compartments with the type installed on the forward slide compartment of Boeing 737-600 through -900 series airplanes. The Board also recommended that the FAA issue an AD to require initial and periodic inspections of the pivot bracket assemblies on a particular model jumpseat installed on Boeing 737-300 through -500 series airplanes.

East Coast Airways (dba) Executive Airlines Fuel Exhaustion Causes Accident near Wilkes-Barre, Pennsylvania

On May 21, 2000, a Jetsteam 31, operated by Executive Airlines crashed about nine miles south of the Wilkes-Barre/Scranton International Airport in Bear Creek Township, Pennsylvania. The airplane was destroyed and the 19 persons on board were killed. The airplane had been chartered by a casino to transport customers between Atlantic City, New Jersey and Wilkes-Barre. The airplane crashed on its second attempted approach. The Board's investigation was hampered because the CVR failed to operate properly during the accident flight.

On the day of the accident the aircraft, which was owned and operated by Executive Airlines, flew from Farmingdale, New York to Atlantic City, New Jersey and then onto Wilkes-Barre, Pennsylvania. Investigators believe that the flight crew intended to add a total of 180 gallons of fuel, 90 gallons on each side, to the airplane while at the Republic Airport in Farmingdale. However, fuel receipts indicate that a miscommunication between the pilots and the fueler resulted in only 90 gallons of fuel being added.

On August 26, 2002, the Safety Board determined that the probable cause of the accident was the flight crew's failure to ensure an adequate fuel supply for the flight, which led to the stoppage of the right engine due to fuel exhaustion and the intermittent stoppage of the left engine due to fuel starvation. Contributing to the accident were the flight crew's failure to monitor the airplane's fuel state and the flight crew's failure to maintain directional control after the initial engine stoppage.

Jackscrew Failure Causes Alaska Airlines Flight 261 Crash into Pacific Ocean

On January 31, 2000, Alaska Airlines flight 261, a McDonnell Douglas MD-83, N963AS, crashed into the Pacific Ocean about three miles north of Anacapa Island, California. The two pilots, three cabin crewmembers, and 83 passengers on board were killed, and impact forces destroyed the airplane. Flight 261 was operating as a scheduled international passenger flight from Lic Gustavo Diaz Ordaz International Airport, Puerto Vallarta, Mexico, to Seattle-Tacoma International Airport, Seattle, Washington, with an intermediate stop planned at San Francisco International Airport, San Francisco, California.

On December 10, 2002, the Safety Board determined that the probable cause of this accident was a loss of airplane pitch control resulting from the in-flight failure of the horizontal stabilizer trim system jackscrew assembly's acme nut threads. The thread failure was caused by excessive wear resulting from Alaska Airlines' insufficient lubrication of the jackscrew assembly. Contributing to the accident was Alaska Airlines' extended lubrication interval, and the FAA's approval of that extension, which increased the likelihood that an unperformed or inadequate lubrication would result in excessive wear of the acme nut threads; and Alaska Airlines' extended end play check interval, and the FAA's approval of that extension, which allowed the excessive wear of the acme nut threads to progress to failure without the opportunity for detection. Also contributing to the accident was the absence of a fail-safe mechanism on the MD-80 to prevent the catastrophic effects of total acme nut thread loss. As a result of the investigation of the Alaska Airlines flight 261 accident, the Safety Board made 16 recommendations to the FAA.

Major On-going Aviation Investigations

Emery Worldwide Airlines Flight 17 Accident in Rancho Cordova, California
On February 16, 2000, Emery Worldwide Airlines flight 17, a DC-8-71, crashed while attempting to land shortly after takeoff from Mather Airport, Rancho Cordova, California. The airplane was operating as a regularly scheduled cargo flight to Dayton, Ohio. The three persons on the airplane were killed and the airplane destroyed. The flight crew reported an aft center of gravity problem after take off. Examination of the flight recorder data and wreckage prompted the Board to explore the possibility that a stabilizer control tab may have been disconnected prior to impact.

AirTran Flight 913 Fire in Greensboro, North Carolina
On August 8, 2000, the flight crew of AirTran flight 913, a Douglas DC-9, reported smoke in the cockpit shortly after take off from Greensboro, North Carolina. The airplane landed safely and an emergency evacuation was conducted. Five passengers received minor injuries. The examination of the airplane found evidence of fire in the electrical panel behind the captain's seat and on the cabin side of the bulkhead forming the rear of the cockpit.

AirTran Flight 956 Fire in Atlanta, Georgia
On November 29, 2000, AirTran flight 956, a Douglas DC-9, returned for an emergency landing at Atlanta, Georgia after the flight crew reported a fire on the airplane. The airplane landed safely and there were no injuries to the 97 people on board. Examination of the airplane revealed substantial sooting on the fuselage exterior, fire damage to the forward cargo bin, and buckling/melting of the passenger floor above the forward cargo bin. Further examination revealed extensive fire damage in the area between the cargo compartment liner and the fuselage skin. This area contains several wiring runs and hydraulic lines that were damaged by fire.

American Airlines Flight 1991/TransWorld Airlines Flight 24 Runway Incursion in Seattle, Washington
On January 22, 2001, when a TWA MD-80 was cleared to land on runway 16R at Seattle while an American Airlines MD-80 was in position on the runway awaiting takeoff clearance. The TWA jet overflew the American Airlines airplane, clearing it by an estimated 60 feet. There were no injuries to the passengers and crew of either airplane.

Beech King Air 200 Accident in Strasburg, Colorado
On January 28, 2001, the accident airplane descended rapidly before colliding with terrain in Strasburg, Colorado. The flight was transporting members of the Oklahoma State University basketball team. All eight passengers and the two pilots were killed.

Comair Flight 5054 Icing Upset in West Palm Beach, Florida
On March 19, 2001, the flight crew of a Comair Embraer 120 reported experiencing an upset event after encountering icing conditions. The aircraft was 46 minutes into a scheduled flight from Nassau, Bahamas, to Orlando, Florida. The airplane diverted to West Palm Beach. Examination of the aircraft found substantial damage to the elevators and the horizontal stabilizer. There were no injuries to the flight crew or 25 passengers.

American Airlines Flight 48 Control Problem in Dallas, Texas
On March 27, 2001, when an American Airlines flight from Dallas, Texas, a 767, experienced pitch control difficulties while on approach to land in Paris. The airplane was descending

through 6,000 feet. The flight crew indicated that the airplane did not respond as expected to control column inputs, and that horizontal stabilizer trim was used for pitch control. The flight landed and there were no injuries to the 124 passengers and 13 crew aboard. The French Bureau Enquêtes-Accidents has delegated the investigation of the incident to the NTSB.

Federal Express Flight 1478 Crash in Tallahassee, Florida

FedEx 727 following the accident in Tallahassee.

On July 31, 2002, Federal Express flight 1478, a Boeing 727, crashed short of the runway 9 at Tallahassee, Florida. The airplane was on a scheduled cargo flight from Memphis, Tennessee to Tallahassee. The airplane was destroyed by impact forces and a post crash fire. The captain and first officer were injured.

Peninsula Airways Flight 350 in Dillingham, Alaska

On October 10, 2001, a Cessna 208 Caravan, operated by Peninsula Airways as flight 350, crashed shortly after takeoff at Dillingham, Alaska. The pilot and all nine passengers were killed and the airplane destroyed by impact forces.

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


Investigators examine wreckage at AA flight 587 crash site.

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

Aviation Charter, Inc, Raytheon King Air 100 in Eveleth, Minnesota

On October 25, 2002, a Raytheon (Beechcraft) King Air 100 operated by Aviation Charter, Inc. crashed on approach to the Eveleth-Virginia Airport, Eveleth, Minnesota. The airplane

was a charter flight form St. Paul to Eveleth. There were eight people on the airplane, including U.S. Senator Paul Wellstone. The airplane was destroyed by impact and post-impact fire. All on board were killed.

Regional Aviation Operations

In 2002, the regional offices initiated 1,856 accident investigations and 44 serious incident investigations involving mostly commercial operations and completed 1,317 investigations. Regional accident and serious incident investigations are handled much like major investigations, but because these investigations are typically smaller in scope, they are usually conducted by a single regional investigator, who, working with representatives from other parties, ensures the investigation of all the relevant facts, conditions, and circumstances to determine the cause of the accident and identify any safety issues. The factual reports of the accidents/serious incidents conducted by the regions yearly are published on the NTSB's website. The brief and probable cause of the accident becomes available on the website after the determination of cause.

Completed Regional Aviation Investigations

In the Alaska Region

Pilot's Failure to Extend Landing Gear Causes Piper PA-31 Accident in Nuisqut, Alaska

On September 18, 2000, a Piper PA-31T3 airplane was destroyed by impact forces and post-impact fire after colliding with tundra-covered terrain, about 300 yards south of the Nuiqsut Airport, Nuiqsut, Alaska. The airplane was operated as flight 181 by Cape Smythe Air Service Inc., Barrow, Alaska. The airline transport-certificated pilot and four passengers were killed. Five other passengers were seriously injured. The flight had originated in Deadhorse, Alaska. Witnesses at the Nuiquit Airport observed the airplane was observed touching down on runway 22 with the landing gear retracted. The belly pod lightly scraped the runway for about 40 feet, but the airplane transitioned to a climb. As the airplane began climbing away from the runway, the landing gear was observed extending. The airplane climbed to about 100 to 150 feet above the ground, and then began a descending left turn. The airplane collided with the ground on a 95-degree heading. The wreckage path extended for about 300 feet; the landing gear, left wing, and the left engine separated from the airplane. A post-crash fire destroyed the fuselage, right wing, and right engine. The Safety Board determined that the probable cause of the accident was the pilot's failure to extend the landing gear; his improper aborted landing procedure, and inadvertent stall/mush. Factors in the accident were an improper adjustment of the landing gear warning horn system by company maintenance personnel, and the failure of the pilot to utilize the pre-landing checklist.

In the Mid-Atlantic Region

Inadequate Nozzle Lock Design Causes Continental Airlines Accident in Newark, New Jersey

On April 25, 2000, in Newark, New Jersey, a McDonnell Douglas DC-10-30 experienced an engine breech. There were no reported injuries. At V1, the DC-10-30's number 1 engine, a General Electric CF6-50C2, experienced a casing breech when the 2nd stage low pressure turbine) anti-rotation nozzle locks failed. Debris from the breach resulted in collateral

damage to the numbers 2 and 3 engines, the fuselage, and the left landing gear. In May 1993, the engine manufacturer issued a service bulletin to replace existing nozzle locks with ones that had thicker posts and arms. In March 1994, the manufacturer issued another service bulletin, which introduced a newly designed nozzle lock. The new locks were installed on the accident engine. The Safety Board determined that the probable cause was a stress rupture of the 2nd-stage low pressure turbine anti-rotation nozzle locks, resulting from inadequate nozzle lock design.

In the Northeast Region

Pilot's Failure to Maintain Airspeed Causes Beech 58 Crash in Cynthiana, Kentucky
On February 14, 2000, a Beech 58 impacted the ground in Cynthiana, Kentucky. There were four fatalities. The pilot filed an IFR flight plan, and received a standard weather briefing. The pilot was advised of occasional moderate rime or mixed icing below 10,000 feet for his route of flight. During the briefing the pilot stated, 'we got boots, and will be all right....' Approximately five minutes before the accident, the pilot reported the airplane was 'picking up' rime ice at 10,000 feet, and he requested 12,000 feet. He also reported that the windshield and wings were covered with ice, and that ice accumulation at 10,000 feet was moderate and steady. When the airplane started to climb to 12,000 feet, calibrated airspeed (CAS) began to decay. When the airplane reached 11,200 feet, and prior to the airplane starting a rapid descent, CAS had dropped to 85 knots. Minimum airspeed for icing conditions was published as 130 knots. In addition, the stall speed for the airplane was approximately 82 knots. The airplane was approved for flight into known icing conditions. Examination of the airframe, engines and propellers revealed no pre-impact failures or malfunctions. The Safety Board determined that the probable cause of the accident was the pilot's failure to maintain airspeed during a climb, which resulted in a loss of aircraft control.

Pilot's Failure to Maintain Airspeed Causes Canadian Grumman G-159 Crash in Linneus, Maine
On July 19, 2000, a Grumman G-159 aircraft impacted the ground in Linneus, Maine. There were two fatalities. The airplane was in cruise flight at 16,000 feet, in instrument meteorological conditions. About two minutes after the crew ceased cross-feeding due to a fuel imbalance, the left engine experienced a total loss of power. About one minute later, the co-pilot indicated to the pilot-in-command (PIC) that the airplane was losing airspeed, and about 15 seconds later, the co-pilot remarked "keep it up, keep it up." Shortly thereafter, the airplane departed controlled flight and impacted terrain. Fire and impact forces destroyed the airplane. Examination of the left engine revealed no evidence of any pre-impact failures that would have accounted for an uncommanded in-flight shutdown. A SIGMET for potential severe clear icing was effective for airplane's flight path; however, the flight crew did not report or discuss any weather-related problems around the time of the accident. At the time of the accident, the airplane was above its single-engine service ceiling. The PIC had accumulated approximately 6,000 hours of total flight experience, of which, about 500 hours were as PIC in make and model. The co-pilot had approximately 600 hours of total fight experience, of which, 300 hours were in make and model. The Safety Board determined that the probable cause of the accident was the PIC's failure to maintain minimum control airspeed, which resulted in a loss of control. Factors in this accident were clouds and a loss of engine power for undetermined reasons, while in cruise flight above the airplane's single engine service ceiling.

In the Northwest Region

Loss of Engine Power Causes Boeing S-307 Stratoliner Crash near Seattle, Washington
On March 28, 2002, a Boeing S-307 Stratoliner, N19903, registered to the National Air & Space Museum and operated by The Boeing Company as a 14 CFR Part 91 maintenance check and proficiency flight, ditched in the waters of Elliott Bay near Seattle, Washington, following a loss of engine power on all four engines. The airplane was substantially damaged but the two airline transport pilots, and two airframe and powerplant mechanics seated at the flight engineer and avionics stations were not injured. The flight had departed Everett, Washington and was destined for Seattle, Washington. The crew had originally planned to practice landings at an airport about 20 minutes away, then stop, refuel the airplane, and return to the original departure airport. Prior to the flight, the crew discussed fuel endurance, which was calculated to be two hours based on the captain's knowledge of the airplane's fuel consumption, and the quantity of fuel indicated on the gauges. The fuel tanks were not dipped. On approach back to the original departure airport, power was lost in all four engines and the aircraft was ditched in Elliott Bay near Seattle. The Safety Board determined that the probable cause of the accident was the loss of all engine power due to fuel exhaustion that resulted from the flight crew's failure to accurately determine onboard fuel during the pre-flight inspection. A factor contributing to the accident was a lack of adequate crew communication regarding the fuel status.

In the Southwest Region

Inadequate Crew Coordination Causes Rockwell NA 265-65 Crash on Molokai, Hawaii
On May 10, 2000, a Rockwell NA 265-65 Sabreliner corporate jet collided with mountainous terrain about three nautical miles southwest of the Kaunakakai Airport, on the island of Molokai, Hawaii. The airplane was on a night visual approach for landing; it was destroyed in the collision sequence and post crash fire. Two professional flight crewmembers and four passengers were killed. The flight originated on May 9th and made several stops in South America, Easter Island, and Tortegegie Island before arriving in Tahiti, where it remained overnight. On May 10th, it departed from Tahiti at and made an en route refueling stop at Christmas Island.

The Safety Board determined that the probable cause of the accident was inadequate crew coordination that led to the captain's decision to discontinue the instrument approach procedure and initiate a maneuvering descent solely by visual references at night in an area of mountainous terrain. The crew failed to review the instrument approach procedure and the copilot failed to provide accurate information regarding terrain clearance and let down procedures during the instrument approach.

On-going Regional Aviation Investigations

In the Alaska Region

China Airlines Airbus A340-300 Incident in Anchorage, Alaska
On January 25, 2002, China Airlines flight 11, an Airbus Industrie A-340-300, was cleared for takeoff from the Ted Stevens Anchorage International Airport, Anchorage, Alaska to the Chiang Kai-shek International Airport, Taipei, Taiwan when it departed the taxiway. The three cockpit crewmembers, 12 cabin crewmembers, and 237 passengers, were not injured. The airplane was not damaged.

Information received from the FAA indicated the airplane began to taxi for takeoff from the gate area of the north terminal for runway 32. The airplane proceeded southbound on taxiway Romeo, and made a right turn from Romeo onto taxiway Kilo. The airplane was cleared for takeoff on runway 32 as it made the right turn from taxiway Romeo onto Kilo. The airplane should have continued west on Kilo to the approach end of runway 32. Instead, it accelerated west on taxiway Kilo. The local controller and an Anchorage departure radar controller noticed the departure roll. A radio call to the crew to abort the takeoff was not made by either controller. The available taxiway distance from Romeo to the end of Kilo is about 6,800 feet. After departure, main landing gear tire impressions were found in a snow berm at the end of taxiway Kilo. The airplane proceeded to Taipei and landed without incident.

In the Central Mountain Region

America West Airlines CRJ Flight Control Malfunction in Fresno, California
On July 18, 2000, America West Express flight 6088, a Bombardier Canadair Regional Jet CL-65, N97325, experienced an autopilot pitch trim master caution light followed by an autopilot pitch trim nose down master caution light, and a pitch trim malfunction. The flight crew elected to divert to the Fresno-Yosemite International Airport, Fresno, California. The airplane, operated by Mesa Airlines d.b.a. America West Express was not damaged. The three crewmembers and 20 passengers were not injured. The flight departed the Monterey Peninsula Airport, Monterey, California, at 1820, and was scheduled to terminate at the Phoenix Sky Harbor International Airport, Phoenix, Arizona. Visual meteorological conditions existed for the scheduled domestic passenger flight and an instrument flight rules flight plan had been filed.

The pilot reported that while climbing through flight level 200 the autopilot pitch trim master caution warning light and the autopilot pitch trim nose down master caution warning light illuminated. The captain stated that he disengaged the autopilot in accordance with the airplane flight manual procedures in an attempt to resolve the problem. The flight crew said they had to maintain approximately two inches of forward pressure on the flight control column to maintain level flight. The first officer stated that they were able to manually adjust the stabilizer trim up and down, but at no point would the trim go below four units of trim. Investigation disclosed that an internal failure in horizontal stabilizer trim actuator) and the associated motor control unit resulted in Channel 1 of the system being inoperative. Channel 1 did not disengage or automatically switch to Channel 2 as intended by the manufacturer. An anomaly in the system design precluded this failure message from being displayed for the flight crew and they had no information alerting them to the necessity of manually switching the control channel.

Aerospatiale AS 355F1 Air Tour Helicopter Accident in Kahului, Hawaii
On July 21, 2000, an Aerospatiale AS 355F1, N510TG, operated by Blue Hawaiian Helicopters, collided with mountainous terrain in the Lao Valley, about nine miles west of Kahului, Hawaii. The helicopter was operated as an on-demand air taxi sightseeing flight under the provisions of 14 CFR Part 135. A company flight plan was filed for the planned 30-minute long tour flight. Impact forces and a post-impact ground fire destroyed the helicopter. The commercial pilot and six passengers were killed. Weather permitting, the flight route was to encompass an area at or near the Lao Valley, which has the anecdotal reputation for being the second wettest location on earth in terms of rainfall.

A search for the overdue helicopter was initiated when it had not returned to Kahului within 10 minutes of its planned flight time. The accident site was located about 1500, near the southwestern portion of the Lao Valley. The impact site was on the north face of a 2,900-foot-high mountain, at about 2,850 feet. The helicopter's flight path was partially recorded by radar facilities. The recorded radar data showed that the helicopter had reversed course and descended just prior to the collision with the mountain. Three other tour helicopter pilots from the same operator reported they had flown within two miles of the accident site and that they modified their tour because of inclement weather conditions. As a result of this investigation, the operator agreed to make changes to its operating procedures.

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

On August 10, 2001, an American Eurocopters AS350-B2 helicopter, N169PA, using the call sign Papillon 34, collided with mountainous terrain about four miles east of Meadview, Arizona. The helicopter was operated by Papillon Grand Canyon Helicopters as an on demand air tour sightseeing flight. The helicopter was destroyed in the collision and post-crash fire. The pilot and five passengers were killed, and the other passenger was seriously injured. The flight originated from the company terminal at the McCarran International Airport, Las Vegas, Nevada, as a tour of the west Grand Canyon area with a planned stop at a landing site in Quartermaster Canyon. The helicopter was en route back to Las Vegas when the accident occurred. At an elevation of 4,041 feet, the accident site is on the western side of an escarpment known as Grand Wash Cliffs in a steeply sloped mountainous area covered with sparse brush, hard dirt, loose rocks, and Joshua trees indigenous to the high Arizona desert. The average elevation of the top of the mesa formed by Grand Wash Cliffs is about 5,500 feet. Surveys of all possible approach paths to the accident site were conducted and no ground contact evidence was found. All ground scars were confined to the immediate vicinity of the wreckage mass within the approximate diameter of the main rotor. The skids were spread and the cross tubes had rotated rearward in the fuselage attach clamps.

Mid-Air Collision of Two Grumman TS-2F Over Hopland, California

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

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

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

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

On July 18, 2002, a Consolidated Vultee P4Y-2, N7620C, under contract to the Department of Agriculture Forest Service and piloted by a commercial pilot, was destroyed when it impacted into mountainous terrain six miles southwest of Estes Park, Colorado. A post-crash explosion and fire ensued. Prior to the impact, the airplane's left wing separated and aircraft control was lost while maneuvering to deliver fire retardant on the Big Elk wildfire, burning in an area northwest of Lyons, Colorado. Visual meteorological conditions prevailed at the time of the accident. The pilot and second pilot on board the airplane were killed. A witness on the ground took a series of photographs showing the airtanker's left wing separating at the wing root and the remaining airplane subsequently entering a 45-degree dive to the ground in a counter-clockwise roll. An examination of the airplane wreckage showed extensive areas of preexisting fatigue in the left wing's forward spar lower spar cap, the adjacent spar web, and the adjacent area of the lower wing skin. The airplane was manufactured in 1945 and was in military service until 1956. In 1958, the airplane was converted to civilian use as an airtanker and served in that capacity to the time of the accident.

American West Airlines Airbus A320 Accident in Phoenix, Arizona

On August 28, 2002, an Airbus Industrie A320-231, N635AW, operating as America West Airlines flight 794, experienced a loss of directional control during landing rollout at the Phoenix Sky Harbor International Airport, Phoenix, Arizona. While decelerating about midfield, the airplane veered right off runway 8, crossed the apron east of intersection B8, and experienced the collapse and partial separation of its nose gear strut assembly upon traversing the dirt infield area south of the runway between intersections B9 and B10. The airplane was substantially damaged. On board were two flight crewmembers, three flight attendants, and 154 passengers (including four lap children). Ten persons reported injuries; the captain sustained a minor injury, eight passengers (including one lap child) sustained minor injuries, and one passenger reported a serious injury.

The captain reported that he was handling the flight controls, and the airplane touched down on the centerline of the runway about 1,200 feet beyond its threshold. During rollout, he positioned both thrust levers into reverse but then took the number one thrust lever out of the reverse position. He then moved the number two thrust reverser out of reverse and applied full left rudder and full left brake in an effort to maintain directional control. He indicated, however, that the airplane continued swerving to the right until it departed the pavement and slid to a stop in a nose-down attitude with a collapsed nose gear strut. There was no fire. No mechanical or system failures have been identified; however, eight days before the accident, maintenance personnel had deactivated the number one thrust reverser. The investigation is focusing on crew training and flight standardization issues. The airline has made several operating procedural changes.

In the Mid-Atlantic Region

Medevac Helicopter Accident in Cleveland, Ohio

On January 18, 2002, in Cleveland, Ohio, a medevac helicopter struck a building and impacted the ground following lift-off. The helicopter lifted off the hospital's rooftop helipad at night. The paramedic said that when the helicopter was about 20 feet above the helipad, and while he was programming the GPS receiver, a "sudden gust" of wind pushed the helicopter from directly behind. He was not alerted to anything unusual until he looked up and noticed the helicopter's close proximity to a 16-floor brick building. The pilot then made a rapid right cyclic input to avoid hitting the building, but the helicopter struck the building, and fell about 13 floors to ground level. The paramedic did not see or hear any warning lights, horns or unusual noises, and was not aware of any mechanical problems with the helicopter. A police officer who flew two missions in the local area prior to the accident said

the wind speed at 500 feet was at least 25 knots and gusting from the south/southwest. An FAA inspector who stood on the rooftop helipad after the accident said the wind gusts were about 20-30 knots from the southwest and they swirled around the heliport.

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

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

In the North Central Region

Canadair Challenger 600 Accident in Wichita, Kansas

On October 10, 2000, a Canadair Challenger 600-2B16 airplane, operated by Bombardier Incorporated, was destroyed on impact with terrain and an airport perimeter fence during initial climb at the Wichita Mid-Continent Airport, Wichita, Kansas. The airplane came to rest on a two-lane, north-south road located along the western perimeter of the airport. The test flight was not operating on a flight plan. The pilot and flight test engineer were killed and the copilot was seriously injured.

Learjet 25D Accident in Salina, Kansas

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

In the Northeast Region

Lear 25 Crash in Ithaca, New York

On August 24, 2001, a Learjet 25, N153TW, operated by Ameristar Jet Charter, Inc., was destroyed after impacting terrain while departing from the Tompkins County Airport, Ithaca, New York. The certificated airline transport pilots were killed. Night instrument meteorological conditions prevailed and an instrument flight rules flight plan was filed for the 14 CFR Part 135 on-demand cargo flight, destined for the Jackson County-Reynolds Field, Jackson, Michigan.

Mid-Air Collision Between a Piper and a Mooney Over Caldwell, New Jersey

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

In the Southeast Region

General Dynamics F-16 and Cessna 172 Midair Collision Over Bradenton, Florida

On November 16, 2000, a General Dynamics F-16 military jet airplane operated by the United States Air Force and a civilian Cessna 172 were involved in a midair collision in the vicinity of Bradenton, Florida. The F-16 was one of two airplanes operating on a low altitude training mission. No flight plan was filed for the Cessna 172. The pilot of the F-16 successfully ejected and the Cessna pilot (who was airline transport pilot qualified) was killed. Witnesses stated they heard the sound of approaching jets. They looked up and observed the first jet flying towards the south followed by the second jet located to the left and slightly lower than the first jet. They also observed a small civilian airplane flying from west to east perpendicular to the military jets. The second collided with the civilian airplane and initially continued southbound. The airplane was observed making a right turn, and then turning back to the left. A parachute was observed, and the airplane entered into a flat spin to the left and disappeared from view below the trees. An explosion was heard, followed by heavy dark smoke rising above the terrain.

In the Southern Region

CRJ-200 Atlantic Southeast Airlines Accident in Atlanta, Georgia

On June 2, 2002, Atlantic Southeast Airlines flight 4509, a Bombardier Canadian Regional Jet, CL6002B-19, experienced a left main landing gear failure while landing at the Atlanta Hartsfield International Airport, in Atlanta, Georgia. The pilot, first officer, flight attendant, and 50 passengers were not injured. According to the flight crew, the approach to landing was uneventful. Upon landing the pilot deployed the thrust reversers and felt the airplane tilt to the left. At first he believed that he had a flat tire. However, as the aircraft continued down the runway, he realized that the left gear had collapsed. As the airplane began slowing, the Captain notified the tower that he had a problem and ordered the flight attendant to prepare the cabin for an emergency evacuation. According to the flight attendant, the evacuation progressed smoothly. Examination of the airplane found that the left main landing gear trunnion fractured due to corrosion just below its attach point to the wing spar.

International Aviation Accident Assistance

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

Swissair MD-11 Accident in Nova Scotia, Canada

The NTSB is assisting the Transportation Safety Board of Canada in its investigation of the September 2, 1998 crash of a Swissair MD-11 off the coast of Nova Scotia. Flight 111, en route from John F. Kennedy Airport, to Geneva, Switzerland, crashed in the North Atlantic killing all 229 passengers and crew.

GulfAir A320 Accident in Manama, Bahrain

The NTSB is assisting the government of Bahrain in its investigation of the August 23, 2000 crash of a GulfAir A320. The aircraft crashed at sea during a go around on approach to Manama, Bahrain, killing 143.

Singapore Airlines 747 Accident in Taipei, Taiwan

The NTSB is assisting Singapore authorities in its investigation of the October 31, 2000 crash of a Singapore Airlines 747 as it attempted to take off from Taipei, Taiwan, and struck a barrier. There were 82 fatalities.

Learjet Accidents in Germany and France

The NTSB is supporting authorities of the governments of Germany and France in separate accidents that occurred in 2000 and 2001. Both accidents exhibited similar scenarios of an engine-related anomaly, a precautionary landing, and a crash during the attempted landing. Both accidents resulted in fatalities and destruction of the airplanes.

Thai Airways 737 Explosion in Bangkok, Thailand

The NTSB is providing technical support to the Government of Thailand's investigation of a March 3, 2001 explosion and fire that destroyed a Thai Airways International 737-400 that was sitting at a gate at Don Muang International Airport, Bangkok. A flight attendant aboard the plane was killed and the airplane destroyed.

Express One International Boeing 727 Accident in Micronesia

At the request of the Federated States of Micronesia (FSM), the NTSB is investigating a landing accident that occurred on March 11, 2001, at Pohnapei Airport, FSM. The airplane landed short of the island runway, the right main landing gear separated, and the airplane skidded off the right side of the runway. No injuries occurred to the three crewmembers on the cargo flight; the aircraft sustained substantial damage.

Cessna 402B Crash in the Bahamas

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

CASA 235 Crash in Malaga, Spain

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

Boeing MD-87 and Cessna Citation Collision in Milan, Italy

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

Air China B-767 Crash in Pusan, Korea

On April 15, 2002, the NTSB dispatched a team of investigators to assist the Government of South Korea in its investigation of the crash of an Air China Boeing 767-200ER near the city of Pusan. Flight 129 from Beijing had apparently been diverted from Pusan to Seoul due to adverse weather conditions when the crash occurred. The aircraft departed Beijing as flight CA129 for Pusan's Kimhae Airport. While turning onto final approach to Runway 18R at Kimhae, the aircraft impacted rising, wooded terrain, broke apart, and caught fire. Local authorities report that 128 of the 167 persons aboard were killed.

Air China crash site.

EgyptAir B-737 Crash in Tunis, Tunisia

On May 7, 2002, the Safety Board sent a team of investigators to assist the Government of Tunisia in its investigation of the crash of an EgyptAir Boeing 737-500 (SU-GBI). Fourteen of the 62 individuals on board were killed when the aircraft crashed while on approach to Tunis-Carthage Airport runway 11 while on a flight from Cairo. Shortly before the accident, the captain reported a landing gear malfunction, and had performed a low pass over the airfield. The aircraft crashed during its second approach.

EgyptAir B-737 crash site.

China Northern Airlines MD-82 in Beijing, China

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

China Airlines Boeing 747-200 in the Straits of Taiwan

On May 25, 2002, China Airlines flight 611, a Boeing 747-200, crashed into the straits of Taiwan near the southwest end of Makung Island, Taiwan. Preliminary radar data indicates that the 23-year-old airplane apparently broke up at about 30,000 feet. All 225 persons onboard were killed.

Recovery of China Airlines' wreckage.

DHL Boeing 757 and Bashkirian Airlines TU-154 Over Uberlingen, Germany

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

Public Hearings

Emery Worldwide Airlines Flight 17 Accident, February 16, 2000

On May 9 and 10, 2002, the NTSB conducted a public hearing as part of its ongoing investigation into the fatal crash of an Emery Worldwide Airlines DC-8 cargo aircraft near Rancho Cordova, California. Board Member John Goglia chaired the hearing.
Emery Worldwide Airlines flight 17, a McDonnell Douglas DC-8-71 (N8079U), on a scheduled cargo flight from Sacramento, California to Dayton, Ohio, with three crew members aboard, crashed shortly after takeoff from Mather Field on February 16, 2000. The aircraft was destroyed by impact forces and post-crash fire; there were no survivors.

The major issues examined at the hearing centered on aircraft maintenance and the associated oversight by airline and FAA personnel. The hearing originally was planned for August 2001 but was postponed when Emery suspended air carrier operations. A Board of Inquiry, made up of senior Safety Board staff, and a technical panel of NTSB investigators led the questioning of witnesses, who were also questioned by representatives of parties to the hearing: FAA, the Boeing Company, Emery Worldwide Airlines, Tennessee Technical Services and the Air Line Pilots Association.

American Airlines Flight 587 Crash, November 12, 2001

The Safety Board convened its public investigative hearing on the crash of American Airlines flight 587 on October 29, 2002. The hearing lasted four days and was held in the NTSB Board Room and Conference Center.

On November 12, 2001, American Airlines flight 587, an Airbus A300-600 on a scheduled flight to Santo Domingo, crashed into a neighborhood in Belle Harbor, New York shortly after takeoff from John F. Kennedy International Airport, killing all 260 persons aboard and 5 on the ground. The plane's vertical stabilizer and rudder and both engines separated from the aircraft before it impacted the ground.

Safety issues examined at the hearing were:

- certification standards for the vertical stabilizer and rudder;
- continuing airworthiness inspection procedures;
- airplane manufacturers' rudder system design philosophies;
- pilot training; and
- the potential role of wake turbulence in the accident sequence.

Technical witnesses were called to offer testimony addressing one or more of the identified issues. They were questioned by the Board Members; a technical panel made up of investigators from the NTSB and its counterpart agency in France, the BEA (Bureau D'Enquetes et D'Analyses pour la Securite de L'Aviation Civile); and representatives of the parties to the investigation, including the FAA, Airbus, American Airlines, and Allied Pilots Association.

Acting Chairman Carmody chaired the en banc hearing with all Board Members participating.

Office of Highway Safety

Highway transportation accidents have a significant impact on American society. In 2001, more than 42,100 people were killed and more than 3 million were injured in motor vehicle accidents. The economic costs are also staggering and easily exceed $130 billion in medical costs, property damage and lost wages. The Safety Board is charged with mitigating those costs by improving the safety of the public with recommended changes in government and industry transportation policies, practices and systems through independent accident investigations. In that role, the Board attempts to determine first what happened in an accident and then, by establishing a probable cause, why it happened.

We devote our resources to in-depth investigations of those accidents that have a significant impact on the public's confidence in highway transportation safety, generate high public interest, and highlight national safety issues. Historically, those types of accidents have been primarily single major events after which the Board made recommendations on issues arising from the accident circumstances. However, those accidents generally involved large loss of life and property damages, and in some cases may not have been representative of the typical highway accidents occurring daily nationwide. As a result, the Office of Highway Safety also attempts to identify emerging trends to identify potential causes and recommend appropriate countermeasures by conducting safety studies and examining accident data.

Completed Highway Investigations

Driver Fatigue Causes Bus Accident in San Miguel, California

On January 2, 2001, a West Valley Charter Lines bus, used to transport students to the California School for the Deaf, Fremont, departed the right side of the road, crossed the asphalt shoulder, and struck the terminal end of a W-beam breakaway cable guardrail. The bus then clipped the end of the concrete bridge rail and plunged about 23 feet to the roadway below. The bus began to roll, and the right front of the bus struck the roadway below. It continued to roll and turn toward the right after impacting the ground and came to rest on its left side, having rolled 270 degrees and yawed (rotated laterally) 180 degrees. Two passengers were ejected and came to rest underneath the bus, and were killed. Three passengers remained inside the bus, two sustained serious injuries and one sustained minor injuries.

Body damage to nonconforming bus involved in the San Miguel accident.

On February 19, 2002, the NTSB determined that the probable cause of the accident was driver fatigue. Contributing to the accident was the transportation schedule established by the school, and a lack of knowledge by the driver of the effect of inverted sleep/rest cycles. Contributing to the severity of the injuries in this accident was the use of a nonconforming bus for student transportation.

Loss of Stability on Icy Roads Causes 15-Passenger Van Crash in Joliet, Illinois

On January 26, 2001, a 2000 15-passenger van, owned and operated by the Salvation Army, departed a Salvation Army facility in Chicago and after having traveled some 32 miles, the van was involved in a fatal crash, killing all 11 van occupants. Witnesses reported that the van was traveling in the southbound left lane of Interstate 55 near milepost 250 when it slid out of control on the icy road surface, crossed the 40-foot-wide median, and was struck by a tractor-trailer traveling in the northbound left lane of I-55.

On February 22, 2002, the NTSB determined that the probable cause of the accident was the Salvation Army van's loss of lateral stability when it encountered icy roadway conditions. Contributing to the loss of stability was the driver's failure to reduce his speed after passing several other accidents and slower moving traffic on the icy roadway surface. The driver's use of an over-the-counter antihistamine may have contributed to this operational error.

Excessive Speed Causes 15-Passenger Van Rollover in Karnack, Texas

On February 10, 2000, a 1999 15-passenger bus/van departed Prairie View A&M University near Hempstead, Texas. The van was carrying a track coach, an athletic trainer, and eight student athletes, en route to a men's indoor track meet at Arkansas State University in Pine Bluff, Arkansas, a distance of approximately 480 miles.

The NTSB studies emerging trends and investigates accidents to find potential root causes of highway accidents and their counter measures.

A 21-year-old student athlete, said to be familiar with the route, was driving, and the van was traveling north on Texas State Highway 43, a two-lane highway near Karnack. The van was traveling at a police-estimated speed of approximately 82 mph in a posted 65-mph zone when it swerved sharply to the right, and went out of control. The van driver and three of the five ejected occupants were killed. The remaining six passengers, including the two other ejected occupants, were seriously injured.

On May 9, 2002, the NTSB determined the probable cause of the accident was the excessive speed of the van, in combination with the operating maneuvers initiated by the van driver. Contributing to the accident was the lack of oversight regarding the transportation of student athletes by the Prairie View A&M University. Contributing to the severity of the injuries were the failure of the State of Texas to require the use of restraints in all seating positions and the failure of the van passengers to use the available restraints.

Driver Incapacitation Causes Work Zone Accident in Jackson, Tennessee

Jackson, Tennessee accident scene.

About 8 a.m. on July 26, 2000, a work zone project began near milepost 85.6 on east-bound Interstate Highway 40. This was the third day of an operation that consisted of milling rumble strips into the shoulder pavement. The three construction vehicles involved were positioned along the outside shoulder of the interstate. Two Tennessee Highway Patrol (THP) vehicles, with their emergency lights flashing, were also present to assist with enforcement and traffic control. The THP vehicles were stopped 450 feet and 950 feet, respectively, behind the construction vehicles along the right lane.

About 8:52 a.m., an eastbound 1999 International truck tractor pulling a loaded semitrailer, and traveling at a driver-estimated speed of 65 mph in a 55-mph work zone, collided with the trailing THP vehicle. Witnesses reported that the patrol car exploded and caught fire at impact. The patrol car was pushed approximately 192 feet before it came to rest in the median. The tractor-semitrailer continued through a 61-foot depressed earthen median and into the westbound lanes, where it collided with a 1997 Chevrolet Blazer. The tractor-semitrailer then continued across the travel lanes and came to rest in a wooded area on the north side of I-40. The state trooper in the THP vehicle was killed, and the Chevrolet driver was seriously injured.

On May 14, 2002, the NTSB determined that the probable cause of the accident was the driver's incapacitation, owing to the failure of the medical certification process to detect and remove a medically unfit driver from service. Contributing to this accident were the lack of planning and coordination between the TDOT, its contractors, and the THP regarding work zone projects; the lack of traffic control training, specific to highway work zone operations, provided to THP officers; and the failure of the TDOT and its contractors to protect all work zone personnel and road users.

As a result of this accident investigation, the Safety Board made recommendations to the Federal Highway Administration (FHWA), the NHTSA, the TDOT, the National Sheriffs' Association, the International Association of Chiefs of Police, and the American Association of State Highway and Transportation Officials (AASHTO).

Failure to Ensure Safe Load Passage Causes Grade Crossing Accident in Intercession City, Florida

On November 17, 2000, a 23-axle, heavy-haul vehicle, operated by Molnar Worldwide Heavy Haul Company, was delivering a condenser to the Kissimmee Utility Authority Cane Island Power Plant. The private access road to the plant crossed over a single railroad track owned by CSX Transportation, Inc. As the vehicle, traveling between one and three mph, crossed the tracks, the crossing warning devices activated and the gates came down on the load. Seconds later, Amtrak train 97 collided with the right side of the rear towed four-axle tractor. No injuries occurred. The collision destroyed the tractor and caused over $200,000 damage to the train and crossing signals.

Accident involved a 23-axle, heavy-haul vehicle similar to one pictured.

On July 23, 2002, the NTSB determined that the probable cause of the collision was the failure of the Kissimmee Utility Authority, its construction contractors and subcontractors, and the motor carrier to provide for the safe passage of the load over the grade crossing.

Accident scene at Intercession, Florida.

Safety issues identified in this accident:

- ineffective execution of the roles and responsibilities of the power company and its contractors and subcontractors, the Florida Department of Transportation, the motor carrier, the truck driver, and pilot car drivers in planning and effecting the movement of this oversize load;
- adequacy of the railroad notification requirement;
- consistency and availability of information regarding railroad notification; and
- lack of low-clearance warning signs and standard 1-800 emergency number signs.

As a result of this accident investigation, the Safety Board made recommendations to the FHWA, the Federal Motor Carrier Safety Administration (FMCSA), AASHTO, the National Committee on Uniform Traffic Laws & Ordinances, the Kissimmee Utility Authority, and all Class 1 and regional railroads.

Poorly Maintained Brakes Cause Semitrailer to Collide with School Bus in Mountainburg, Arkansas

On May 31, 2001, a southbound truck-tractor semitrailer exited Interstate 540 near Mountainburg, Arkansas. The driver was unable to stop at the stop sign at the bottom of the exit ramp. The 79,040-pound combination unit was traveling at approximately 48 mph when it collided with a 65-passenger, 1990 Blue Bird Corporation school bus operated by the Mountainburg Public Schools.

The tractor-tractor following the accident in Mountainburg, Arkansas.

Three school bus passengers seated across from the impact area were killed; one was partially ejected. Two other passengers, one of whom was seated in the impact area, received serious injuries, and four passengers had minor injuries. The school bus driver and the truck driver both sustained minor injuries.

On September 4, 2002, the Safety Board determined that the probable cause of the accident was the reduced braking efficiency of the truck's brakes, which had been poorly maintained and inadequately inspected. Contributing to the school bus passengers' injuries during the side impact were incomplete compartmentalization and the lack of energy-absorbing material on interior surfaces. As a result of its investigation, the Safety Board made recommendations to the FMCSA, NHTSA, the Commercial Vehicle Safety Alliance, the National Fire Protection Association, and spring brake manufacturers. The Safety Board also reiterated a recommendation to DOT.

Bus Driver's Fatigue Causes Motorcoach Accident in Pleasant View, Tennessee

On August 19, 2001, a Greyhound motorcoach was traveling eastbound on Interstate Highway 24 near the town of Pleasant View, Tennessee (about 25 miles from its final destination traveling at or near the 70-mph speed limit in the right-hand lane when it slowly drifted across the left-hand lane, over the rumble strips, off the roadway, and into the grassy median. The bus eventually overturned onto its right side, slid 198 feet on the grassy roadside, and came to rest. During the overturn, one passenger was partially ejected and killed. The driver and the other 43 passengers received minor to serious injuries. The driver reported no mechanical problems with the bus, and a postcrash inspection indicated no defects in the brakes, steering, tires, or suspension. According to the police report, no adverse weather conditions existed at the time of the accident. On December 11, 2002, the Safety Board determined that the probable cause of the accident was driver fatigue due to inadequate sleep in the 24-hour period preceding the accident.

Driver's Inability to Control Motorcoach in Icy Conditions Cause Rollover in Canon City, Colorado

On December 21, 1999, a 1999 Setra 59-passenger motorcoach, operated by Sierra Trailways, Inc., was traveling eastbound on State Highway 50 along a seven-mile-long downgrade west of Canon City, Colorado, when it began to fishtail while negotiating a curve. At the time, the motorcoach was traveling at 63 mph. The speed limit on the descent was 65 mph, with an advisory speed limit of 55 mph on the curves along this section of the roadway. The driver recovered the vehicle from the fishtail, and the motorcoach was traveling about 70 mph when the driver lost control of the vehicle on a curve. The motorcoach drifted off the right side of the road, struck a roadside delineator, returned to the road, rotated clockwise 180 degrees toward the centerline, and departed the north side of the roadway backward. The vehicle rolled at least 1.5 times down a 40-foot-deep embankment and came to rest on its roof. The driver and two passengers were killed; 33 passengers sustained serious injuries, and 24 sustained minor injuries.

When the motorcoach fishtailed, the transmission retarder was engaged, even though witnesses reported sporadic ice and snow. Following this fishtail, the driver shifted into neutral, thereby disengaging both the transmission retarder and eliminating any retarding torque provided by the transmission. As the motorcoach continued to descend the roadway, the driver lightly applied the service brakes (now his only means of braking) several times. Why this sequence of events occurred was the focus of the Safety Board's investigation.

Although the busdriver had received little training from Setra or Sierra Trailways on the functional characteristics of transmission retarders, he had substantial experience driving

commercial vehicles, including at least 10 years' driving motorcoaches. He had made approximately 50 trips to Colorado ski resorts, including seven trips to Crested Butte, using engine retarder-equipped motorcoaches. Even though his final trip to Crested Butte was his first using this transmission retarder-equipped motorcoach, the driver had recently logged about 62,000 miles on an identically equipped motorcoach. Additionally, the Setra and Allison operator's manuals specifically warn against retarder use during slippery road conditions.

The Safety Board conducted extensive postaccident analyses on the accident vehicle. No mechanical problems were found with the transmission or any other vehicle components, and although some minor problems may have existed with the service brakes, these problems would not have significantly reduced the busdriver's ability to brake. Additionally, data from the vehicle's transmission ECU and the ABS ECU were of limited diagnostic and investigative value. The Safety Board could not determine why the driver had the retarder engaged during icy roadway conditions, why he shifted the transmission into neutral after the fishtail, and why he chose not to apply the brakes more vigorously prior to the accident

On December 17, 2002, the Safety Board determined that the probable cause of the accident was the motorcoach driver's inability to control his vehicle under the icy conditions of the roadway; the driver initiated the accident sequence by inappropriately deciding to use the retarder under icy conditions. Why the bus driver did not, or was unable to, slow the vehicle before the crash could not be determined. As a result of this accident, the Safety Board made safety recommendations to the FMCSA, the United Motorcoach Association, the American Bus Association, the Institute of Electrical and Electronics Engineers, and the Society of Automotive Engineers.

On-going Highway Investigations

15-Passenger Van Rollovers in Texas and North Carolina

The NTSB continues to investigate two accidents involving 15-passenger vans, one in Henrietta, Texas in May 2001 and the second in Randleman, North Carolina in July 2001. In each case, vans operated by church groups had left rear tire blowouts and subsequent rollovers, killing five and injuring 21 in the two accidents. These complicated investigations are examining issues associated with consumer awareness of tire pressure and weight limits for 15-passenger vans; how to control blowouts; seatbelt use requirements for 15-passenger vans; structural integrity and/or roof crush standards; licensing and training of 15-passenger van drivers.

Barge/Bridge Accident on South Padre Island, Texas

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

Schoolbus/Work Zone Accident in Omaha, Nebraska

The NTSB continues to investigate an accident in Omaha, Nebraska in October 2001 involving a school bus with 25 high school students and three adults. The schoolbus was traversing a curve on a bridge that was part of a workzone as a motorcoach entered the curve from the opposite direction. The schoolbus then struck a guardrail and a bridge rail,

ultimately traveled off the bridge and fell 49 feet to a creek below. Three students and one adult were killed and the remaining passengers received injuries ranging from critical to minor.

Work Zone Accident in Monaca, Pennsylvania

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

SUV Crossover Accident in Largo, Maryland

The NTSB continues to investigate an accident near Largo, Maryland in February 2002 involving an SUV, operated by an inexperienced driver, unfamiliar with the vehicle who was talking on a cellular telephone, that went out of control, swerved across the Washington Beltway median, vaulted over a guard rail and struck a minivan traveling in the opposite direction. Five people were killed.

Multiple Vehicle Accident in Smoky Conditions in Cuervo, New Mexico

The NTSB continues to investigate an accident near Cuervo, New Mexico in March 2002 that involved 12 vehicles: cars, trucks, an RV, and a schoolbus that collided on an interstate when visibility was reduced by smoke that blew across the roadway. The smoke came from a brush fire started by a railroad work crew replacing rail. The accident resulted in seven fatalities, three serious injuries, 15 minor injuries, and one person uninjured.

15-Passenger School Van Accident in Memphis, Tennessee

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

Barge/Bridge Accident in Webbers Falls, Oklahoma

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

NTSB investigators on scene at Oklahoma bridge collapse.

Motorcoach/Tractor-trailer Accident in Loraine, Texas

The NTSB continues to investigate an accident near Loraine, Texas that occurred in June 2002. A Greyhound bus ran into the back of a tractor-trailer on an interstate highway. The bus was traveling at 67 mph and the tractor-trailer, which had just exited a rest area, was traveling at 30-40 mph. The bus driver swerved to the left before impact and was injured. Three passengers died and three others were seriously injured.

Chartered Motorcoach Accident in Victor, New York

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

Multiple Passenger Car Accident in Hagerstown, Maryland

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

Office of Marine Safety

The NTSB is authorized to investigate marine accidents involving foreign vessels in U.S. territorial waters or U.S. vessels anywhere in the world. In past years, the Board has conducted marine accident investigations as far away as the Persian Gulf and the South China Sea.

The marine accident investigation function is performed entirely by NTSB headquarters staff. To carry out its marine safety program, the Board maintains a small staff of professional investigators with maritime knowledge and experience. These investigators include licensed master mariners, marine engineers, naval architects, and human performance and survival factors specialists.

Under current marine accident selection criteria, the Board generally will investigate accidents involving:

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

In September 2002, the Safety Board and the U.S. Coast Guard concluded a new agreement setting out each agency's role in the investigation of major marine shipping accidents. With the Memorandum of Understanding (MOU) signed by NTSB Chairman Marion C. Blakey and Admiral Thomas Collins, Commandant of the Coast Guard, the two agencies resolved a long-standing uncertainty over how to determine which will lead the investigation of a major marine accident. Among its advantages, the new agreement permits the Safety Board to focus its attention on cruise ships and high-speed ferry operations, while ensuring that accidents that involve Coast Guard functions are independently reviewed.

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

Completed Major Marine Investigations

Unsafe Maintenance of Amphibious Passenger Vehicle (DUKW) Causes Accident in Hot Springs, Arkansas

On May 1, 1999, the amphibious passenger vehicle *Miss Majestic*, with an operator and 20 passengers on board, entered Lake Hamilton near Hot Springs, Arkansas, on a regular excursion tour. About seven minutes after entering the water, the vehicle listed to port and rapidly sank by the stern in 60 feet of water. Thirteen passengers, including three children, lost their lives. The vehicle damage was estimated at $100,000.

Miss Majestic being raised from Lake Hamilton, Arkansas.

The Safety Board's investigation of this accident identified several major safety issues:

- vehicle maintenance;
- Coast Guard inspections of the *Miss Majestic*;
- Coast Guard inspection guidance;
- reserve buoyancy; and
- survivability

On April 2, 2002, the NTSB determined that the probable cause of the accident was the failure of Land and Lakes Tours, Inc., to adequately repair and maintain the DUKW. Contributing to the sinking was a flaw in the design of DUKWs as converted for passenger use, that is, the lack of adequate reserve buoyancy that would have allowed the vehicle to remain afloat in a flooded condition. Contributing to the unsafe condition of the *Miss Majestic* was the lack of adequate oversight by the Coast Guard. Contributing to the high loss of life was a continuous canopy roof that entrapped passengers within the sinking vehicle.

As a result of this investigation, the Safety Board made recommendations to the USCG and the governors of New York and Wisconsin. A recommendation was also issued in advance of the report to the operating companies and refurbishers of amphibious passenger vessels.

Adopted at the same time were two brief reports on the sinkings of other amphibious passenger vessels, the *M/V Minnow* that sank in Lake Michigan in September 2000 and the DUKW No. 1 that sank in Lake Union, Washington in December 2001. These sinkings did not result in loss of life; however, they served to illustrate the systemic problems and risks involved in amphibious passenger vessel operations. The reports were published with the *Miss Majestic* report.

Inadequate Inspection and Maintenance Causes Fire on Passenger Ferry Enroute from New York to New Jersey

On November 17, 2000, a fire broke out on board the passenger vessel *Port Imperial Manhattan* as the commuter ferry, with three crewmembers and eight passengers aboard, was en route

from Manhattan to Weehawken, New Jersey. Beginning in the engine room, the fire soon burned out of control, causing the vessel to lose power and forcing passengers and crew to abandon the interior spaces. Passengers and crew were rescued by another ferry, and the burning vessel was towed to a Manhattan pier, where the fire was extinguished. One passenger was treated for smoke inhalation. The estimated cost to repair the vessel was $1.2 million.

On June 11, 2002, the Safety Board determined that the probable cause of the accident was the operator's inadequate inspection and maintenance of the vessel's electrical system. Contributing to the extent of the damage were the absence of fixed fire detection and suppression systems and the crew's lack of knowledge of proper marine firefighting techniques.

Investigators found that the fire most likely started as a result of a loose connection in a junction box in the engine room and that an access door propped open by the crew allowed it to spread to other areas of the vessel. The Board concluded that if the ferry operator, NY Waterway, had had an effective preventive maintenance program, the loose electrical connection could have been detected before it caused a fire. The Board recommended that the Coast Guard require such programs for all systems affecting the safe operation of domestic passenger vessels.

The *Port Imperial Manhattan* did not have fire detection and suppression systems protecting its engine room. A fire detection system would have alerted the crew to the presence of a fire while it was still small enough for the crew to extinguish it. Once the fire reached a free-burning stage, the crew faced a more serious and life-threatening situation. A fixed fire suppression unit in the engine room would have allowed the crew to extinguish the blaze before it spread to other parts of the vessel. Therefore, the Board recommended that fixed fire suppression systems be installed as mandatory equipment in engine rooms on all small passenger vessels in commuter and ferry service.

Port Imperial Manhattan after the fire in the Hudson River.

The Board also found that the lack of remotely operated fire pumps compromised the crew's ability to fight the fire. To activate the vessel's main fire pumps, the crew would have had to enter the engine room. However, they were not able to do so because of the fire. To remedy this problem, the Board recommended that small passenger vessels in commuter and ferry service be fitted with fire pumps capable of remote operation.

The crewmembers of the *Port Imperial Manhattan* did not use proper firefighting techniques, the Board found, and were ineffective in controlling or extinguishing the fire. The Board attributed this deficiency to a lack of adequate training and recommended that the Coast Guard establish appropriate firefighting training requirements.

The Board also concluded that the instruction and drills provided to the crew of the *Port Imperial Manhattan* did not adequately prepare them for directing and safely managing the passengers during the fire emergency. The passengers were largely left to fend for themselves while the crew was preoccupied with fighting the fire. While there were only eight passengers on board when the fire occurred, the ferry was certificated to carry as many as 350 passengers. Consequently, the Board recommended that the USCG develop detailed guidance for crewmembers on crowd management during a shipboard fire or other emergency.

The NTSB investigates accidents involving foreign vessels in U.S. waters or U.S. vessels anywhere in the world.

As a result of this investigation, the Board made 13 recommendations to the Coast Guard, the Federal Communications Commission, NY Waterway and the Passenger Vessel Association, including recommendations addressing the distribution of lifejackets on vessels, verbal safety briefings for passengers, and backup power sources for VHF radiotelephone communications systems.

Master's Failure to Use Appropriate Navigational Tools Causes Passenger Ferry Grounding in Sandy Hook Bay, New Jersey

On January 4, 2001, the passenger ferry *Finest*, with 264 persons aboard, ran aground outside the channel to the Shrewsbury River, Sandy Hook Bay, New Jersey, while en route from New York City to Highlands, New Jersey. The vessel was refloated about 4½ hours later. No one was injured in the grounding and the vessel sustained no damage.

On September 17, 2002, the Safety Board found that the probable cause of the accident was the master's failure to use appropriate navigational tools and procedures. The Board recommended that the Coast Guard install fixed beacons to augment or replace buoys at the entrance of Shrewsbury River channel. The Board also recommended that the company establish requirements that its crew members with navigational responsibilities become proficient in the use of installed navigational equipment, and that the company establish operations standards for navigation in adverse environmental conditions.

The NTSB also addressed a situation that arose after the grounding, in which the company provided passengers with free alcoholic beverages while awaiting the refloating of the vessel. The Board agreed with the Coast Guard that this practice could result in safety problems during emergency situations and recommended that the company establish a policy requiring the cessation of alcoholic beverage service during emergency situations.

Improper Installation of Lube Oil Hose Causes Fire on Passenger Ferry Enroute from New York to New Jersey

On September 28, 2001, the *Seastreak New York* was en route from Highlands, New Jersey to New York City, with 198 passengers and six crewmembers. Minutes after departing, a deckhand discovered a small fire in the starboard engineroom and was singed when the fire

flashed. Ultimately, the fixed CO^2 fire suppression activated and extinguished the fire. Using its port engines, the *Seastreak* proceeded to a nearby Coast Guard station and the passengers disembarked without further incident. There were no passenger injuries. Damages were estimated at $81,000.

On September 17, 2002, the Safety Board determined that the probable cause of the accident was improper installation of the Centinel System's lube oil hose, which allowed the hose to come in contact with the hot exhaust manifold. Contributing to the accident was the absence of guidelines from the manufacturer on the proper installation of the lube oil hose and the lack of inspection and maintenance procedures. As a result, the Safety Board issued recommendations to the ferry company and the engine manufacturer.

Speeding Coxswain Causes Coast Guard Patrol Boat to Collide with Passenger Vessel in Biscayne Bay, Florida

On January 12, 2002, a 24-foot Coast Guard patrol boat, with two crewmembers on board collided with the small passenger vessel *Bayside Blaster*, carrying two crewmembers and 53 passengers. Both Coast Guard crewmembers were ejected from their boat. The patrol boat continued running, circled to port, and struck the *Bayside Blaster* again. The unmanned patrol boat continued to circle for 10 to 15 minutes, striking a moored recreational boat two times and pilings near the shore. Five passengers on board the Blaster reported injuries. As a result of the accident the Coast Guard patrol boat was declared a total loss. Both the *Bayside Blaster* and the recreational boat sustained substantial damage.

Coast Guard patrol boat being examined after it collided with passenger vessel in Biscayne Bay.

The Board noted that the coxswain of the Coast Guard patrol boat was operating the vessel in excess of the Florida speed restrictions for no safety or law enforcement reason in a no-wake, manatee-protection zone. Even if there were no speed restrictions, the coxswain's speed was imprudent for the prevailing conditions of darkness, background lighting, and potential for encountering passenger and recreational vessels in the area of the accident. Safety Board investigators noted that the lack of Coast Guard speed restrictions for conducting routine patrols allowed coxswains too much latitude in selecting patrol speeds, which could endanger other boaters as well as Coast Guard crewmembers.

On December 17, 2002, the NTSB determined that the probable cause of the accident was the failure of the Coast Guard coxswain to operate the patrol boat at a safe speed in a restricted area. The Board also found that contributing to the accident was the lack of adequate Coast Guard oversight of nonstandard boat operations. As a result, the Board made recommendations to the Coast Guard; Boatrides International, Inc.; and the Passenger Vessel Association.

On-going Marine Investigations

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

The NTSB continues to investigate the February 2001 collision between the nuclear submarine *U.S.S. Greeneville* and the Japanese fishing training vessel *Ehime Maru*. The *Greeneville* had departed Pearl Harbor with civilian guests on board to demonstrate the ship's maneuvering capabilities. The crew was putting the submarine through a series of turns, dives, and surfacing operations. As the *Greeneville* reached the surface during an emergency ascent maneuver, its conning tower and vertical tail fin struck the *Ehime Maru*, which had left Honolulu earlier that day. Shortly after the collision, the *Ehime Maru* sank. Nine of the 35 people on board the Japanese vessel perished. The U.S. Navy subsequently towed the *Ehime Maru* to shallow water and recovered eight of the nine victims. The last victim remains missing and is presumed drowned.

Arctic Rose Sinks in the Bering Sea

The Safety Board is participating in a Coast Guard-led investigation into the loss of the *Arctic Rose* and her 15 crewmembers in the Bering Sea. On April 2, 2001, the U. S. fish-processing vessel *Arctic Rose* sank with all hands. This fishing vessel accident is one of the worst in U.S. history.

Robert Y. Love Collides with Highway Bridge in Webbers Falls, Oklahoma

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

Chilbar Collides with Wharf in New Orleans, Louisiana

The Office of Marine Safety is investigating an accident on October 24, 2002, in which the U.S.-flag tanker *Chilbar*, northbound on the Mississippi River, lost steering as it approached the downtown Riverwalk area of New Orleans. Although the vessel was headed directly toward the wharf, it veered aside just before hitting it, resulting in minor damage to both vessel and wharf, and no injuries.

Tour Boat, *Panther*, Sinks in Everglades National Park

The Safety Board is investigating the December 30, 2002, sinking of the *Panther*, a tour boat carrying 33 passengers, in the Ten Thousand Islands area of Everglades National Park, Florida. All the passengers were rescued by boats that happened to be nearby. None suffered serious injuries.

Office of Railroad, Pipeline and Hazardous Materials Investigations

Railroad Safety

Railroads are one of the nation's safest forms of transportation, but the potential for tragedy exists in railroad operations as it does in every other mode of transportation. Millions of passengers are carried each year on Amtrak and rapid rail systems, and over 1.52 million carloads of hazardous materials move by rail each year. Records show that more than 600 million train miles were completed in the year 2002, an increase of over 108 million train miles from 1997.

Since 1967, the primary responsibility for railroad accident investigation has been assigned by Congress to the NTSB. As in the other surface modes, the Board performs in-depth analyses of selected rail accidents, determines the probable causes, and issues recommendations to make changes to prevent similar accidents. 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.

The Railroad Division launched on 18 accident investigations in calendar year 2002. Because of its small staff and limited resources, the Safety Board does not investigate every rail accident reported to the Federal Railroad Administration (FRA). In order to use the Board's resources most efficiently, accident criteria have been established to help highlight accidents that have significant safety issues for investigation by the Board. Those selection criteria include:

- collisions or derailments involving passenger, rail transit, or commuter trains;
- collisions between trains resulting in a passenger or employee fatality, serious injury to two or more employees, or damage of $500,000 or more to railroad and/or nonrailroad property;
- accidents involving a passenger or employee fatality;
- accidents resulting in an explosion, fire, or release of hazardous materials resulting in an evacuation; or
- rail/highway grade crossing accidents involving railroad employees or passenger fatalities, failure of crossing protection, or derailment of the train.

Completed Major Rail Investigations

Driver's Failure to Stop at Grade Crossing Causes Amtrak/Semitrailer Accident in Bourbonnais, Illinois

On March 15, 1999, Amtrak train 59, with 207 passengers and 21 railroad employees on board, operating on Illinois Central Railroad (IC) main line tracks, struck and destroyed the loaded trailer of a tractor-semitrailer combination that was traversing the McKnight Road

Amtrak train 59, The City of New Orleans, following the collision at a grade crossing near Bourbonnais, Illinois.

grade crossing. Both locomotives and 11 of the 14 cars in the Amtrak consist derailed. The derailed Amtrak cars struck two freight cars that were standing on an adjacent siding. The accident resulted in 11 deaths and 122 people being transported to local hospitals. Total Amtrak equipment damages were estimated at $14 million, and damages to track and associated structures were estimated to be about $295,000.

On February 5, 2002, the NTSB determined that the probable cause of the collision between Amtrak train 59 and the tractor-semitrailer was the truck driver's judgment, likely impaired by fatigue, that he could cross the tracks before the arrival of the train. Contributing to the accident was Melco Transfer, Inc.'s failure to provide driver oversight sufficient to detect or prevent driver fatigue.

The safety issues identified during this investigation included truck driver performance; emergency response; and signal system performance. As a result of this investigation, the Safety Board made safety recommendations to the DOT, the FRA, all Class I and regional railroads, Amtrak, the International Association of Fire Fighters, and the International Association of Fire Chiefs.

Defective Rails Cause Amtrak Derailment in Nodaway, Iowa

On March 17, 2001, westbound Amtrak train No. 5-17, carrying 241 passengers and 15 employees, enroute from Chicago, Illinois, to Oakland, California, derailed near Nodaway, Iowa. Eleven of the 16 cars and two locomotives derailed. There was one fatality and 78 injuries.

During the investigation, a broken rail, at the point of derailment, was discovered. The broken rail came from a 16-foot, 6-inch section of replacement rail. Post-accident metallurgical analysis of pieces of replacement rail indicated that the rail had multiple internal defects. The replacement section, which was installed in February 2001, had not been ultrasonically inspected before or after installation. Furthermore, the Safety Board concluded that, relying on scanning schedules for mainline track, as required under 49 CFR 213.237, does not ensure the safety of replacement rails, which are not required to be scanned for internal defects.

On March 5, 2002, the NTSB determined that the probable cause of the derailment was the failure of the rail beneath the train, due to undetected internal defects. Contributing to the accident was the lack of a comprehensive method of ensuring that replacement rail, known as a plug, was free from internal defects. As a result of its investigation, the Safety Board made recommendations to the FRA, the Burlington Northern Santa Fe Corporation, and all other Class I and passenger railroads.

Use of Dynamic Braking in Speed Calculations Contribute to CSX Coal Train Derailment in Bloomington, Maryland

On January 30, 2000, eastbound loaded CSX Transportation (CSXT) coal train V986-26 lost effective braking while descending a section of track known as "17-mile grade" from Altamont to Bloomington, Maryland, and derailed 76 of its 80 "bathtub" high-side gondola cars when the train failed to negotiate curves at excessive speed. The derailed cars destroyed an occupied residence, killing a 15-year-old boy and seriously injuring his mother. Three other occupants of the residence escaped with little or no injury. Track and equipment damages were estimated to be in excess of $3.2 million. There was no resulting fire or hazardous materials release.

On March 5, 2002, the NTSB determined that the probable cause of the derailment was the railroad's practice of including dynamic braking in determining maximum authorized speed without providing the engineer with real-time information on the status of the dynamic braking system. The safety issues addressed in the report include:

- the determination and designation of maximum authorized train speeds with sufficient safety margins to ensure that a train can be stopped by the air brake system alone;
- locomotive engineer support and training; and
- engineer knowledge of the condition of the dynamic braking system before and during use.

As a result of its investigation of this accident, the Safety Board made safety recommendations to CSXT and all Class I railroads.

Engineer's Failure to Slow Train Contributes to Conrail/Union Pacific Train Collision in Momence, Illinois

On March 23, 1999, eastbound Consolidated Rail Corporation (Conrail) train struck the side of the lead locomotive unit of southbound Union Pacific Railroad (UP) train at a crossing of Conrail and UP tracks in Momence, Illinois.

As a result of the collision, the lead locomotive unit of the Conrail train and both locomotives and the first 16 cars of the UP train derailed. Diesel fuel from the second UP locomotive was released and caught fire, damaging the locomotive and containers on the freight cars in the immediate area. The UP estimated its damage to be $1,654,000. Conrail estimated its damage to be $137,000. Both conductors and engineers were injured.

On March 14, 2002, the NTSB determined that the probable cause of the collision was the failure of the Conrail engineer, despite the crew's difficulty in seeing the home signal, to slow the train enough to be able to stop it before it entered the crossing. Contributing to the accident was the conductor's delayed action in warning the engineer to slow the train even though the conductor realized that the train might be traveling too fast to stop at the crossing. Also contributing to the accident was the lack of any safety redundancy system capable of preventing a collision in the event of human failure.

Ineffective Track Inspections Cause UP Freight Train Derailment and Release of Hazardous Materials in Eunice, Louisiana

On May 27, 2000, 33 of the 113 cars making up eastbound UP train derailed near Eunice, Louisiana. Of the derailed cars, 15 contained hazardous materials and two contained hazardous materials residue. The derailment resulted in a release of hazardous materials with explosions and fire. About 3,500 people were evacuated from the surrounding area, which

Railroads are one of the nation's safest forms of transportation, but the potential for tragedy exists as rail traffic continues to increase.

included some of the business area of Eunice. No one was injured during the derailment of the train or the subsequent release of hazardous materials. Total damages exceeded $35 million.

On April 2, 2002, the NTSB determined that the probable cause of the derailment was the failure of a set of joint bars that had remained in service with undetected and uncorrected defects because of the UP's ineffective track inspection procedures and inadequate management oversight. The major safety issues identified in this investigation were track conditions on the UP's Beaumont Subdivision and the effectiveness of the UP's track inspection activities, including management oversight. As a result of the investigation, the NTSB made safety recommendations to the FRA, the UP, and the Association of American Railroads (AAR).

Chicago, Illinois Transit Authority Operators' Failure to Comply with Rules Causes Two Collisions

On September 4, 2002, the Safety Board adopted a special investigation report that examined two similar accidents involving Chicago Transit Authority (CTA) rapid transit trains. The Board determined that both accidents occurred after the train operators failed to comply with CTA rules designed to prevent collisions. The CTA experienced the two rear-end collisions within a two-month period in 2001. The first occurred late morning on June 17 when CTA train #104, en route from downtown Chicago to O'Hare Airport on the Blue Line, collided with a standing train (#207) near the Addison Street Station. About 75 passengers were on train #104, while train #207 was carrying about 40 passengers. Eighteen passengers, an off-duty CTA employee, and both train operators received minor injuries. CTA estimated the damages at $30,000.

The second accident occurred on August 3, during the morning rush hour, when a CTA Brown Line train, en route from Kimball Station to downtown Chicago, collided with a standing Purple line train on elevated tracks near Hill Street. Each train, made up of six passenger cars, was carrying a load of about 90 passengers per car. Police logs indicate 18 people were taken to area hospitals with minor injuries. Damages in this accident were estimated at about $136,000.

In the first accident, trains in the area were operating under a single-track detour due to maintenance work on a parallel track. The Board concluded that had the operator of train #104 stopped and contacted the control center when the signals on the train did not activate, as required by CTA operating rules, and had the control center followed existing procedures, the accident could have been prevented. Similarly, the Board found that had the operator in the August 3 accident complied with CTA rules and waited for a stop signal to clear before proceeding, this accident also could have been avoided. Looking into these rule violations, Safety Board investigators found that CTA's program for enforcement of operating rules was "inadequate" and that, "consequently, rules violations, such as those related to these two accidents were not uncommon." The Board, therefore, recommended that CTA develop new procedures "to ensure that all operating personnel are complying with CTA operating rules, including speed restrictions and signal rules."

Investigators also determined that the operators in both accidents had ample time to see the train ahead and come to a safe stop but, for "unexplained reasons," failed to do so. The Board stated that "because the transit cars involved in these accidents did not have event recorders, or had recorders with only limited capabilities, insufficient information was available to provide the basis for a thorough analysis of the actions of the two operators or the performance of the trains prior to the collisions." The Board recommended that event recorders be required on new or rehabilitated trains funded by Federal Transit Administration (FTA) grants.

The Board also noted that inspection manuals produced by the American Public Transportation Association (APTA) provide transit agencies with little specific guidance on programs

for ensuring compliance with operating rules. The Board recommended that APTA manuals be modified to include information on auditing the effectiveness of such programs.

Crew Fatigue Causes Canadian National/Illinois Central Railway Freight Train Collision in Clarkston, Michigan

On November 15, 2001, Canadian National/Illinois Central Railway (CN/IC) southbound train 533 and northbound train 243 collided near Clarkston, Michigan. A signal intended for train 533 displayed a stop indication, but train 533 did not stop before proceeding from a siding onto the mainline track. Train 243 was operating northward on a proceed signal on the main track about 30 mph when the trains collided. Both crewmembers of train 243 were killed; the two crewmembers of train 533 sustained serious injuries. The total cost of the accident was approximately $1.4 million.

On November 19, 2002, the Safety Board determined that the probable cause of the accident was the train 533 crewmembers' fatigue, which was primarily due to the engineer's untreated, and the conductor's insufficiently treated, obstructive sleep apnea. In its investigation of this accident, the Safety Board examined the adequacy of rail industry standards and procedures for identifying and reporting potentially incapacitating medical conditions. As a result of its investigation of this accident, the Safety Board made safety recommendations to the Canadian National Railway (parent organization of the CN/IC) and the FRA.

On-going Rail Investigations

Angels Flight Railway Foundation Collision in Los Angeles, California

On February 1, 2001, a collision occurred between two cars operated by the Angels Flight Railway Foundation in downtown Los Angeles. There were approximately 20 passengers in the two cars. According to emergency medical personnel, four passengers sustained critical injuries; four passengers sustained moderated injuries; two passengers sustained minor injuries, and about five passengers walked away from the accident site with unknown injuries to seek medical attention on their own. One of the critically injured passengers died later at a local hospital.

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

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

UP Coal Trains Collide in Pacific, Missouri

On December 13, 2001, an eastbound UP unit coal train with 134 loaded coal cars collided on No. 2 main track with the rear end of a standing UP unit coal train that had 135 loaded coal cars. Upon impact, the rear car of the standing train and a locomotive unit used for pushing the train derailed, fouling the adjacent main track, No. 1 main. A westbound UP train with 104 empty coal cars collided with the derailed equipment, resulting in a fire. Damage was estimated to be about $10 million. Four train crewmembers were injured.

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

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

View of accident site, Minot, South Dakota derailment.

Amtrak Derailment in Crescent City, Florida

On April 18, 2002, a northbound Amtrak Auto Train derailed on the CSXT Railroad's track. The derailment occurred in a three-degree left-hand curve south of Crescent City, Florida. The train was traveling about 56 mph. Twenty-one of the 40 cars derailed. The train was carrying 418 passengers and 34 Amtrak employees. The derailment resulted in four fatalities, six serious injuries, and 22 other injuries requiring hospitalization.

Crescent City, Florida derailment accident site.

Derailed passenger cars at Crescent City, Florida.

BNSF Freight Train/Metrolink Commuter Train Collision in Placentia, California

On April 23, 2002, a head-on collision occurred between a BNSF freight train and a stopped Metrolink commuter train in Placentia, California. As a result of the collision, the leading Metrolink cab car and the leading truck of the second Metrolink passenger car derailed. No BNSF equipment derailed; 161 persons were transported to area hospitals and two Metrolink passengers were killed.

Coal Train/Intermodal Train Collision in Clarendon, Texas

On May 28, 2002, an eastbound coal train collided head-on with a westbound intermodal train in single-track, track warrant control territory near Clarendon, Texas. Two crewmembers were aboard each train. All crewmembers jumped from their moving trains just prior to the collision. The conductor and engineer of the coal train were critically injured, the conductor of the intermodal train was seriously injured, and the engineer of the intermodal train was killed. Three locomotives and 29 freight cars were destroyed. Early damage estimates exceed $7 million.

Amtrak/MARC Train Collision in Baltimore, Maryland

On July 17, 2002, a northbound Amtrak train No. 90, the Palmetto, collided with a MARC commuter train, train No. 437 in Baltimore, Maryland. The MARC train was traveling through the crossover switch when it was struck and sideswiped by the Amtrak train. As a result of this collision, nine injuries were reported; four Amtrak employees, one MARC employee, three passengers on the MARC train, and one on the Amtrak train. All of the injured were treated and released from a local medical center. Total damages were estimated to be $740,000.

Amtrak Derailment in Kensington, Maryland

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

Norfolk Southern Freight Train Derailment near Farragut, Tennessee

On September 15, 2002, a Norfolk Southern freight train derailed near Farragut, Tennessee. The train was en route to Birmingham, Alabama. Three locomotives and 25 cars derailed, including a tank car containing 10,600 gallons of concentrated sulfuric acid, which was punctured. A 1.3 mile area around the accident site was evacuated due to the released material; the evacuation affected several thousand homes in the area. There were no fatalities and no serious injuries; 15 residents and two police officers went to a hospital for observation and were released.

AirTrain Derailment at JFK International Airport, New York

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

Pipeline Safety

Approximately 2.1 million miles of natural gas pipelines in the United States are managed by about 783 transmission and gathering operators; 1,326 distribution operators; 70 liquefied natural gas operators; and 52,000 master meter operators. Another 157,000 miles of hazardous liquid pipelines across the nation are managed by approximately 200 operators.

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 import or that involve a selected accident prevention issue.

Completed Pipeline Investigations

Inadequate Inspections Cause Fuel Oil Pipeline Rupture in Chalk Point, Maryland
On April 7, 2000, the Piney Point Oil Pipeline system, which was owned by the Potomac Electric Power Company (Pepco), experienced a pipe failure at the Chalk Point Generating Station in southeastern Prince George's County, Maryland. The release was not discovered and addressed by the contract operating company, Support Terminal Services, Inc., until late afternoon. Approximately 140,000 gallons of fuel oil were released into the surrounding marsh, Swanson Creek, and subsequently, the Patuxent River, as a result of the accident. No injuries were caused by the accident, which cost approximately $71 million for environmental response and clean-up operations.

Fracture in a buckle in the pipe, Chalk Point, Maryland.

The major safety issues examined:

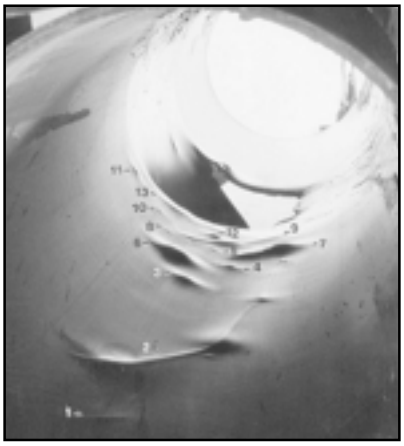
- sufficiency of the evaluation procedures for pipe wrinkles;
- efficiency of the leak notification procedures;
- effectiveness of the incident command;
- leak detection procedures used on the Piney Point Oil Pipeline, and
- analysis of the pipeline's in-line inspection results.

On July 23, 2002, the Safety Board determined that the probable cause of the accident was a fracture in a buckle in the pipe that was undiscovered because the data from an in-line inspection tool was interpreted inaccurately. Contributing to the magnitude of the fuel oil release were inadequate operating procedures and practices for monitoring the flow of fuel oil through the pipeline. As a result of its investigation of this accident, the Safety Board adopted safety recommendations to the Research and Special Programs Administration and the Environmental Protection Agency.

Excavation Damage and Inadequate Operating Procedures Cause Gasoline Pipeline Rupture in Bellingham, Washington

On June 10, 1999, a 16-inch-diameter steel pipeline owned by Olympic Pipe Line Company ruptured and released about 237,000 gallons of gasoline into a creek that flowed through Whatcom Falls Park in Bellingham, Washington. About 90 minutes after the rupture, the gasoline ignited and burned approximately 1½ miles along the creek. Three people died as a result of the accident; eight additional injuries were documented. A single-family residence and the city of Bellingham's water treatment plant were severely damaged.

Photograph of area after released gasoline ignited.



Inside view of ruptured pipe section.

The accident sequence began when the controller operating the pipeline rerouted product flow from one facility into another. As the delivery points were switched, pressure in the accident pipeline began to build back upstream. As a consequence of this rising pressure in the pipeline, a block valve at Bayview, about 23 miles downstream from accident site, closed, causing a pressure surge that traveled upstream where the pipeline ruptured at a point weakened by third party construction damage. Simultaneous to this event, the supervisory control and data acquisition system (SCADA) system that controllers used to operate the pipeline became unresponsive, preventing the controller from starting the additional pumps necessary to alleviate the pressure backup. Also, because of the problems with the SCADA system, the rupture was not promptly recognized by the controller who restarted the pipeline.

On October 8, 2002, the Safety Board determined that the probable cause of the accident was the damage done by a construction crew and Olympic Pipe Line Company's inadequate inspection of work during the construction project. Another factor was Olympic Pipe Line Company's inaccurate evaluation of in-line pipeline inspection results.

Other elements of the Board's findings of probable cause were: Olympic's failure to test all safety devices associated with the Bayview products facility before activating the facility, Olympic's failure to investigate and correct the conditions leading to the repeated malfunctioning of the Bayview inlet block valve, and the company's practice of entering new, untested records into the computer operating the pipeline. The last element led to the system's becoming non-responsive at a critical time during pipeline operations.

As a result, the Safety Board made the following recommendations to the Research and Special Programs Administration:

- Issue an advisory bulletin to all pipeline operators who use SCADA systems, advising them to implement an off-line workstation that can be used

There are more than two million miles of natural gas, hazardous liquids, and carbon dioxide pipelines in the United States.

to modify their SCADA system database or to perform developmental and testing work independent of their on-line systems.

- Advise operators to use the off-line system before any modifications are implemented to ensure that those modifications are error-free and that they create no ancillary problems for controllers responsible for operating the pipeline.
- Develop and issue guidance to pipeline operators on specific testing procedures that can (1) be used to approximate actual operations during the commissioning of a new pumping station or installation of a new relief valve, and (2) be used to determine, during annual tests, whether a relief valve is functioning properly.

On-going Pipeline Investigations

Natural Gas Pipeline Explosion and Fire in Carlsbad, New Mexico

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

On August 19, 2000, a 30-inch diameter natural gas transmission pipeline, owned by El Paso Natural Gas Pipeline Company, ruptured near Carlsbad, New Mexico. The escaping natural gas ignited and killed 12 members of a family who were camping at a nearby site on the Pecos River. The rupture resulted in a crater about 86 feet long by 46 feet wide and approximately 20 feet deep.

Post-accident inspection of the failed pipe segment revealed significant internal corrosion. At least 50 percent pipe wall loss was found in a 10-foot-long area along the bottom of the pipe. The failed pipeline segment had originally been constructed, in 1950, without pig traps. The pipeline segment that ruptured had not been cleaned by maintenance pigging, nor had an in-line inspection been performed on that pipeline section before the accident. Safety Board investigators took samples of pipeline liquids and solids at selected locations for analysis. Safety issues being examined include internal corrosion prevention program and pipeline integrity assessments.

Liquid Pipeline Ruptire in Cohasset, Minnesota

Crater created by pipe rupture, Carlsbad, New Mexico.

On July 4, 2002, a 34-inch diameter hazardous liquids pipeline owned by Enbridge Energy Partners L.P. experienced a failure west of the town of Cohasset, Minnesota. Approximately 250,000 gallons of crude oil were released as a result of the rupture. The release occurred in a remote open wetland area.

Due to concerns that the crude oil might escape the area, a controlled burn was executed in coordination with company, local, state, and federal officials. The fire was ignited on the afternoon of July 4th, and extinguished itself approximately 24 hours later. As a precaution, residents from 12 homes were evacuated in the surrounding area, prior to the start of the in situ burn. There were no injuries as a result of the release or controlled burn of the crude oil. The release of crude oil into the environment, and the resultant in situ burn, covered an area of approximately 11 acres and impacted wildlife, vegetation, the soil, surface waters, and groundwater. Post-accident inspection of the failed pipe segment revealed that the failure initiated at a crack in the pipe. Safety Board investigators shipped the ruptured segment of pipe to the NTSB laboratory for in-depth analysis. Safety issues being examined include the internal inspection program and possible stresses induced in the pipe during shipment and prior to installation.

Hazardous Materials Safety

The most current figures published by RSPA indicate that more than 3.1 billion tons of hazardous materials are shipped within the United States each year, and that more than 800,000 shipments of hazardous materials enter this nation's transportation system each day in all modes, nearly a two-fold increase over the RSPA's previous estimate of 500,000 shipments per day.

The growth in the transportation of hazardous materials is also reflected in the number of hazardous materials incidents reported to RSPA over the past 10 years. In 2001, 17,749 hazardous materials incidents were reported, almost two times the 9,393 incidents reported in 1992. In 2001, the reported damages were $65.5 million compared to $36.2 million reported in 1992, an increase of 81 per cent. Although the number of reported injuries and fatalities have fluctuated over the past 10 years, 226 fatalities and nearly 4,500 injuries were reported from 1992 through 2001 and attributed to the release of hazardous materials.

In December, the NTSB's Acting Chairman signed an MOU with the Chemical Safety and Hazard Investigation Board (CSB) establishing a protocol for the investigation of accidents involving the release of hazardous materials. The MOU was developed to highlight the mandate of each agency and to prevent duplicate investigations or jurisdictional disputes. The NTSB is the lead investigative agency in transportation-related accidents involving hazardous materials, including accidents that occur during loading or unloading, while the CSB has responsibility for accidents involving the processing, handling or storage of a chemical substance. The MOU also outlines procedures by which the two agencies will notify each other of accidents and share information developed during investigations. Both the NTSB and the CSB recognize that because of their common objectives, close communication during investigations is necessary to promote public safety and to ensure efficient use of resources.

Completed Hazardous Materials Investigations

Inadequate Company and Federal Oversight Causes Tank Car Accident, Release of Hazardous Materials, and Fire in Riverview, Michigan

On July 14, 2001, at the ATOFINA Chemicals plant in Riverview, Michigan, a pipe attached to a fitting on the unloading line of a railroad tank car fractured and separated, causing the release of methyl mercaptan, a poisonous and flammable gas. About 25 minutes later, the methyl mercaptan ignited, engulfing the tank car in flames and sending a fireball about 200 feet into the air. The fire was extinguished about 9:30 a.m. Three plant employees were killed in the accident. About 2,000 residents were evacuated from their homes for about 10 hours.

On June 26, 2002, the Safety Board determined that the probable cause of the accident was a fractured cargo transfer pipe that resulted from the failure of ATOFINA to adequately inspect and maintain its cargo transfer equipment and inadequate federal oversight of unloading operations involving hazardous materials. Contributing to the accident was ATOFINA's reliance on a tank car excess flow valve to close off leaks (the device was not appropriate for this type of leak) and the company's failure to require employees to wear appropriate safety equipment. The workmen were not wearing self-contained breathing apparatus (SCBA) and were in fact instructed to detect by odor the release of methyl mercaptan. In addition, the only way to shut off the flowing product in the event of a leak like this was to use a manual valve on top of the tank car - no remote cutoff switch was installed. The pipe that failed had been weakened by erosion and corrosion that occurred over a protracted period of time. Visual inspections failed to detect the deteriorating condition of the pipe.

View of accident site, Riverview, Michigan.

Since the accident, ATOFINA made a number of changes to its plant procedures and equipment to address problems identified during this investigation. The company now requires that the cargo unloading apparatus, including the integral piping, be removed from service every two years and undergo non-destructive testing to ensure that it is still safe. Additionally, ATOFINA redesigned the unloading apparatus. Operators are now required to wear SCBAs when working on the methyl mercaptan tank cars, and they are required to carry an escape hood with an emergency air supply when in the area of the tank cars. In addition, operators now perform leak tests on the unloading apparatus before opening the valve to the tank car.

The Board found that current federal oversight of loading/unloading operations is deficient. For example, FRA regulations cover the setting of tank car brakes, the chocking of wheels, and other such matters, but they do not address the inspection, maintenance and support of cargo transfer fittings, leak test procedures for fittings, or the use of personal protection equipment by operators. The Board therefore recommended that DOT, with the assistance of the Environmental Protection Agency and the Occupational Safety and Health Administration, promulgate new rules to address these deficiencies. The Board also recommended that the FRA warn companies involved in tank car loading and unloading operations that tank car excess flow valves cannot be relied upon to stop leaks that occur during those operations.

Failure to Control Semitrailer Causes Accident and Hazardous Materials Release in Ramona, Oklahoma

On May 1, 2001, a tractor semitrailer carrying horizontally mounted cylinders filled with compressed hydrogen gas struck a pick-up truck on U.S. Highway 75 just south of Ramona, Oklahoma. During the crash some of the cylinders, valves, piping and fittings at the rear of the semitrailer were damaged and released the hydrogen gas. The hydrogen ignited, burned the rear of the semitrailer and caused five area homes to be evacuated. The driver of the tractor-trailer died in the accident.

Through the investigation, the Board determined that the valves, piping and fittings at the rear of the semitrailer were not adequately protected for a rollover impact. Eight of 10 shutoff valves were sheared off, causing the release and ignition of the hydrogen. Because the outermost cylinders typically extend beyond the top and side edges of the trailer bulkheads they are vulnerable to initial impact with roadway or terrain creating an increased risk of damage, failure and ejection in an accident.

On September 17, 2002, the Safety Board determined that the probable cause of the collision was the failure, for unknown reasons, of the pickup driver to control her vehicle. Contributing to the severity of the accident were the inadequate protection and shielding of the cylinders, valves, piping, and fittings and the inadequate securement of cylinders on the semitrailer.

As a result of the investigation, the Board recommended that RSPA modify regulations for the protection of valves, piping and fittings on horizontally mounted cylinders; require horizontal cylinders be protected from impact with the roadway or terrain; and revise the North American Emergency Response Guidebook to include information about the specific chemical and flammability properties of hydrogen.

Hazardous Materials Support of Completed Investigations in Other Modes

There has been an almost 200 percent increase in the number of hazardous material incidents reported over the past 10 years.

Grade Crossing Accident in Bourbonnais, Illinois

On March 15, 1999, Amtrak train 59, with 207 passengers and 21 Amtrak or other railroad employees on board and operating on Illinois Central Railroad (IC) main line tracks, struck and destroyed the loaded trailer of a tractor-semitrailer combination that was traversing the McKnight Road grade crossing. The Hazardous Materials staff documented the release and environmental impact of the release of furnace dust, a hazardous waste, from a railroad freight car struck by derailed cars from the Amtrak train. Additional information available in the Rail Safety section.

Liquid Pipeline Rupture in Bellingham, Washington

On June 10, 1999, a 16-inch-diameter steel pipeline owned by Olympic Pipe Line Company ruptured and released about 237,000 gallons of gasoline into a creek that flowed through Whatcom Falls Park in Bellingham, Washington. About 90 minutes after the rupture, the gasoline ignited and burned approximately 1½ miles along the creek. Two investigators from the Hazardous Materials staff assisted with the investigation. One investigator was responsible for the testing of a pressure relief valve from the pipeline system. The second investigator evaluated the environmental impact and response to the release of the gasoline. Because of the results of the tests of the pressure relief valve, the Safety Board issued a Safety Recommendation to the Research and Special Programs Administration to develop and issue guidance to pipeline operators on specific testing procedures that can be used to approximate actual operations during the commissioning of a new pumping station or installation of a new relief valve, and be used to determine, during annual tests, whether a relief valve is functioning properly. Additional information available in the Pipeline Safety section.

Fuel Oil Pipeline Rupture in Chalk Point, Maryland

On April 7, 2000, the Piney Point Oil Pipeline system, which was owned by the Potomac Electric Power Company (Pepco), experienced a pipe failure at the Chalk Point Generating Station in southeastern Prince George's County, Maryland. The release was not discovered and addressed by the contract operating company, Support Terminal Services, Inc., until late afternoon. Approximately 140,400 gallons of fuel oil were released into the surrounding marsh, Swanson Creek, and subsequently, the Patuxent River, as a result of the accident. An

environmental response investigator from the Hazardous Materials staff documented and evaluated the spill response efforts and the environmental impact of the spill. Deficiencies identified with the incident command structure for environmental response led the Safety Board to issue a safety recommendation to the Environmental Protection Agency. Additional information available in the Pipeline Safety section.

Freight Train Derailment and Release of Hazardous Materials in Eunice, Louisiana

On Saturday, May 27, 2000, 33 of the 113 cars making up eastbound UP train QFPLI-26 derailed near Eunice, Louisiana. Of the derailed cars, 15 contained hazardous materials and two contained hazardous materials residue. The derailment resulted in a release of hazardous materials with explosions and fire. Hazardous materials investigators documented the release of the hazardous materials, the damages to the tank cars, and the environmental impact from the release of these materials. Additional information available in the Rail Safety section.

On-going Hazardous Materials Investigations

Cargo Tanker Rupture in South Charleston, West Virginia

On January 5, 2002, a tractor/cargo tank semitrailer departed the Bayer Corporation plant in South Charleston, West Virginia. As the tractor/semitrailer departed the plant and entered the cross street, the semitrailer catastrophically failed at the void space between the first and second of three independent tanks on the semitrailer. The semitrailer was built in 1974 and had three independent stainless steel tanks joined in a single unit by girth bands that overlapped the adjoining ends of the successive tanks. Carbon steel stiffeners extended longitudinally along each side of the trailer and provided additional support. The cargo tanks were covered with insulation and a steel jacket. At the time of the accident, the three cargo tanks contained a total of 5,152 gallons of polypropylene glycol. Although no release occurred and this chemical is not regulated as a hazardous material by the DOT, the cargo tank semitrailer can be used for the transportation of regulated hazardous materials. There were no fatalities, injuries, or evacuations. The roadway was closed for seven hours. The safety issues being examined are the structural integrity of cargo tank semitrailers of a similar design and the adequacy of the DOT hazardous materials regulations to require visual inspections of cargo tanks that are covered by insulation and/or jackets.

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

On September 13, 2002, a 24,000-gallon capacity railroad tank car containing 4,500 gallons of flammable waste catastrophically ruptured at the BASF Corporation chemical plant in Freeport, Texas. At the time of the accident, the tank car was positioned at a cargo transfer station in the plant. To liquefy the solid waste and to facilitate its transfer, steam heat had been applied to the tank car for several hours between September 11 and the morning of September 13. Plant employees involved with the transfer operation noticed vapors venting intermittently through the tank car's safety relief valve. By 9 a.m., about 30 minutes before the rupture, vapors were venting through the safety relief valve continuously, indicating increasing pressure within the tank car. BASF employees then began to apply water to the tank car with the hope of cooling the tank and reducing the pressure. The area was evacuated at 9:10 a.m., and the tank car ruptured about 9:30 a.m. The force of the explosion propelled the 300-pound dome housing from the tank car about 1/3 mile. Two nearby storage tanks containing oleum (fuming sulfuric acid and sulfur trioxide) were damaged and released about 10,650 pounds of oleum. The tank car, highway cargo tank, and the transfer station were destroyed in the accident. Twenty-eight employees and area residents reported minor injuries.

Safety issues being examined are BASF procedures for heating cargoes in railroad tank cars and other bulk hazardous materials containers, and BASF procedures for determining the critical properties of hazardous materials that may induce runaway reactions during loading and unloading operations.

Hazardous Materials Support of On-going Investigations in Other Modes

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

On February 16, 2000, an Emery Worldwide Airlines, Inc. McDonnell Douglas DC-8 departed Mather Airport, Sacramento, California. Moments after takeoff, the flight crew declared an emergency. Two minutes after takeoff, the airplane crashed into an automobile salvage yard east of the airport in Rancho Cordova. The airplane was transporting a package containing 16 detonating fuses as a declared item of cargo. No other declared shipments of hazardous materials were on board. The hazardous materials safety issue being examined is the potential involvement of declared and/or undeclared shipments of hazardous materials in the crash of the airplane.

AirTran DC-9 Cargo Compartment Fire in Atlanta, Georgia

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

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

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

Canadian Pacific Railway Derailment in Minot, North Dakota

On January 18, 2002, a Canadian Pacific Railway freight train with two locomotives and 112 cars derailed 31 freight cars near Minot, North Dakota. Seven of 15 cars that were carrying anhydrous ammonia catastrophically failed, and released over 200,000 gallons of anhydrous ammonia. The ammonia created a vapor plume about 5 miles long and 2 1/2 miles wide, and affected approximately 15,000 residents near the derailment site and a portion of the city of Minot. The release of the ammonia resulted in one fatality, more than 300 injuries and the displacement of residents for up to 30 days. The hazardous materials safety issues are the vulnerability of tank cars in cold temperatures, and methods of reducing the risks of transporting hazardous chemicals.

Pipeline Rupture and Release of Crude Oil in Cohassett, Minnesota

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

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

Public Hearings

Minot, North Dakota Train Derailment, January 18, 2002
The Safety Board convened a public hearing on July 15-16, 2002, in Washington, D.C. to examine safety issues surrounding the January 18, 2002 Canadian Pacific Railway derailment and subsequent release of over 200,000 gallons of anhydrous ammonia. The release of this cargo resulted in one fatality, over 300 injuries, and the displacement of residents for up to 30 days.

The derailment occurred when a Canadian Pacific Railway freight train with 2 locomotives and 112 cars derailed 31 freight cars near Minot, North Dakota. Seven of 15 cars that were carrying anhydrous ammonia catastrophically failed, creating a vapor plume about five miles long and 21/2 miles wide, which affected approximately 15,000 residents near the derailment site and a portion of the city of Minot.

Safety Board Vice Chairman Carol Carmody chaired the hearing. Safety issues examined at the hearing included the maintenance and inspection of continuously welded rail, federal oversight of the railroad's track maintenance program, vulnerability of tank cars in cold temperatures, and methods of reducing the risks of transporting hazardous chemicals. Subject matter experts included members from the FRA, Canadian Pacific Railway, Volpe National Transportation Center, tank car manufacturers, hazardous materials shippers, and the AAR.

Office of Research and Engineering

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

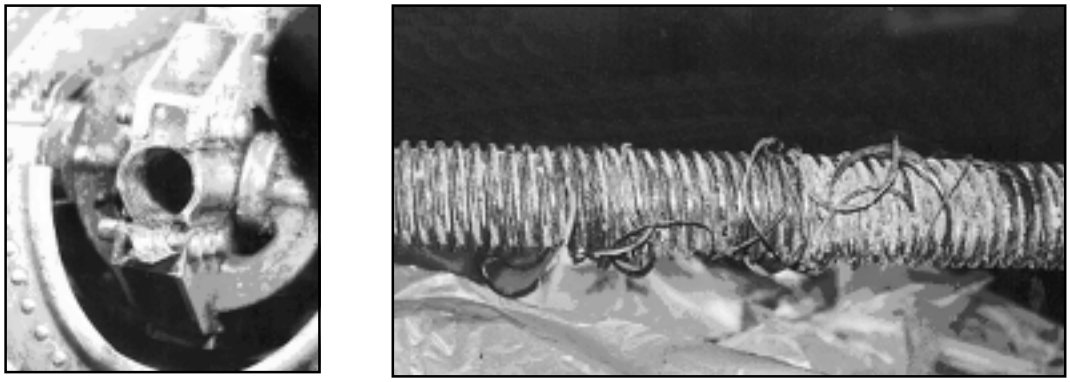
Significant Technical Accomplishments

Alaska Airlines Flight 261

After recovery of the CVR and flight data recorder (FDR) from the ocean in February 2000, they were shipped to the NTSB laboratories in Washington, D.C. Technical specialists in the Office of Research and Engineering immediately began the task of extracting and analyzing the recorder data. Within hours, the CVR and FDR specialists were able to provide on-scene accident investigators with valuable information that alerted them to a possible control problem. In the days following the accident, technical specialists from several divisions in the Office of Research and Engineering used the CVR/FDR data (and radar data supplied by the FAA) to compute the crew's actions and vehicle response during the final minutes of the flight. This work included computer simulations that recreated the aircraft's performance.

All of the technical information produced by NTSB engineers was provided to the IIC and the rest of the investigation team as it was developed. This knowledge led the wreckage recovery team to concentrate efforts on retrieving the horizontal stabilizer assembly from the MD-80 aircraft. Within days, metallurgists in the Office of Research and Engineering's materials laboratory were examining the jackscrew/gimbal nut assemblies from the aircraft to determine the sequence of failures and the initial cause of the accident. They found that the threads on the accident gimbal nut were severely worn and then sheared off, and remnants of the threads were wrapped around the jackscrew. No grease was found on the portion of the jackscrew where the gimbal nut would normally be expected to operate.

Determining how a particular part may have failed often requires lengthy research. The condition of the jackscrew from the Alaska Airlines MD-80 led engineers from the Office of Research and Engineering to develop multidisciplinary research, analysis, and testing programs in several areas. Structural and fatigue tests along with finite element analysis determined the load-carrying capacities of the jackscrew components and helped explain the sequence of failure events. Lubricating greases in various combinations and environments were tested, and it was determined that each of the greases used by Alaska to lubricate the jackscrew assembly were acceptable and that changing from one grease to another was not detrimental to the wear properties of the jackscrew assembly. Wear characteristics of the steel-aluminum bronze material combination used on aircraft flight control components were also investigated. It was determined that the extreme amount of wear on the accident airplane jackscrew could only be explained by a near total lack of lubrication.



Gimbal nut (left) and jackscrew (right) from Alaska Airlines MD-80.

Some test and research programs were conducted in cooperation with the U.S. Navy Materials Laboratory, Rensselaer Polytechnic Institute, Battelle Memorial Institute, and Science Applications International Corporation. Technical specialists from the Office of Research and Engineering also provided extensive written and visual material for the public hearing into this accident, held in December 2000, and for the Board Meeting, held in December 2002.

American Airlines Flight 587

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

Analysis of the radar data and flight recorders indicated the airplane encountered a wake from a previously departed aircraft. Subsequent airplane performance analysis on these data revealed the pilot commands and airplane responses. Knowing these behaviors, investigators were then able to calculate the aerodynamic loads imparted to the vertical fin of the aircraft. Investigators are now pursuing the effects of these loads on the structural design, the manufacturing techniques, and the material behavior of the composite vertical fin.

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

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

Other Significant Work Accomplishments

Safety Studies

Intrastate Trucking Safety Report—In March 2002, the Safety Studies and Statistical Analysis Division completed a safety report analyzing intrastate trucking operations (NTSB/SR-02/01). Data from the Motor Carrier Management Information System, trucks involved in fatal accidents, and U.S. roadside inspections were analyzed to describe the general characteristics of intrastate motor carriers, to identify intrastate carrier accident characteristics, and to compare these characteristics with accidents involving interstate carriers. This information was supplemented by an NTSB-administered survey distributed to intrastate motor carriers. The data indicate that intrastate and interstate carriers share many similarities in terms of operating characteristics and characteristics of their accident-involved trucks and drivers. Most of the differences in the characteristics of accident-involved trucks of intrastate and interstate carriers appear to reflect differences in operational factors, such as size of fleet, operating hours, and types of cargo hauled.

Transportation Safety Databases—The NTSB relies on many external databases when performing accident investigations, safety studies, and special investigations. Most of these databases are sponsored and operated by the modal administrations of the DOT. In recent years, the Board's ability to study important safety issues has been hindered by poor data quality. In September 2002, the Board concluded a safety study on transportation safety databases (NTSB/SR-02/02) to highlight data quality issues and encourage improvements in this area. The study highlighted the value and potential uses of transportation safety data, described some accident and incident databases commonly used by the Board, and summarized past Board recommendations involving transportation data. The study also evaluated Bureau of Transportation Statistics (BTS) efforts to establish data quality standards, identify information gaps, and ensure compatibility between the safety data systems maintained by the DOT.

The Safety Board's past recommendations indicate that exposure data are not adequately detailed to support the analysis of risk factors for transportation accidents, reducing the ability of the federal government to understand safety problems and target safety resources. BTS efforts to identify information gaps and to establish data quality standards are an important first step toward improving data quality. As a result of this finding, the Board issued a recommendation to the BTS to develop a long-term program to improve the collection of data describing exposure to transportation risk in the United States.

Evaluation of the Rollover Propensity of 15-Passenger Vans—In November 2002, the Safety Board reported on the rollover propensity of 15-passenger vans. Fifteen-passenger vans, which make up about 0.25 percent of the passenger vehicle fleet in the United States, are frequently used to transport school sport teams, van pools, church groups, and other groups. Although they are involved in a proportionate number of fatal accidents compared to their percentage in the fleet, they are involved in a higher number of single-vehicle accidents involving rollovers than are other passenger vehicles. Various factors have been associated with 15-passenger van rollover, particularly occupancy level and travel speed. Because these vans are designed to carry 15 passengers, the Safety Board is particularly concerned about the relationship between occupancy level and vehicle rollover. Fully loading or nearly loading a 15-passenger van causes the center of gravity to move rearward and upward, increasing its rollover propensity and the potential for loss of control in emergency maneuvers.

Complex accident investigations require support from a wide range of technical disciplines in the Office of Research and Engineering.

NHTSA has been evaluating vehicle rollover for several years. NHTSA has initiated rulemaking, established a rollover resistance rating system, and is currently examining dynamic testing procedures; however, these programs have not been extended to 15-passenger vans. The Safety Board is concerned that NHTSA has not included 15-passenger vans in the dynamic testing or proposed rollover resistance ratings for this class of vehicle, given their high rate of rollover involvement in single-vehicle accidents, particularly under fully or nearly loaded conditions.

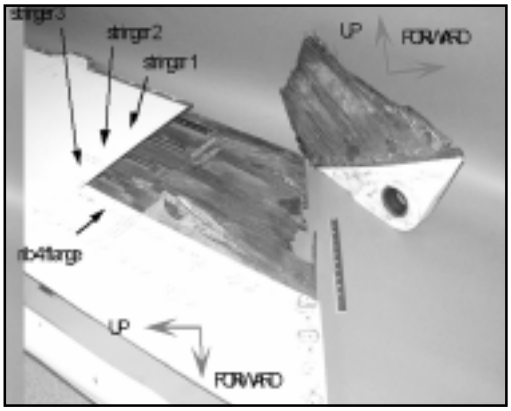
Aviation Annual Review for Commercial and General Aviation—The Safety Board prepares annual statistical reports summarizing commercial aviation accidents and general aviation accidents. In the past, these reports have consisted of tabular data accompanied with only a limited amount of explanatory information. Both the Annual Review of Commercial Aviation and the Annual Review of General Aviation have been redesigned to graphically display accident data and to better communicate what we know about accident characteristics.

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

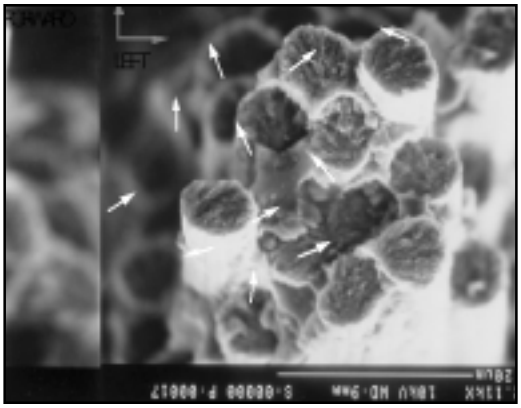
Materials

Staff materials engineers examined parts and wreckage from well over 100 accidents, involving all transportation modes, in 2002. In addition to work on American Airlines flight 587, engineers also assisted in the examination of nine other in-flight structural breakups in the United States, including the loss of two firefighting airplanes--a Lockheed C130A and a Consolidated Vultee P4Y-2. Both of these airplanes experienced wing failures because of fatigue cracking. Reexamination of the structure from another C130A that crashed in a remote area in California during 1994 has also revealed new evidence of fatigue cracking in the wing structure of that airplane.

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



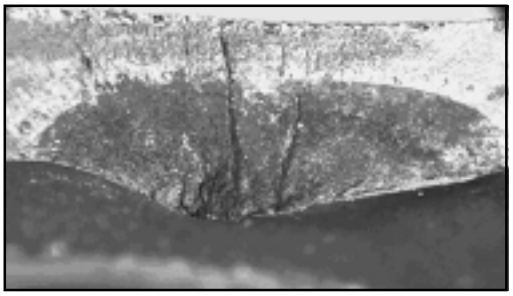
Stabilizer lug attachment shown disassembled and sectioned for examination.



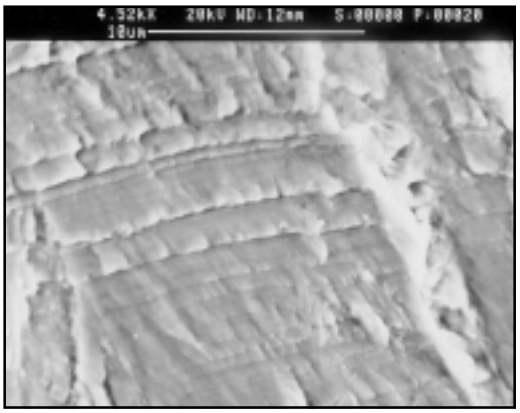
Typical fracture features for the composite lugs showing fractured fiber ends.

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

During 2002, the materials laboratory generated reports on 40 components that fractured as a result of fatigue cracking. Included in this group were five propeller blades and four crankshafts from general aviation airplanes, and a tail rotor blade and a main rotor hub from helicopters. As these fatigue fractures demonstrate, the results of research on the parts and structure examined by the Materials Laboratory is quite often the primary information used in determining the probable causes of these accidents.



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

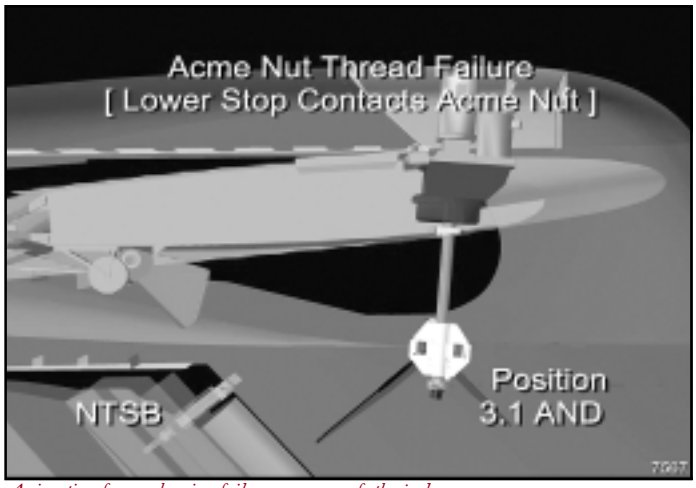


Scanning electron micrograph of fatigue striations located on a fracture face of the shell of a cargo truck semitrailer. The scale bar at the top is approximately 0.0004 inch long.

Vehicle Performance

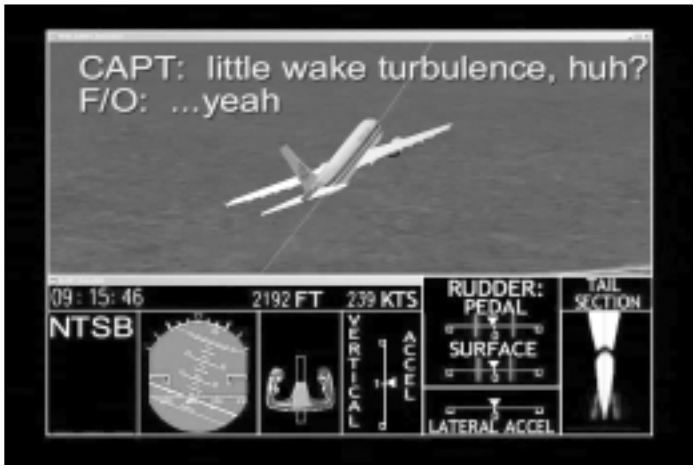
Performance engineers have conducted analyses supporting several investigations. These analyses covered a wide range of subjects including airplanes, marine vessels, trains, road vehicles, and vehicle occupants.

In aviation investigations, staff was involved with performance analyses for three major aviation accidents. Alaska Airlines flight 261 (report adopted December 10, 2002) required performance calculations and simulations to determine the airplane's flight path and the aerodynamic loads on the horizontal stabilizer. The aerodynamic load history determined in this analysis helped identify the low-cycle fatigue failure mechanism that fractured the airplane's jackscrew assembly resulting in loss of control of the airplane. Animations of the airplane flight path and of the failure sequence of the jackscrew were presented at the Board's meeting to discuss the accident report. They are available at www.ntsb.gov/events/2000/aka261/presentations/presentations.htm.



Animation frame showing failure sequence of the jackscrew.

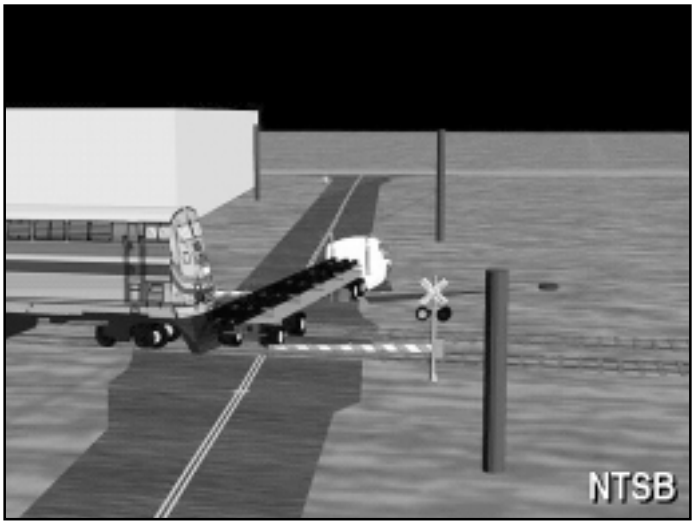
Staff is currently involved with the American Airlines flight 587 accident investigation. Vehicle performance issues played a significant role in the public hearing held in Washington, D.C. in November 2002. The vehicle performance animation laboratory developed a detailed animation of the airplane's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



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

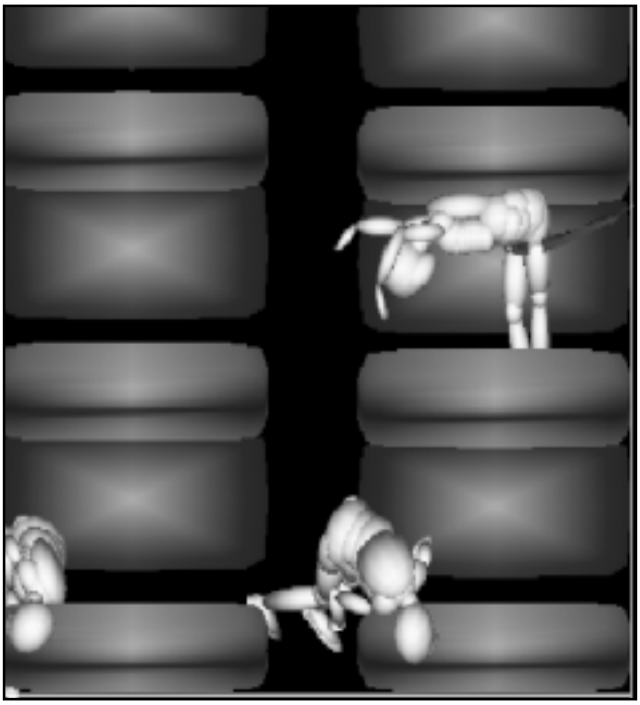
In June 2002, a Federal Express Boeing 727 on approach to Tallahassee, Florida, crashed short of the runway. Vehicle performance staff conducted an extensive on-scene investigation, gathering physical evidence from the scene. Airplane performance calculations are now being conducted to determine what role the pilot and airplane played in the cause of the accident. In addition to these major aviation accidents, staff continues to provide technical support to NTSB regional office investigations of general aviation aircraft accidents.

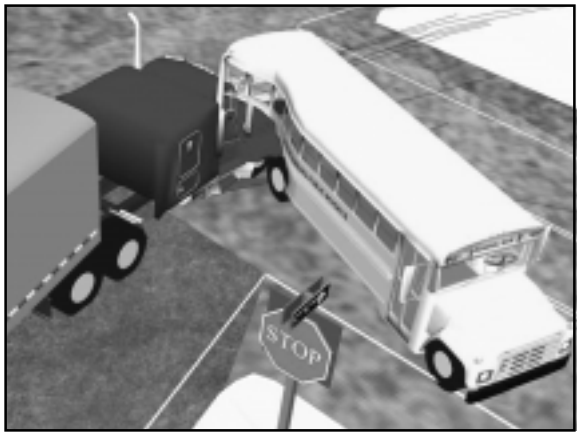
Staff engineers also supported a number of highway and railroad vehicle accident investigations in 2002 by developing detailed vehicle and occupant simulations. Three simulations concerned collisions at rail-highway grade crossings. On February 5, 2002, the NTSB adopted its report of a grade crossing accident in Bourbonnais, Illinois, involving a semitrailer loaded with steel and an Amtrak passenger train. A vehicle simulation was conducted to determine if the truck went around closed crossing gates or if the railroad signals were delayed in operating. The simulation is available at www.ntsb.gov/events/2002/bourbonnais/amtrak59_anim.htm. The simulation showed conclusively that, due to vehicle off tracking and the truck's position at impact, the truck would had to have had gone around the closed gates.



Animation frame showing collision of Amtrak passenger train and tractor-trailer in Bourbonnais, Illinois.

A second grade crossing collision between a freight train and a school bus was simulated. This required an occupant kinematic study to investigate the potential benefits of safety restraints on school buses. The animation is available at www.ntsb.gov/events/2001/conasauga/con_ani.htm. An accident involving the collision between a train and a tractor-trailer at a grade crossing in Intercession City, Florida, was also simulated and presented to the Safety Board in July 2002. The simulation is at www.ntsb.gov/events/2002/intercession/int_ani.htm.


Occupant kinematics of school bus/freight train collision.



Animation frame of vehicle collision near Mountainburg, Arkansas.

Another detailed simulation study was conducted for the May 31, 2001, accident near Mountainburg, Arkansas, where a truck-tractor semitrailer exited the Interstate, was unable to stop at the stop sign at the bottom of the ramp, and collided with a school bus. The animation is at www.ntsb.gov/events/2002/MountArk/mount_ani.htm.

The simulation and analysis showed that the truck was unable to stop because the truck's brakes faded due to overheating, which resulted in reduced braking efficiency. The brakes had been poorly maintained and inadequately inspected.

Accident Data and Public Records

Forty-nine accident reports and studies were published in 2002, and docket information on the Alaska Airlines flight 261 and American Airlines flight 587 accidents was made available on the website. Almost 3,000 requests for public records and more than 320 requests under the Freedom of Information Act were processed through the Public Inquiries Branch during 2002.

Data specialists in the Office of Research and Engineering continue to respond to requests for aviation accident information and research. Some of these requests concerned the accident frequency of a particular aircraft model or air carrier, while others were interested in particular types of accidents. The new availability of accident data from 1962-1983 on the NTSB website, combined with complete download and text search capabilities, now allow most research to be done directly online. The Safety Board anticipates that an increasing number of data users who have commercial or research interests will now regularly acquire the data directly through the website. The office also issued statistical information on U.S. civil aviation and published the NTSB annual reviews of aircraft accident data for U.S. air carriers and for general aviation.

Cockpit Voice Recorders/Flight Data Recorders

Staff engineers extracted, formatted, and analyzed data from 62 cockpit voice recorders (15 were foreign), 69 flight data recorders (12 were foreign), and 12 rail recorders in 2002.

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

Staff engineers have recently completed a four-year update to the minimum performance standards that are used by the aviation industry to make and install new flight data and

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

Medical Factors

Research and Engineering staff continue to pursue safety improvements regarding the use of prescription and over-the-counter medications by vehicle operators (as detailed in Safety Recommendations I-00-1 through –5, A-00-4 through -6, H-00-12 through -15, M-00-1 through –4, R-00-1 through -8). In 2002, staff met with representatives of the Secretary of Transportation and every modal administration within the DOT, and have in particular supported efforts by the FRA and planned efforts by the FTA and the NHTSA to educate and inform operators and the general public about the potential hazards of vehicle operation while using certain licit medications, and planned efforts by the Food and Drug Administration to more effectively identify and communicate those hazards to prescribers, dispensers, and consumers of such medications.

Research and Engineering staff continue to support investigations into commercial driver medical conditions and in 2002 met with the administrator and staff of the FMCSA to review progress on the medical oversight of commercial drivers (as detailed in Safety Recommendations H-01-17 through -25). Staff also supported several NTSB highway investigations involving noncommercial driver medical conditions. In addition, staff provided technical review for the American Medical Association's Older Drivers Project, which aimed to develop a guide for physicians who must counsel patients on driving risks.

Research and Engineering supports the training of investigators, physicians, psychologists, and physiologists in the medical aspects of accident investigation. Military, civilian, private, commercial, academic and governmental employees receive education in the collection and analysis of medical information in accident investigation through the NTSB Academy and in formal programs and presentations coordinated through the Office of Research and Engineering. In 2002, the office completed coordination of programs allowing civilian residency programs in aerospace medicine to provide hands-on experiences in civil aviation accident investigation to physicians specializing in the field.

In 2002, Research and Engineering staff supported the investigation of a fatal railroad accident in Michigan involving an engineer and conductor, both with previously diagnosed obstructive sleep apnea. Staff recognized the failure of current federal regulations to adequately identify and remove from service safety-sensitive railroad workers with potentially impairing or incapacitating medical conditions. As a result of the investigation, recommendations were issued to standardize reporting and evaluation of medical conditions by railroads.

The staff provides medical consultation to accident investigators in all modes on about 100 accidents a year. The following are some examples from 2002:

- a fatal accident in which a barge collided with a highway bridge in Oklahoma involving a marine operator with a previously undiagnosed cardiac condition;
- a nonfatal cargo aircraft accident in Florida requiring review of medical records, X-rays, cockpit voice recordings, and planning of formal medical testing of a pilot to evaluate the possibility of an unrecognized preexisting medical condition;

- a fatal highway accident in Oklahoma, involving a commercial hazardous materials tractor-trailer and a private vehicle whose drivers both had been diagnosed with multiple medical conditions and who had both been prescribed potentially impairing medications;
- two fatal highway accidents in Maryland involving noncommercial drivers with known histories of seizure disorder;
- two fatal general aviation accidents in Tennessee within two months involving pilots with substantial preexisting cardiac disease; and
- two general aviation accidents (one fatal) in Florida involving the same pilot for whom toxicology testing revealed the presence of alcohol, sleep aids, and antidepressants.

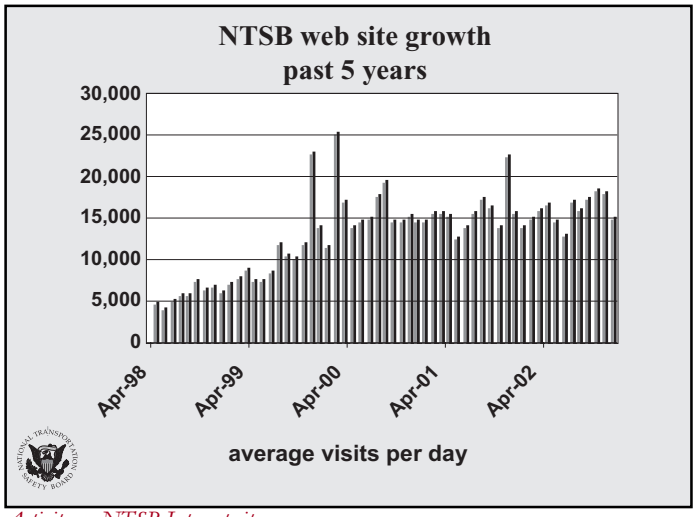
Fire and Explosion Factors

Technical specialists in fire and explosion from the Office of Research and Engineering investigated fires in railroad, hazardous materials, general aviation, and major commercial aviation accident investigations. In May 2002, investigators traveled to Dalian, China, to help investigate an in-flight fire and crash into the sea of a China Northern MD-80 aircraft. Fire scene analysis identified the characteristics of significant fire in the rear of the passenger cabin among the wreckage recovered from the ocean. Forensic samples taken on scene, then shipped to and chemically analyzed in the United States by the FBI, identified the presence of an accelerant liquid. This chemical analysis, combined with on-scene examination of wreckage, helped to identify arson as the probable cause of the accident.

Fire specialists have conducted geophysical, structural, and civil engineering studies for the Howard Street tunnel train derailment and fire in Baltimore, Maryland, on July 18, 2001, including a joint effort with the Nuclear Regulatory Commission to generate a computer model of the fire that can be used to assess the thermal damage that might have been inflicted in a hypothetical case involving the shipment of spent nuclear fuel.

Information Technology

Internet activity in 2002 showed moderate growth, with an increase in average hits per day up about 300 over the previous year. Several improvements to the site in the fall prompted a higher level of activity, with average hits per day up to 17,315 in the last three months of the year (compared to 16,211 on average for the entire year).



Activity on NTSB Internet site.

In September 2002, the website's searchable database was expanded to cover aviation accident investigations conducted from 1962 to 1983; the addition of 90,000 data records more than doubled the number of air carrier and general aviation

accident investigation records available for retrieval. Over 230,000 publications were downloaded, with the most popular reports continuing to be those involving aviation. Two events were webcast on the Safety Board's public site: the December 2002 Board Meeting for Alaska Airlines flight 261, and the public hearing into the investigation of American Airlines flight 587. All events in the NTSB Conference Center are webcast internally, making it easy for all employees to monitor proceedings while continuing to work in their offices.

A new home page design for the public Internet was launched in August 2002; the modifications were designed to add visual interest and increase the accessibility of a wider variety of topics.

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

Redesigned home page for NTSB website.

In the spring of 2002, the Office of Research and Engineering implemented a revised, searchable docket management system on the agency's intranet to manage public and official use records related to accident investigations, safety studies, and other activities. Training was conducted at headquarters and in each regional office to facilitate the transition. The system is currently accessible only to NTSB employees and fulfillment contractors, but it will eventually become an integrated part of the public website. Over 16,000 documents were added to the new system during its first nine months of operation.

Home page of NTSB Docket Management System.

Administrative Law Judges

Since 1967, the Safety Board has served as the "court of appeal" for airmen, mechanics or mariners whenever the FAA or Coast Guard takes a certificate action.

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

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

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

The FAA has the right to appeal decisions of the five-member Board to the U.S. Court of Appeals where that agency determines that the Board's decision "will have a significant adverse impact" with respect to aviation safety duties and powers designated to be carried out by the FAA. Airmen and mechanics have the right to appeal all adverse Board decisions to the Court of Appeals.

Upon review of the Board's decision, the Court of Appeals has the power to affirm, modify or set aside that decision in whole or in part -- or, if need is found, to order further proceedings by the Board. The decision of the Court of Appeals is subject to review by the U.S. Supreme Court on writ of certiorari.

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

Marine certificate actions are heard first by the Coast Guard's administrative law judges, and may be appealed to the Commandant of the Coast Guard. The ruling of the Commandant may then be appealed to the NTSB, where the Board follows the same appellate process as it does in considering the initial decisions of its law judges in aviation cases. In 2002, one marine appeal was filed with the NTSB and the Board closed two cases.

There were 390 aviation certificate appeals filed with Board's Office of Administrative Law Judges in 2002; 123 of these cases were from emergency orders. The Board's judges held 72 hearings and closed 345 cases in 2002.

During 2002, 50 of the judges' decisions were appealed to the full five-member Safety Board for review. The Board decided 65 appeals, reversing the judges' decisions in nine cases. Thirteen of the Board's decisions were appealed to the U.S. Courts of Appeals, which rendered six decisions in 2002, affirming the Board in two, reversing the Board in one and remanding one case back to the Board for additional disposition. The remaining two cases were dismissed.

There were 12 EAJA applications filed with the Board's administrative law judges in 2002, and 12 EAJA cases were decided by the judges. In 2002, five of the judges' EAJA decisions were appealed to the full Board, which issued rulings in seven EAJA cases.

The NTSB serves as the "Court of Appeals" for airmen, mechanics and mariners.

NTSB Academy

The NTSB Academy is a major Safety Board initiative to improve the training and skills of its own employees, and make its safety expertise more widely available to the transportation community.

The Academy's mission is to provide comprehensive education and training for those who improve safety by conducting independent transportation accident investigations; to foster an environment that encourages transportation safety initiatives and technical research; and to promote uniform programs that ensure compassion, understanding, and assistance for those affected by transportation tragedies.

Artist's rendering of the Academy.

The academy motto emphasizes "Independence, integrity and innovation in transportation accident investigation."

In 2000, the NTSB selected The George Washington University as the new home for the Academy. The NTSB and the university signed a 20-year lease in 2001. A major portion of a new building, located on university's campus in Ashburn, Virginia, was completed in 2002. The building is expected to open in late summer 2003.

The state-of-the-art, 72,000-square-foot, two-level facility contains five classrooms, a large laboratory, equipped with an 15-ton crane, to house the three-dimensional, 93-foot reconstruction of the forward portion of the TWA flight 800 aircraft's fuselage, ample laboratory space, an outside simulations court, meeting rooms, student and teacher work areas, and offices.

The structures began rising from a graded site of red dirt in January to a nearly complete two-level classroom building in December. By the end of 2002, the 300 x 100-foot laboratory's steel superstructure and 25 percent of its outside walls were completed. Also,

during the year, numerous contracts were signed to provide furniture, cabling, security and audio-visual capabilities for the Academy building.

Although the facility was still under construction, 11 courses were offered in 2002 under the academy's sponsorship. These courses trained 55 NTSB employees and more than 250 transportation professionals from the United States and 24 foreign nations.
They included:

- a two-and-a-half-week course in basic aircraft accident investigation for newly hired investigators from the NTSB, industry, and other government agencies from the U.S. and other nations.
- two comprehensive family assistance courses for those who assist friends and families of major transportation accident victims.
- three courses for NTSB staff to prepare for public hearings.
- two courses to prepare NTSB investigators for class instruction.
- two courses of airline industry training to familiarize industry representatives with their duties and responsibilities during NTSB accident investigations.
- a newly developed course designed for law enforcement officers who initially respond to transportation disasters.

The academy motto emphasizes "Independence, integrity and innovation in trasnportation accident investigations."

Administrative Services and Staff

Since the Safety Board established the Office of the Academy in 2001, an administrative infrastructure has been developed to support the delivery and development of current and future courses. These include student, instructor and administrative databases, procedures for setting tuition costs, internal and external websites, and financial protocols that integrate with the Office of Chief Financial Officer to track tuition payments, vendor contracts, disbursements, and travel and lodging.

During 2001, the NTSB selected a core staff of five to plan, develop and execute the Academy's objectives: an Academy director, an assistant director of instruction, an operations manager, a communications manager, and an administrative officer. In 2002, the NTSB selected an Academy President and Academic Dean, and a registrar.

Curriculum Development

The Academy Curriculum Development Committee met semi-annually. Its chairman is the managing director, and its members are the office directors. The committee reviews training needs and suggests resources. The committee also approves the work of the Academy staff that is responsible for identifying and developing curricula in all modes; developing courses and course material; and identifying effective instructors.

Twelve courses were selected to be presented in 2003, including four under development: survival factors, human factors, fire and explosion, and witness interviewing. All four are being designed for multi-modal audiences.

Outreach

Academy staff met with several transportation safety organizations and institutions of higher learning to help develop Academy partnerships. Staff also made several safety presentations to international organizations meeting in Canada, Scotland, and Colombia.

Transportation Disaster Assistance

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

In July 2002, the NTSB changed the name of its Office of Family Affairs to the Office of Transportation Disaster Assistance (TDA) to better reflect the broad range of the office's duties, and the extension of its services to all modes of transportation covered by the NTSB.

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

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

Accident Launches

In 2002, TDA specialists assisted on the following accidents:

Amtrak derailment in Florida (four fatalities). Assisted Amtrak in developing a passenger list. Provided assistance to families of deceased and survivors. Supported investigators examining survival factors by conducting interviews of accident survivors.

Metrolink/BNSF train collision in California (two fatalities). Coordinated the efforts of responding local, state and federal agencies, and with the local Red Cross chapters to ensure support for survivors and family members. Assisted survival factors investigators with scene documentation and forensic analysis. Worked with county coroner to compile cause of death data at autopsies.

China Air flight 611 in Taiwan (225 fatalities). Assisted NTSB and Taiwanese investigators with forensic analysis and injury documentation. Advised Taiwanese authorities on family assistance issues and provided support materials for their family assistance efforts.

Bridge collapse in Oklahoma (14 fatalities). Supported the Offices of Highway and Marine Safety during the on-scene investigation by arranging interviews with hospitalized motorists involved in the accident. Assisted the state medical examiner with the identification process by acquiring the ante mortem medical records from the victims' families.

Amtrak derailment in Maryland (no fatalities). Assisted Amtrak in its family support operations. Conducted interviews of survivors in support of NTSB survival factors investigators.

Cessna 3101 crash in California (two fatalities in aircraft; two fatalities on ground). Worked closely with LA County Sheriff to ensure witness statements had been gathered. Conducted interviews of victims and witnesses at several hospitals in the Los Angeles area. Coordinated crisis service for victims' families with hospital caseworkers and the American Red Cross. Coordinated underwater search in lake adjacent to the crash site for aircraft components. Assisted in gathering of information from family of pilot. Assisted investigator with various logistical support requests.

Federal Express flight 1478 in Florida (no fatalities). Worked with the Federal Bureau of Investigation (FBI) Evidence Response Team on documentation of the wreckage site. Served as a liaison between the IIC, FBI, local and county police, FedEx and the Tallahassee Airport Authority with on-scene issues and resource needs.

Westwind II aircraft accident in New Mexico (two fatalities). Coordinated the efforts of the FBI Evidence Response Team in the collection of human remains at the crash site. Provided forensic expertise to the NTSB investigative team and assisted the local medical examiner in the collection of medical records for the identification of the victims.

Beech King Air accident in Eveleth, Minnesota (8 fatalities). Assisted the charter company by facilitating crisis counseling to their employees through the American Red Cross. Worked with the FBI Evidence Response Team to recover human remains and personal effects. Assisted the medical examiner in expediting determination of positive identification.

NTSB Academy Courses

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

The Transportation Disaster Response: A Course for Law Enforcement Officers course enhances community readiness for a major aviation or other transportation accidents. NTSB disaster response specialists and accident investigators, federal and state law enforcement officials, and other professionals present a variety of disaster response topics. Law enforcement officials leave this course with new knowledge gained from other communities that have responded to major transportation disasters, and a confident skill set enabling them to prepare their own resources in advance. This course was presented for the first time in December 2002 at George Washington University's Ashburn, Virginia campus, future home of the NTSB Academy. It was attended by 37 law enforcement officials from 11 states, the District of Columbia and Ontario, Canada.

The Family Assistance During Transportation Disasters course brings together leaders from many transportation disciplines to share knowledge and enhance family assistance operations following transportation disasters. NTSB transportation disaster assistance specialists, grief and trauma specialists, federal transportation officials, and other professionals present a

In July 2002, the NTSB changed the name of its Office of Family Affairs to the Office of Transportation Disaster Assistance (TDA) to better reflect the broad range of the office's duties, and the extension of its services to all modes of transportation covered by the NTSB.

course focused on meeting both the immediate and long-term needs of family members affected by transportation disasters. Topics include:

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

This course was presented in April and October 2002 at the Ashburn, Virginia campus. The two courses were attended by 120 transportation professionals representing 20 domestic air carriers, 21 international air carriers, four airport authorities, several government agencies and private organizations, and airport authorities from 15 countries.

Partnerships With Other Agencies

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

Carol J. Carmody

Acting Chairman (2002-)
Vice Chairman

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

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

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

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

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

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

Her career includes managing a firm which administered Taft-Hartley pension plans; owning and managing an employment agency; serving at the Central Intelligence Agency; and working at Braniff Airlines.

Ms. Carmody has a Master's in Public Administration from American University in Washington, D.C. and a Bachelor of Arts from the University of Oklahoma. Her term as Member expires on December 31, 2004.

Marion C. Blakey

Chairman (2001-2002)

Marion Clifton Blakey was sworn in on September 26, 2001 as the ninth Chairman of the Safety Board.

Soon after her arrival, the Chairman visited the sites of the September 11, 2001 terrorist attacks on New York City and the Pentagon. In November 2001, she launched on the investigation into the American Airlines flight 587 accident in New York City. The crash killed all 260 on board the plane and five people on the ground. It was the second deadliest airline crash in U.S. history.

Ms. Blakey served in a number of positions in government, including as Administrator of the DOT's National Highway Traffic Safety Administration (NHTSA) (1992-1993). As the nation's leading highway safety official, she was charged with reducing deaths, injuries and economic losses resulting from motor vehicle crashes. She also served in five government departments and agencies, including the Department of Commerce, the Department of Education, the National Endowment for the Humanities and the White House, as well as the DOT. She also held four previous Presidential appointments, two of which required Senate confirmation.

Ms. Blakey received her bachelor's degree with honors in international studies from Mary Washington College of the University of Virginia. She also attended Johns Hopkins University, School of Advanced International Studies for graduate work in Middle East Affairs.

Ms. Blakey departed the Safety Board in September 2002 to become the FAA Administrator.

John A. Hammerschmidt

Member

John A. Hammerschmidt has served for over 18 years at the Safety Board. He has served as a Member of the Board since June 1991 and, prior to that, served as Special Assistant to the Board Chairman and Member during 1985-91. He has been appointed by the President and confirmed by the U. S. Senate three times.

Mr. Hammerschmidt is a private pilot, and is the senior Safety Board Member. He has participated on-scene in more than five dozen major accident investigations and public hearings, involving all transportation modes: highway; aviation; rail; marine; pipeline; and space launch. His on-scene investigations include the 2001 collision between the U.S. nuclear attack submarine USS GREENEVILLE and the Japanese fisheries training vessel EHIME MARU near Honolulu, Hawaii; the 2000 Alaska Airlines flight 261 accident near Point Mugu, California; the 1999 gasoline pipeline accident in Bellingham, Washington; the 1997 Comair EMB-120 commuter airline accident near Monroe, Michigan; the 1996 collision of the bulk carrier BRIGHT FIELD with the Port of New Orleans River Walk Shopping Mall; the 1995 Atlantic Southeast Airlines EMB-120 commuter accident at Carrollton, Georgia; the 1994 USAir DC-9 accident at Charlotte, North Carolina; and the 1993 Amtrak accident near Mobile, Alabama, the worst in Amtrak history.

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

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

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

Mr. Hammerschmidt is a native of Harrison, Arkansas. He presently resides in Arlington, Virginia. His term on the Safety Board expired on December 31, 2002.

John J. Goglia

Member

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

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

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

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

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

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

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

George W. Black, Jr.

Member

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

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

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

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

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

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

Mr. Black's term as a Safety Board Member expired on December 31, 2001.

National Transportation Safety Board
Washington, DC 20594