

National Transportation Safety Board



ANNUAL REPORT TO CONGRESS



1999 Annual Report

NTSB/SPC-00/03



National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

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Abstract: This report summarizes the activities and accomplishments of the Safety Board during the 1999 calendar year.

The National Transportation Safety Board is an independent Federal agency dedicated to promoting aviation, railroad, highway, marine, pipeline, and hazardous materials safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The Safety Board makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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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 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 in 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 NTSB, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of safety in the transportation system than the individual modal agencies working separately. Since 1967, the Board has investigated accidents in the aviation, highway, marine, pipeline, and railroad modes.

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

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.

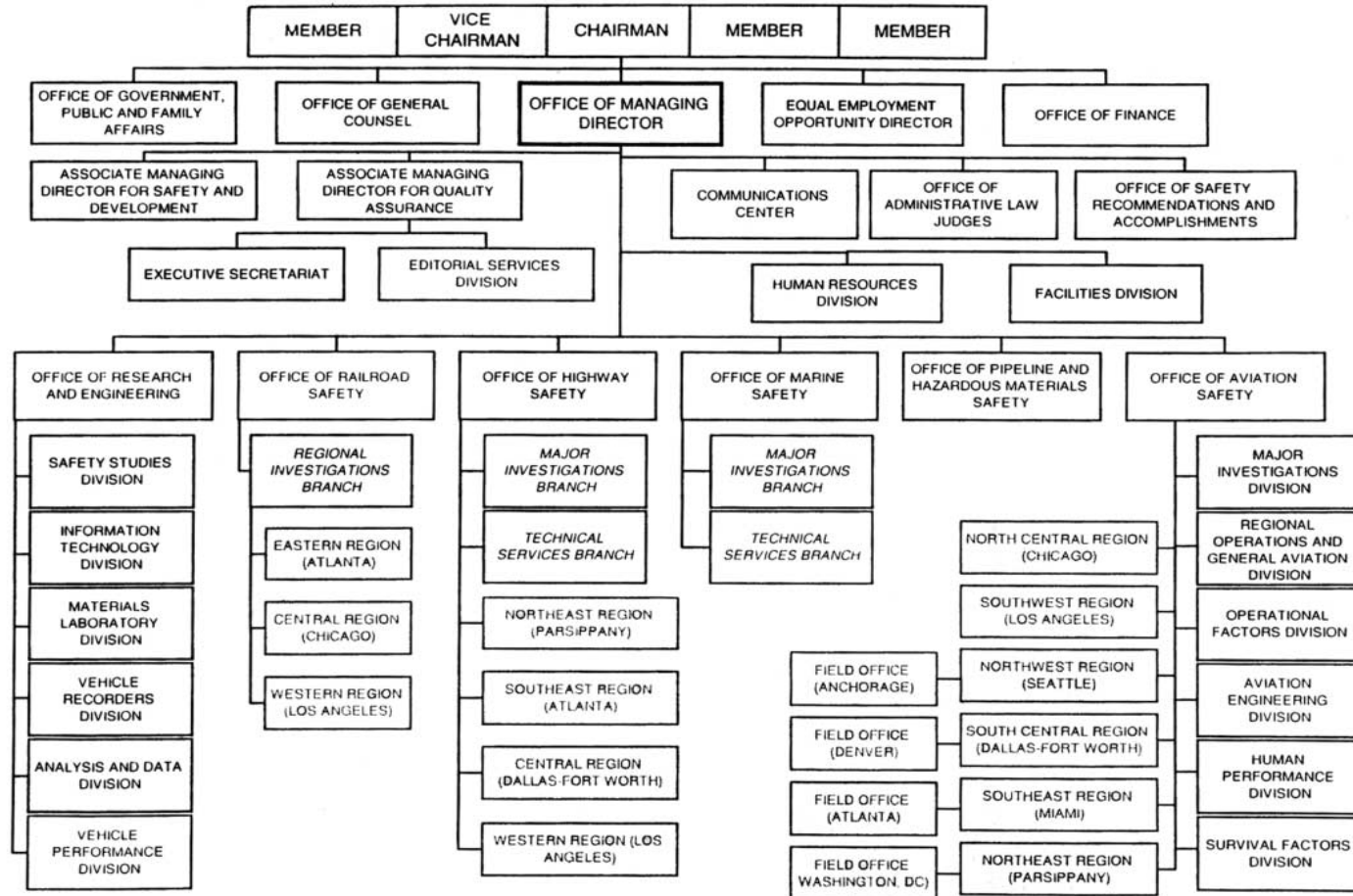
To date, the NTSB has issued almost 11,600 safety recommendations pertaining to the various transportation modes to more than 1,300 recipients. Because the Board has no authority to regulate the transportation industry, its effectiveness depends on its reputation for conducting thorough and accurate 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 and the transportation industry.



Newport, Rhode Island. NTSB Chairman Jim Hall addresses media regarding the crash of EgyptAir flight 990 on October 31, 1999. This was the deadliest accident investigated by the Board in 1999.

Organizational Chart

NATIONAL TRANSPORTATION SAFETY BOARD



Member Profiles

JAMES EVAN HALL CHAIRMAN



Jim Hall, of Chattanooga, Tennessee, was appointed as a Member of the National Transportation Safety Board in October 1993; he became Chairman in June 1994. As head of the agency he calls the "eyes and ears of the American taxpayer," Chairman Hall has worked tirelessly to improve the safety of all modes of transportation during his tenure. He named 1999 as the "Year of Child Passenger Safety" and focused the Safety Board's, the transportation industry's, and the regulators' attention on improving child safety in all modes.

While Mr. Hall has been Chairman, the Safety Board has experienced a period of unprecedented activity, including aviation investigations into the crashes of USAir flight 427 in Aliquippa, Pennsylvania; ValuJet flight 592 in the Everglades; TWA flight 800 off Long Island; Korean Air flight 801 in Guam; and EgyptAir flight 990 off the coast of Rhode Island. In the surface modes, the Board recently launched investigations into the Amtrak grade crossing accident in Illinois, the casino bus crash in Louisiana, and an amphibious tour boat sinking in Arkansas.

On average, the Safety Board investigates some 2,000 aviation accidents and 500 accidents in the other modes (rail, marine, highway, and pipeline) annually. In 1996, President Clinton and the Congress assigned the Board the additional responsibility of coordinating Federal assistance to the families of aviation accident victims.

Mr. Hall was the on-scene Board Member at the January 1994 Ringling Brothers Circus train derailment in Florida; the October 1994 American Eagle ATR-72 crash in Roselawn, Indiana; the December 1994 American Eagle Jetstream accident in Raleigh-Durham; the February 1995 and August 1997 cargo plane crashes in Kansas City and Miami; the August 1997 Amtrak accident in Kingman, Arizona; the July 1999 crash of a single-engine aircraft near Martha's Vineyard, Massachusetts that claimed the lives of John F. Kennedy, Jr., his wife Carolyn, and her sister Lauren Bessette; and the October 1999 crash of an EgyptAir Boeing 767 off the coast of Rhode Island.

He has also served as the Chairman of the Board of Inquiry for public hearings on four major accidents: the USAir flight 427 crash; the November 1994 runway collision in St. Louis; the February 1996 commuter train/Amtrak collision in Silver Spring, Maryland; and the TWA flight 800 crash. In addition, Chairman Hall has chaired safety forums on commercial air service in Alaska and truck and bus safety and international symposia on the impact of fatigue on transportation safety, preventing pipeline excavation damage, the effects of corporate culture on safety, improving assistance to survivors and families of accident victims, and increasing the use of data recorders in all transportation modes.

During Mr. Hall's chairmanship, the Safety Board has issued landmark safety studies on commuter airlines, the air tour industry, the performance and use of child restraint systems, the dangers of passenger-side automobile air bags to children, personal watercraft safety, transit bus safety oversight, and passive grade crossings.

In September 1996, President Clinton named Chairman Hall to the White House Commission on Aviation Safety and Security. In two reports to the President, the commission issued 51 recommendations to improve aviation safety and security around the world.

In January 1996, Chairman Hall was honored by *Aviation Week and Space Technology* with an Aviation Laurel for "relentlessly pursuing every avenue available in an attempt to resolve what happened to USAir flight 427." The magazine wrote that "Hall has exhibited exemplary leadership . . . and has professionally and respectfully addressed the concerns of the accident victims' families." It also lauded his efforts to upgrade flight data recorders on U.S. airliners.

In 1997, Chairman Hall was presented the Herbert C. Bonner Award by the National Association of State Boating Law Administrators. He received the award for the commitment he had shown over the years toward boating safety. That organization presented him with its Administrator's Award in 1999.

Prior to his appointment to the Safety Board, Chairman Hall served as counsel to the U.S. Senate Subcommittee on Intergovernmental Relations and on the staff of U.S.

Senator Al Gore, Sr. Later, he maintained a private legal practice in Chattanooga, Tennessee. Then, as a member of Tennessee Governor Ned McWherter's cabinet, Mr. Hall served as director of the Tennessee State Planning Office for five years. While in the Governor's cabinet, he developed Tennessee's first comprehensive anti-drug effort. In early 1993, Mr. Hall returned to Washington to serve as chief of staff for U.S. Senator Harlan Mathews.

Chairman Hall received a law degree from the University of Tennessee. While serving in the Army, he received a Bronze Star for Meritorious Service in Vietnam. He and his wife, the former Anne Stewart Impink, have two daughters, Molly and Katie. Chairman Hall's term on the Board expires on December 31, 2002.

**ROBERT TALCOTT FRANCIS II
VICE CHAIRMAN**



Robert Talcott Francis II has been the Vice Chairman of the National Transportation Safety Board since January 1995 when he was appointed to the Safety Board by President Clinton. In August 1995, Vice Chairman Francis was confirmed by the United States Senate.

Since joining the Safety Board, Mr. Francis has been involved in a number of transportation accident investigations, including the explosion and crash of TWA flight 800 off Long Island, New York, in July 1996; the crash of ValuJet flight 592 in the Florida Everglades in May 1996; the crash of a DC-8 cargo carrier in Kansas City; a major parachuting accident in Virginia; and an Amtrak train derailment in Arizona. He also has chaired a number of Safety Board public hearings including the March 1998 hearing on Korean Air flight 801 that crashed in Guam in August 1997. In addition to his accident investigation work and other Safety Board duties, he has been actively involved as a member of the Air Transport Association of America's Steering Committee on Flight Operations Quality Assurance programs and the Flight Safety Foundation's ICARUS Committee, a group composed of worldwide aviation experts who gather informally to share ideas on reducing human error in the cockpit.

Prior to his appointment to the Safety Board, Mr. Francis served as Senior Representative for the FAA in Western Europe and North Africa and was based in Paris, France. Representing the FAA Administrator, he worked extensively on aviation safety and security issues with U.S. and foreign air carriers, transportation governmental

authorities, aircraft manufacturers, and airports. At the Safety Board, he continues to be actively involved in international aviation issues, and has spoken extensively about the Safety Board's role and international activities. In conjunction with his work at the Safety Board, he is a recipient of an *Aviation Week and Space Technology* 1996 Laurel Award and was recognized by both the U.S. Navy and the U.S. Coast Guard for meritorious service in the TWA flight 800 investigation.

A native of Cohasset, Massachusetts, Mr. Francis received his A.B. from Williams College and attended Boston University and the University of Ibadan, Nigeria. An active general aviation pilot, he holds a commercial pilot certificate with instrument and twin-engine ratings. He is a member of the French Academy of Air & Space, a fellow of the Royal Aeronautical Society, and a member of both the Wings Club of New York and the AeroClub of Washington. Mr. Francis and his wife, Judy, have two daughters, Allison and Carolyn.

His term as Vice Chairman expired on August 14, 1999, and his appointment as a Member of the Safety Board expired on December 31, 1999.

JOHN ARTHUR HAMMERSCHMIDT MEMBER



John A. Hammerschmidt became a Member of the National Transportation Safety Board in June 1991 and is now serving in his second 5-year term. Prior to becoming a Board Member, Mr. Hammerschmidt had extensive senior-level Safety Board experience, serving as Special Assistant to the Board Chairman and Member during 1985-91.

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 modes of transportation: highway, aviation, rail, marine and pipeline.

On-scene investigations include the June 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 Riverwalk Marketplace; 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 1999, Mr. Hammerschmidt chaired the Safety Board's public hearing in Miami, Florida, on the 1998 fire aboard the cruise ship *Ecstasy* as the vessel was leaving the Port of Miami. In 1997, he chaired a 4-day public hearing in San Juan, Puerto Rico, on the worst pipeline accident ever investigated by the Board, an explosion that killed 33 people there. 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 5-day public hearing in Indianapolis, Indiana, on the American Eagle ATR-72 accident near Roselawn, Indianapolis. 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 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 currently resides in Arlington, Virginia. Mr. Hammerschmidt's term on the Safety Board expires on December 31, 2000.

**JOHN J. GOGLIA
MEMBER**



John Goglia is an internationally recognized expert in aviation maintenance and aircraft operations. He was first sworn in as a Member of the National Transportation Safety Board in August 1995.

He is the first working A&P mechanic to serve on the Safety Board, with over 30 years of aviation experience. Before his Senate confirmation, he was based with USAir and was the recipient of the prestigious 1994 Industry Aviation Mechanic of the Year Award.

With a wealth of experience, Member Goglia is a leading advocate regarding the evaluation of human factors in the aviation workplace. He developed the Maintenance Resource Management Program, combining management, labor, regulatory agencies and academia into what has become the premier human factors program in aviation maintenance.

Mr. Goglia served as the Governor's appointee to the Massachusetts Workers Compensation Board and to the Boston Area Second Airport Site Selection Board.

Mr. Goglia served as Team Coordinator of the International Association of Machinists and Aerospace Workers' (IAM) Accident Investigation Team and for over 21 years he served as the IAM's Flight Safety Representative. He was the IAM's principal specialist on aviation issues, serving as liaison to the FAA, NTSB, DOT, and other executive branch agencies as well as the U.S. Congress. He represented the IAM on the

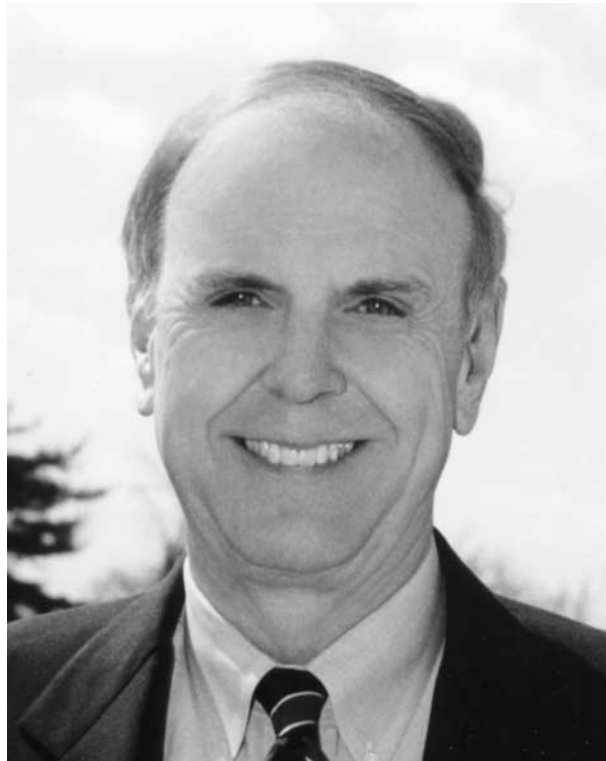
aviation Rulemaking Advisory Committee, which evaluates and recommends changes regarding aviation safety and operational regulations.

Member Goglia served as Chair and a founding member of the National Coalition for Aviation Education, an aviation industry organization that advances aviation 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 professional society dedicated to advanced safety and professionalism throughout the aviation maintenance industry. He is an internationally known speaker and author addressing aviation safety issues, lecturing at world symposiums and serving as contributing editor to several industry periodicals. In 1960, John learned to fly in a Piper J2-J3 and, for over 10 years, he was owner/operator of an aircraft service company.

Mr. Goglia was the Member on scene for the Safety Board's investigation of the grade-crossing accident in Fox River Grove, Illinois, in October 1995 that killed seven high school students on a school bus. In January 1996, he chaired a briefing for government and industry representatives regarding the problem of ingestion of birds in the new generation of air carrier engines.

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

**GEORGE WASHINGTON BLACK, JR.
MEMBER**



George W. Black, Jr., P.E., of Georgia became a Member of the National Transportation 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. Department of Transportation.

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.

He returned to traffic safety engineering in 1973 when 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 10 years with the County, he oversaw the implementation of a nearly \$500 million road 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' (Georgia Division) Karl Bevins Award and the 1997 Transportation Professional of the Year Award, the Gwinnett County Chamber of Commerce's Public Service Award, and the American Society of Civil Engineers' 1996 National Civil Government Award. In August 1998 he received the International Institute of Transportation Engineer's Edmund R. Ricker Traffic Safety Award.

Since his appointment to the Board, Mr. Black has been on-scene board member for several aviation accidents, including Delta flight 1288 at Pensacola, Florida; United Express flight 5926 at Quincy, Illinois; Korean Air flight 801 on Guam; and a general aviation mid-air collision in Cobb County, Georgia. In other modes of transportation: a propane gas explosion in San Juan, Puerto Rico, a fatal interstate bus crash in Old Bridge, New Jersey, and school bus accidents in Monticello, Minnesota, and Holmdel, New Jersey.

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

The NTSB and Congress

The Chairman of the National Transportation Safety Board and staff testified before Congressional committees 16 times during calendar year 1999. Below is an outline of testimony provided by Safety Board Members and staff. Complete copies of the testimony are available on the NTSB's Web site at <http://www.nts.gov/speeches>.

On February 23, 1999, Chairman Jim Hall testified before the Subcommittee on Transportation and Related Agencies, House Committee on Appropriations, regarding heavy vehicle safety. The Chairman's testimony discussed growing concerns over truck safety, including increased vehicle size, congested highways and driver fatigue. In his testimony, the Chairman noted several solutions to the problem such as new hours-of-service regulations, collision avoidance systems for trucks, and on-board recorders.

Chairman Hall testified before Congress twice in March. On March 10, he testified before the Subcommittee on Transportation and Related Agencies, House Committee on Appropriations, regarding aviation safety. The Chairman's testimony discussed controlled flight into terrain, the need for upgraded flight data recorders, airframe structural icing, traffic collision avoidance systems, runway incursions, and child safety seats on airplanes.

On March 25, Chairman Hall appeared before the Subcommittee on Surface Transportation and Merchant Marine, Senate Committee on Commerce, Science and Transportation. The topic of the Chairman's testimony was grade crossing safety. Cited as an example was the March 15, 1999, collision of Amtrak's "City of New Orleans," travelling from Chicago, Illinois, to New Orleans, Louisiana, and a semi-trailer loaded with steel bars. Eleven passengers, all located in a sleeper car, were killed.

On April 27, the Chairman again testified on truck and bus safety issues, similar to the testimony presented in February. This testimony was provided by the Chairman before the Senate Committee on Commerce, Science and Transportation.

On May 6, before the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, and July 15, before the Senate Committee on Commerce, Science and Transportation, Chairman Hall testified regarding the Safety Board's three-year reauthorization request. The Chairman's testimony described the need for the nine requested changes to the Board's authority: marine jurisdiction on the territorial seas; accident scene priority; personnel management, including prescription of reasonable rates of pay for overtime; exempted service appointment authority; discretionary base pay supplement for employees engaged in investigation work; retirement at age 55 with 20 or more years of service; technical service agreements and collections; collection for production of dockets; protection of voice and video recorder information for all modes of transportation; an increase in the authorization of appropriations; marine primacy; and public aircraft investigation clarification.

Joseph Osterman, Director of the Office of Highway Safety, provided testimony on May 26, before the Subcommittee on Ground Transportation, House Committee on Transportation and Infrastructure, regarding oversight of the Office of Motor Carriers, Federal Highway Administration and of bus safety. The testimony highlighted the Safety Board's belief that better accident reporting data is crucial to highway safety. Also of great concern to the Board is better oversight of all stakeholders, including drivers, companies, shippers, brokers, consignors, freight forwarders, and tour operators.

On July 22, Chairman Hall appeared before the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, to discuss aviation operations during severe weather conditions. Of concern to the Safety Board are weather hazards in the airport terminal area such as low ceilings and visibility; airplane airframe icing, both on the ground and airborne in the airport terminal area; runway contamination by ice, snow, and water; and thunderstorms and convective activity, which produces low-altitude windshear, strong and gusty winds, heavy rains, hail, and lightning.

Severe weather concerns were highlighted in the June 1, 1999, crash of American Airlines flight 1420, an MD-82, in Little Rock, Arkansas, that took the lives of 11 people. There were heavy thunderstorms in the area of the airport at the time of the accident.

Pipeline safety was the topic of testimony given by the Chairman before the Subcommittee on Economic Development, Public Buildings, Hazardous Materials, and Pipeline Transportation, House Committee on Transportation and Infrastructure, on July 27. The Chairman conveyed the Board's belief that the Research and Special Programs Administration (RSPA) has failed in its mission to play a crucial role in pipeline safety as the Federal regulators in this area. Testimony cited the June 10, 1999, explosion of a gas pipeline owned by Olympic Pipeline in Bellingham, Washington, as an example. The explosion and subsequent fire killed three people.

Dr. Vernon Ellingstad, Director of the Office of Research and Engineering, appeared before the Subcommittee on Aviation, House Committee on Transportation and Infrastructure, on August 3, regarding pilot fatigue. Dr. Ellingstad noted that NTSB investigations have identified serious and continuing problems concerning the far-reaching effects of fatigue, sleepiness, sleep disorders, and circadian rhythm disruption in transportation system safety, and identified Safety Board recommendations to the FAA to combat pilot fatigue.

Testimony on aging aircraft wiring was provided by Dr. Bernard Loeb, Director of the Office of Aviation Safety, on September 15, before the Subcommittee on Oversight, Investigations, and Emergency Management, House Committee on Transportation and Infrastructure. Dr. Loeb's testimony focused on the Safety Board's efforts to address aircraft wiring issues raised in accident and incident investigations, including the NTSB's investigation of TWA flight 800 and the Canadian investigation of Swissair flight 111.

On September 29, the NTSB submitted testimony for the record to the Subcommittee on Surface Transportation and Merchant Marine, Senate Committee on Commerce, Science and Transportation, regarding the Motor Carrier Safety Improvement Act of 1999. The Board's testimony discussed the need for improvements to the Commercial Driver's License program, improved data collection, and protection of data obtained from event recorders.

Chairman Hall appeared before the Subcommittee on Coast Guard and Maritime Transportation, House Committee on Transportation and Infrastructure, on October 7, to discuss cruise ship safety and the threat posed by fire at sea. In his testimony, the Chairman outlined recommendations the Safety Board has made to combat fire at sea including smoke detectors, sprinkler systems, low-level emergency lighting systems, and protected means of escape.

On October 27, the Chairman provided testimony before the House Committee on Transportation and Infrastructure, Subcommittee on Economic Development, Public Buildings, Hazardous Materials, and Pipeline Transportation. The Chairman's testimony focused on the Board's investigation into the June 10, 1999, rupture and explosion of a gas pipeline in Bellingham, Washington.

Coast Guard Search and Rescue operations were the topic of testimony provided by the Chairman on November 3, before the Subcommittee on Coast Guard and Maritime Transportation, House Committee on Transportation and Infrastructure. The Chairman's remarks reviewed the Board's investigation into the December 29, 1997, sinking of the sailing vessel *Morning Dew* and the resulting Coast Guard search and rescue effort.

The testimony highlighted the Board's findings that the Coast Guard needs to upgrade its search and rescue communications equipment, that watchstander duty hours need to be reviewed, watchstander procedures for responding to an emergency should be reviewed and updated, and additional training for communications watchstanders are needed, as well as the need for better management oversight of watchstanders.

On December 14, James LaBelle, Chief of the NTSB's Northwest Field Office in Anchorage, Alaska, testified before the Subcommittee on Transportation, Senate Committee on Appropriations, regarding aviation safety in Alaska. Mr. LaBelle reviewed the "closed - unacceptable" status of two of the Board's 1995 recommendations regarding automated surface weather observing sites (to the FAA) and mike-in-hand radio service (to the National Weather Service).

State and Local Government Outreach in 1999

The year 1999 saw an unprecedented level of activity by the Safety Board to expand its outreach to State and local officials in order to promote implementation of recommendations made to the States. The Board and staff made more than 40 personal appearances, either in the states or at organizations of State officials, in addition to submissions of documentary support.

The Safety Board continues to see an increased interest in transportation safety issues from the States. Most notable in 1999 has been the enactment of graduated licensing systems in 13 States, bringing the total with some form of graduated licensing to 37. Virtually all of these laws have been enacted in the past 5 years. Historically, the only other safety laws to be widely adopted so quickly have been child safety seat use and zero alcohol tolerance for drivers under age 21.

There also has been increased interest in occupant protection legislation. Primary enforcement bills were introduced in 21 States, and other measures to strengthen safety belt use laws, such as increased penalties and expanded coverage were introduced in 19 States. Alabama and Michigan enacted primary enforcement, bringing the total number of States with such a law to 16, plus the District of Columbia. The Air Bag and Seat Belt Safety Campaign led strong efforts to pass laws in a number of States this year.

In the marine safety area, a series of high-visibility boating accidents have caught the attention of legislators in a number of States. This has led to increased interest in mandatory boater education requirements and personal flotation device (PFD) use requirements for children. Laws requiring children to wear PFDs were enacted in New Jersey and Washington. Oregon and West Virginia enacted boater education requirements. In each case, the Safety Board participated through either personal testimony or correspondence or by providing background information. In California, a mandatory boater education bill passed the legislature, but was vetoed by Governor Davis. There also has been continuing interest in imposing restrictions on personal watercraft use as a result of both safety and environmental concerns. Measures containing restrictions similar to those recommended by the Board in its 1998 safety study were enacted in Arkansas, Louisiana, and Nebraska.

One of the important reasons for the Safety Board's increased presence in the States has been its leadership and participation in coalitions of government and private-sector organizations to seek both highway and marine safety improvements. These groups provide opportunities for the Board to broadcast its message far more broadly than is possible when it acts alone. Further, the coalitions have been a valuable source of information that allows the Board to better target its limited resources toward those States where it can have the greatest impact.

When Chairman Hall addressed the National Association of Governors' Highway Safety Representatives in August 1999, he called upon the States to make highway safety a top priority. He also sent letters to all 50 Governors, and in a meeting with Utah Governor Mike Leavitt, Chairman of the National Governors' Association (NGA), urged NGA to make highway safety one of its top priorities. This effort is still underway, as the Safty Board makes plans to meet with Maryland Governor Parris Glendening, who will be the NGA Chairman in 2000.

Safety Recommendations and Accomplishments

“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. In May 1999, the NTSB issued an updated Most Wanted list of 10 safety improvement goals covering all modes of transportation: aviation, highway, rail, marine, and pipeline.

The Most Wanted list highlights safety recommendations the NTSB believes should be acted on as soon as possible because they have the most potential to improve safety, save lives, and reduce accidents and injuries.

Issues highlighted on the Most Wanted list:

- ***Automatic information recording devices:*** Require adequate recording devices on all types of vehicles, such as flight data recorders on aircraft and voyage event recorders on ships.
- ***Child and youth safety in transportation:*** Toughen and enforce minimum drinking and driving laws, enact laws mandating a provisional license system and nighttime restrictions for young novice drivers, educate parents and guardians about transporting kids in back seats, make back seats more child friendly, and require restraints for infants and small children in airplanes.
- ***Positive train separation:*** Mandate the installation of automated systems to stop trains when crewmembers make signal or speed mistakes or are incapacitated.
- ***Human fatigue in transportation operations:*** Translate the latest human fatigue research into meaningful time and duty hour regulations for workers in all modes of transportation.
- ***Airport runway incursions:*** Move forward with current and new programs aimed at preventing accidents involving aircraft while they are on the ground at airports.
- ***Excavation damage prevention to underground facilities:*** Urge the Federal government to increase its role in excavation damage prevention programs and review of state programs to improve them.
- ***Recreational boating safety:*** Require states to implement a series of boating safety improvements, educational programs, and regulations.

- ***Highway vehicle occupant protection:*** Require a series of safety improvements to the design, installation, and usage of vehicle seatbelts, air bags, and child restraints.
- ***Airframe structural icing:*** Revise icing regulations based on up-to-date research on icing weather conditions. Conduct research with the goal of developing new on-board systems to detect and protect aircraft against freezing drizzle.
- ***Explosive mixtures in fuel tanks on transport-category aircraft:*** Require design and operational modifications to reduce the potential for explosive fuel-air mixtures in large aircraft fuel tanks.

At its May 5, 1999, Board meeting, the Safety Board removed several items from the list because of substantial progress in implementing many of the recommendations. Although they are no longer on the priority list, the NTSB continues to monitor these recommendations until action is completed. Issues removed were: fishing vessel safety, aircraft cargo hold fires, aircraft wake vortex turbulence, administrative revocation of drivers' licenses, school bus safety, heavy commercial truck safety, small passenger vessel safety, midair collision avoidance alerts in terminal areas, aircraft pilot background checks, and passenger railcar safety.

Family Affairs

The Aviation Disaster Family Assistance Act of 1996 (PL 104-264) conferred major new responsibilities on the NTSB for aiding the families of victims of aircraft accidents on U.S. territory. Prior to the passage of the law, President Clinton issued an executive memorandum requesting that the Board coordinate Federal services for families of victims of major transportation disasters.

The 1996 law was in response to inadequacies in the treatment accorded to families of victims in the wake of a number of major crashes. The intent was to marshal the resources of the Federal government and other organizations in support of the efforts of airlines and local authorities, which traditionally had the responsibility of meeting the needs of aviation disaster victims and their families. The office has extended its service to cover some major accidents in the other modes of transportation.

The major accidents in which the Office of Family Affairs coordinated Federal services for victims and their families during 1999 included the Amtrak "City of New Orleans" crash in Bourbonnais, Illinois; the American Airlines flight 1420 crash in Little Rock, Arkansas; and the crash of EgyptAir flight 990 into the Atlantic Ocean. In addition to these accidents, the Department of State requested a forensic expert from the Family Affairs staff to assist them with a sightseeing plane crash in Tanzania, that killed 10 Americans. The Tanzanian Government requested one accredited NTSB investigator to support them during this accident.

As part of the effort to reach out to the airline industry, airports, public safety, medical examiner/coroner, and mental health communities to help them understand the role and responsibilities of agencies when responding to major transportation disasters, the Family Affairs staff made presentations to the American Red Cross's Aviation Incident Response (AIR) Team, the Airport Chaplain's Association, the National Funeral Directors Association, the Arizona Funeral Director's Association, Airline Medical Directors Association, Wisconsin Coroner's & Medical Examiners Association, Disaster Mortuary Operational Response Team (DMORT) Region V, New Jersey Dental Association, Armed Forces Institute of Pathology (AFIP), American Academy of Forensic Sciences, USAF, 3rd Services Squadron, Search and Recovery Teams.

In addition, the Office of Family Affairs participated in meetings with airports and airlines to develop early response and emergency planning procedures for aviation accidents. Some of the airlines and airports visited in 1999 included Midwest Express, Alaska, Horizon, Continental, Virgin, United, Northwest, American, Pan American, US Airways Express, Copa, Varig, Ronald Reagan Washington National, Dulles, Denver International, Atlanta, Dallas-Fort Worth, Salt Lake City, Hartford, and Philadelphia.

Additionally, presentations were made to Amtrak in Philadelphia, Washington and Wilmington, Delaware; FEMA Region V, Chicago, Illinois; and the FAA in Washington and Hartford, Connecticut.

Representatives from the Office of Family Affairs responded to the following accidents in 1999:

- January 25, 1999, Vero Beach, Florida. A school bus and tractor-trailer collided, resulting in two fatalities.
- March 15, 1999, Bourbonnais, Illinois. Amtrak's "City of New Orleans" and tractor-trailer collided at a grade crossing and 11 people were killed.
- April 30, 1999, Braidwood, Illinois. A charter motor coach overturned on the highway resulting in one fatality.
- May 1, 1999, Hot Springs, Arkansas. An amphibious "Duck" boat carrying tourists sank. Thirteen people were killed.
- May 9, 1999, New Orleans, Louisiana. A casino motor coach ran off the road and overturned. Twenty-two people were killed.
- June 1, 1999, Little Rock, Arkansas. American Airlines flight 1420 crashed, killing 11 aboard.
- July 31, 1999, Marine City, Michigan. A King Air A-90 crashed while conducting parachuting operations. Ten people were killed.
- September 1, 1999, Tanzania. A general aviation crash involving a sightseeing aircraft resulted in 10 American fatalities. The Department of State requested the assistance of the Family Affairs staff.
- September 3, 1999, Palm Beach County, Florida. General aviation crash, eight killed.
- September 5, 1999, Westerly, Rhode Island. Air taxi crash, three killed.
- September 25, 1999, Mauna Loa Volcano, Hawaii. A Piper PA 31 aircraft on a sightseeing flight crashed, killing 10 people.
- October 25, 1999, Minot, South Dakota. A Learjet 35 crashed, killing six people, including golfer Payne Stewart.
- October 31, 1999, Atlantic Ocean off the coast of Massachusetts. Crash of EgyptAir flight 990 with 217 fatalities.

The Office of Family Affairs has worked closely with the Office of Marine Safety and the Office of Railroad Safety to support the families who attended the public hearings in Charleston, South Carolina, for the *Morning Dew* marine accident and in Chicago, Illinois, for the Amtrak accident in Bourbonnais, Illinois. Similar support was given at the Board meeting held to issue the probable cause of the crash of USAir flight 427.

Transportation Fatality Statistics

Preliminary figures for 1999 show that 43,986 persons died in highway, rail, marine, aviation, and pipeline accidents, down from 43,988 in 1998. Increases in fatalities were registered in highway, aviation, and pipeline accidents, while rail and marine fatalities declined.

Highway fatalities, which account for more than 94 percent of all transportation deaths, rose from 41,501 in 1998 to 41,611 in 1999. Fatalities at roadway/railway grade crossings declined from 431 to 402.

Rail fatalities declined from 831 to 805 on the strength of a large drop in pedestrian fatalities associated with intercity rail operations. Fatalities occurring on light rail, heavy rail and commuter rail rose from 192 to 218. (Because of peculiarities in reporting requirements, there may be some duplication in the numbers for intercity rail and commuter rail on the accompanying chart.) Deaths among passengers on trains rose from 4 to 14.

Marine fatalities dropped from 950 to 853, with the largest drop in recreational boating, from 815 to 729. Commercial passenger fatalities rose from 17 to 36.

Aviation deaths rose slightly, from 688 to 691. The vast majority of deaths in aviation occur in private aircraft (general aviation, 628 fatalities). [Detailed aviation statistics are in press release SB-00/05, dated February 25, 2000, found on the Board's Web site.]

Pipeline fatalities increased from 18 to 26. Deaths related to gas pipelines increased from 17 to 22, while liquid pipeline fatalities rose from 1 to 4.

Aviation statistics are compiled by the NTSB. Numbers for all other modes are from the respective Department of Transportation modal agencies. All numbers for 1999 are preliminary.

Table 1. National Transportation Safety Board — U.S. Transportation Fatalities

	1998	1999 ^a
Highway:		
Passenger cars	21,141	20,771
Light trucks and vans	10,665	11,208
Pedestrians	5,228	4,906
Motorcycles	2,292	2,471
Pedalcycles	757	746
Medium and heavy trucks	739	755
Buses	38	58
All other	641	696
Total	41,501	41,611
Grade Crossings^b:	(431)	(402)
Rail:		
Trespassers and non-trespassers ^c	601	530
Employees and contractors	34	43
Passengers on trains	4	14
Light, heavy and commuter rail ^{d e}	192	218
Total	831	805
Marine:		
Recreational boating	815	729
Cargo transport	52	42
Commercial fishing ^f	66	46
Commercial passengers	17	36
Total	950	853
Aviation:		
General aviation	623	628
Airlines	1	12
Air taxi	48	38
Commuter	0	12
Foreign / unregistered ^g	16	1
Total	688	691
Pipeline:		
Gas	17	26
Liquids	1	0
Total	18	26
Grand Total:	43,988	43,986

a. 1999 figures are preliminary estimates supplied by modal agencies within Department of Transportation.

b. Grade crossing fatalities are not counted as a separate category for determining the grand totals because they are included in the highway and rail categories, as appropriate.

c. Does not include motor vehicle occupants killed at grade crossings.

d. 1998 figure includes heavy rail fatalities (54) reported by the Federal Transit Administration (FTA). Heavy rail is defined as an electric railway with the capacity for a heavy volume of traffic. It is characterized by rapid acceleration passenger cars on fixed rails, separate rights of way from all other traffic, sophisticated signaling and high platform loading.

e. Fatalities reported to the FTA for commuter rail operations may also be reported to the Federal Rail Administration and included in the intercity railroad fatalities.

f. Refers to only operational fatalities.

g. Includes non-U.S. registered aircraft involved in accidents in the U.S.

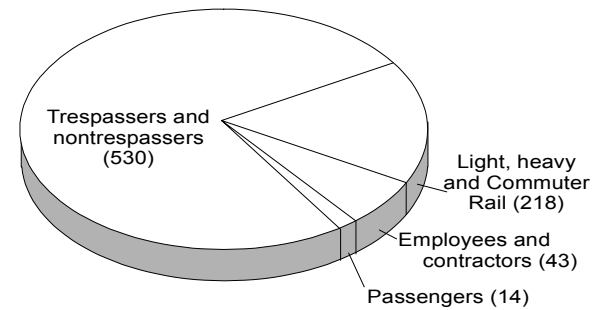
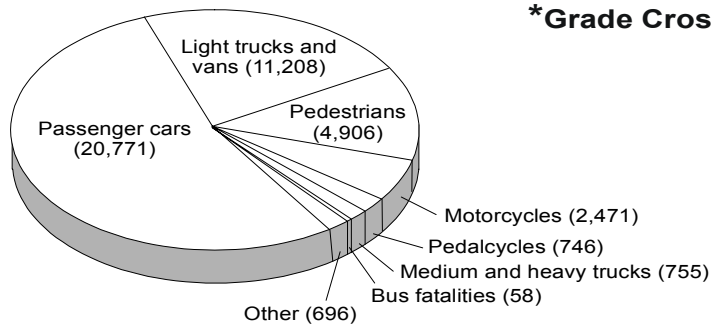
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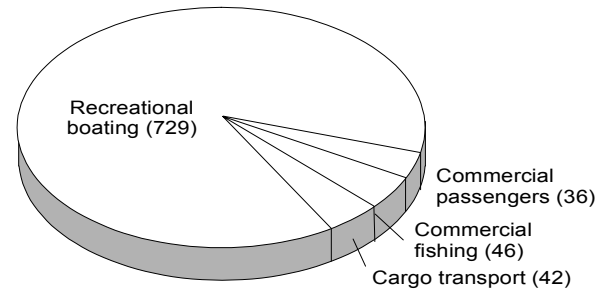
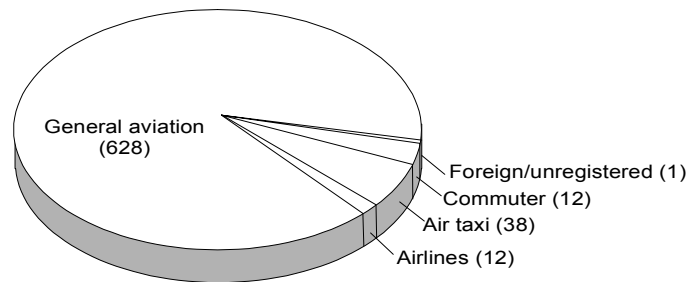
NATIONAL TRANSPORTATION SAFETY BOARD

43,986 Transportation Fatalities In 1999

Highway: 41,611 **Rail: 805**



Aviation: 691 **Pipeline: 26** **Marine: 853**



***Note:** All data are preliminary estimates. Grade crossing fatalities are not included in the grand total because they were counted in the rail and highway categories, as appropriate. The pie charts are not drawn proportionately to each other. Aviation data comes from the NTSB; all other data are from the U.S. Department of Transportation (DOT).

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 has 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 the International Civil Aviation Organization, 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 utilized 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 in the United States and overseas, as well as 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 the more than 2,000 general aviation accidents and incidents that occur annually. These investigations result in safety improvements that have far reaching impact, including, in some cases, commercial operations. In addition, the NTSB investigates accidents and incidents that are less complex and involve only property damage, as they often provide information that may be helpful in preventing accidents.

The NTSB serves as the nation's primary repository of aviation accident statistics and other related data, but its approach goes beyond the collection of data and a narrow determination of probable cause.

Typically, NTSB investigations examine all factors surrounding an accident or series of accidents or serious incidents, thereby ensuring that the regulatory agencies and the industry are provided with 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 the accident.



Calverton, New York. In September 1999 the reconstructed section of the TWA flight 800 Boeing 747 was moved to a smaller hangar at the Calverton, Long Island, facility where it currently is housed. The 96-foot reconstruction of the accident aircraft, including the center wing fuel tank, was strengthened, placed on wheels, and rolled a distance of about 1/2 mile to the new hangar.

OFFICE OF AVIATION SAFETY

The Office of Aviation Safety has the responsibility for investigating aviation accidents and incidents and for proposing probable cause 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 and field 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. Representing the different components of a major aviation investigation, the divisions are 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 and staff experts 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. The Safety Board expert will remain the Group Chairman coordinating information for his or her part of the investigation from the on-scene portion through adoption of the final report.

Operational Factors experts in three disciplines — air traffic control, operations, and weather — support major investigations with intensive work in the specialties. Aviation Engineering experts provide technical skills in the areas of powerplants (engines), structures, systems, and maintenance. Human Performance specialists review the background and performance of persons associated with an accident. Survival Factors experts 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. With all parties working together and sharing information, timely corrective actions may be taken by the appropriate parties to prevent future accidents.

Another part of the investigation process is a public hearing. A 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. After 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.

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 manufacturer of the airframe and the engine to assist in the investigation. NTSB accredited representatives support foreign investigations that are conducted by other nations in accordance with the Convention on International Civil Aviation. The office also maintains liaison and coordination with other governments through the U.S. Interagency Group on International Aviation and the International Civil Aviation Organization.

COMPLETED MAJOR INVESTIGATIONS

USAir 427, Aliquippa, Pennsylvania

On September 8, 1994, USAir flight 427, a Boeing 737-3B7 (737-300), crashed while maneuvering to land at Pittsburgh International Airport, Pittsburgh, Pennsylvania. All 132 people on board were killed, and the airplane was destroyed by impact forces and fire. Throughout the exhaustive investigation, experts worked to determine why the airplane entered an uncontrolled descent and impacted terrain near Aliquippa, Pennsylvania, about 6 miles northwest of the destination airport.

The Board's investigation focused on Boeing 737 rudder malfunctions, including rudder reversals; the adequacy of the 737 rudder system design; unusual attitude training for air carrier pilots; and flight data recorder (FDR) parameters.

On March 24, 1999, the NTSB concluded its longest investigation by determining that the probable cause of the USAir flight 427 accident was a loss of control of the airplane resulting from the movement of the rudder surface to its blowdown limit. The rudder surface most likely deflected in a direction opposite to that commanded by the pilots as a result of a jam of the main rudder power control unit servo valve secondary slide to the servo valve housing offset from its neutral position and overtravel of the primary slide.

As a result of this accident, 10 safety recommendations were made to the FAA in the final report on the investigation. Also as a result of the accident investigation, the Safety Board issued a total of 22 safety recommendations to the FAA on October 18, 1996, and February 20, 1997, regarding operation of the 737 rudder system and unusual attitude recovery procedures. In addition, the Safety Board issued three recommendations,

one of which was designated “urgent,” to the FAA on February 22, 1995, regarding the need to increase the number of FDR parameters.

Korean Air 801, Guam

On August 6, 1997, Korean Air flight 801, a Boeing 747-3B5B (747-300), crashed at Nimitz Hill, Guam. The airplane had been cleared to land at A.B. Won Guam International Airport, Agana, Guam, but crashed into high terrain about 3 miles southwest of the airport while executing a nonprecision approach. Of the 254 persons on board, 228 were killed, and 23 passengers and 3 flight attendants survived the accident with serious injuries. The airplane was destroyed by impact forces and a postcrash fire.

The investigation revealed that by not fully briefing for the instrument approach, the captain missed an opportunity to prepare himself and the crew for the complex approach. Other safety issues in this report focused on flight crew performance; approach procedures; pilot training; air traffic control, including controller performance and the intentional inhibition of the minimum safe altitude warning system (MSAW) at Guam; emergency response; the adequacy of Korean Civil Aviation Bureau (KCAB) and FAA oversight; and flight data recorder documentation. Safety recommendations concerning these issues are addressed to the FAA, the Territory of Guam, and the KCAB.

On November 2, 1999, the NTSB determined the probable cause of this accident was the captain's failure to adequately brief and execute the nonprecision approach and the first officer's and flight engineer's failure to effectively monitor and cross-check the captain's execution of the approach. Contributing to these failures were the captain's fatigue and Korean Air's inadequate flight crew training. Also contributing to the accident was the FAA's intentional inhibition of the minimum safe altitude warning system and the agency's failure to adequately manage the system.

MAJOR AVIATION INVESTIGATIONS

The Board initiated three major aviation accident investigations in 1999. Below is a list of those accidents followed by a summary of each.

- June 1, 1999 – American Airlines flight 1420 – Little Rock, Arkansas
- October 25, 1999 – Sunjet Lear 35 – Aberdeen, South Dakota
- October 31, 1999 – EgyptAir flight 990 – North Atlantic Ocean

American Airlines 1420, Little Rock, Arkansas

On June 1, 1999, American Airlines flight 1420, an MD-82, crashed after landing at Little Rock, Arkansas. There were thunderstorms and heavy rain in the area at the time of the accident. Upon landing, the aircraft skidded off the end of the runway, went down an embankment, and crashed into approach light structures. Eleven of the 145 people on board were killed in the crash.

In January 2000, the Safety Board will hold a public hearing in Little Rock to gather more information on the accident and to interview witnesses. Information from the public hearing will be used in the final report determining probable cause.

Sunjet, Lear 35, Aberdeen South Dakota

On October 25, 1999, air traffic control lost radio contact with a Learjet model 35, registration number N47BA, operated by Sunjet Aviation of Sanford, Florida. Radio contact was lost when the airplane was climbing through 37,000 feet and located northwest of Gainesville, Florida. The plane remained on radar contact.

The aircraft was intercepted at about 45,000 feet by military aircraft, which followed the plane until it crashed near Mina, South Dakota. Radio contact was never resumed with the aircraft. All six persons on board, including golfer Payne Stewart, were killed.

EgyptAir 990, North Atlantic Ocean

On October 31, 1999, EgyptAir flight 990, a Boeing 767-366-ER aircraft, crashed into the Atlantic Ocean about 60 miles south of Nantucket, Massachusetts. At the request of the Egyptian government and in accordance with International Civil Aviation Organization provisions, the NTSB assumed leadership of the investigation.

The Safety Board immediately launched a Go-Team of 15 members. In order to meet the challenges of an overwater aviation crash, the Safety Board worked closely with the U.S. Coast Guard and the U.S. Navy using their search and recovery assets. The Board's investigators remained at the accident site for 36 days.

Additional recovery of wreckage was completed during 10 days in December 1999 when the Navy contracted the *Smit Pioneer*, a large vessel typically used in the petroleum industry and equipped with global positioning systems allowing the ship to remain in position over the wreckage for long periods of time. For this operation the *Smit Pioneer* was configured with spider-type and clamshell grabs for retrieval of debris from the ocean floor, heavy material handling equipment, a remotely operated vehicle (ROV) system, a precision navigation system, and nearly 70 large containers for storage of wreckage.



Atlantic Ocean. Wreckage from EgyptAir flight 990 is brought onto the deck of the *Smit Pioneer*.



Andrews Air Force Base. NTSB officials transport the "black box" from EgyptAir flight 990 to Safety Board Headquarters in Washington, D.C.

GENERAL AVIATION

In 1999, the NTSB's regional and field offices initiated 2,160 general aviation (GA) accident investigations. Although these investigations generally do not have the high visibility of those involving major air carriers, they are an important source of transportation safety information. In addition, the NTSB regional offices investigated 44 aviation incidents in 1999. Incidents are defined as occurrences not serious enough to be considered accidents, but incident investigations can often lead to significant safety improvements.

A GA accident is handled in a manner similar to a major investigation, but because the investigation typically is much smaller in scope, it often is conducted by a single regional investigator who, working with the representatives from other parties, gathers the pertinent information. Analysts located at the Board headquarters review the standardized accident forms and narrative reports prepared by regional investigators for the public record. Computer brief reports containing relevant facts, findings, and probable cause are prepared for all regional investigations; and summary narrative reports are prepared for selective cases. The data from all investigations is maintained to identify trends, assess program effectiveness, and provide statistical support for the NTSB safety recommendations and studies.



Newark, New Jersey. Wreckage from a Beech S-35 private airplane that crashed in downtown Newark on November 25, 1999.



Mauna Loa, Hawaii. On September 25, 1999, a PA-31-350 on a sightseeing flight crashed into the northeast slope of the Mauna Loa volcano on the island of Hawaii. The pilot and nine passengers lost their lives.

Selected General Aviation Investigations Launched in 1999

Eurocopter Incidents, Juneau, Alaska

On September 10, 1999, at approximately 12:04 p.m., an AS-350B-2 helicopter operated by TEMSCO Helicopters of Ketchikan, Alaska, crashed on the Juneau ice field. A second TEMSCO AS-350BA helicopter was sent out to search for the overdue helicopter.

About 2:45 p.m., the pilot of the second helicopter radioed the base manager that he had crashed on the ice while searching for the accident helicopter. Shortly afterward, an additional Temsco AS-350B-2, already en route, was directed to the area to assist in the search.

About 4:30 p.m., the third pilot reported that flat light features were hampering his ability to see the ice field below. The third helicopter then struck the ice field and slid about 50 feet.

Indigenous lighting conditions and instrument training requirements for pilots in the region are some of the factors being reviewed in this investigation being conducted by the NTSB's Northwest Regional Field Office.

Piper PA32, Martha's Vineyard, Massachusetts

On July 16, 1999, the Piper PA32R-301 aircraft flown by John F. Kennedy, Jr., was destroyed during a collision with the water approximately 7 1/2 miles southwest of Gay Head, Martha's Vineyard, Massachusetts. The pilot and two passengers were fatally injured. The flight originated from Essex County Airport in New York where the pilot informed the tower controller that he would be proceeding north of the Teterboro Airport, and then eastbound. There is no record of any further communications between the pilot and the air traffic control system.

According to radar data, the airplane passed north of the Teterboro Airport, and then continued northeast along the Connecticut coastline at 5,600 feet before beginning to cross the Rhode Island Sound near Point Judith. A review of the radar data revealed that the airplane began a descent from 5,600 feet about 34 miles from Martha's Vineyard. The airspeed was about 160 knots, and the rate of descent was about 700 feet per minute (fpm). On July 20, 1999, the airplane was located in 116 feet of water, about 1/4 mile north of the 1,100-foot radar target position.

This accident is under investigation by the NTSB's Northeast Regional Office in Parsippany, New Jersey.

Cessna T-337G-P, Granite Mountain, Washington

On July 17, 1999, a Cessna T-337 G-P Skymaster, operated by the private pilot on a personal/pleasure flight, was destroyed when it collided with terrain approximately 3 nautical miles west of Snoqualmie Pass, Washington. The pilot and his passenger were killed, and the aircraft was destroyed by impact forces and fire.

The aircraft disappeared during a flight from Minnesota to the pilot's home in Anchorage, Alaska. A search for the aircraft was initiated by Washington State Department of Transportation on the morning of July 18, 1999. Search and rescue personnel located the aircraft wreckage on July 23, 1999, in the area of Granite Mountain, approximately 48 miles east of Seattle, Washington.

This investigation is being conducted by the NTSB's Northwest Regional Office in Seattle, Washington.

Beech King Air 65 A-90, Marine City, Michigan

On July 31, 1999, a Beech King Air 65 A-90, N518DM, operated by the Parahawks Skydiving Center, impacted the ground after takeoff from runway 22 at the Marine City Airport, Marine City, Michigan. The pilot and nine skydivers were fatally injured. The aircraft was destroyed by impact forces and a postimpact fire.

This accident is under investigation by the NTSB's North Central Regional Office in West Chicago, Illinois.

Aviation Statistics 1999

Table 1. Accidents, Fatalities, and Rates, 1999 Preliminary Statistics U.S. Aviation

	<i>Accidents</i>		<i>Fatalities</i>		<i>Flight Hours</i>	<i>Departures</i>	<i>Accidents per 100,000 Flight Hours</i>		<i>Accidents per 100,000 Flight Hours</i>	
	<i>All</i>	<i>Fatal</i>	<i>Total</i>	<i>Aboard</i>			<i>All</i>	<i>Fatal</i>	<i>All</i>	<i>Fatal</i>
U.S. air carriers operating under 14 CFR 121										
Scheduled	48	2	12	11	16,500,000	11,160,000	0.291	0.012	0.430	0.018
Nonscheduled	4	--	--	--	928,000	476,000	0.431	--	0.840	--
U.S. air carriers operating under 14 CFR 135										
Scheduled	13	5	12	12	269,000	530,000	4.883	1.859	2.453	0.943
Nonscheduled	76	12	38	38	2,809,000	n/a	2.71	0.43	n/a	n/a
U.S. general aviation	1,908	342	628	622	27,080,000	n/a	7.05	1.26	n/a	n/a
U.S. civil aviation	2,049	361	690	683						
Other accidents in the U.S.										
Foreign registered aircraft	6	--	--	--						
Unregistered aircraft	4	1	1	1						

Notes: All data are preliminary.

Flight hours and departures are compiled and estimated by the Federal Aviation Administration.

n/a - not available

Accidents and fatalities in the categories do not necessarily sum to the figures in U.S. civil aviation because of collisions involving aircraft in different categories.

Table 2. Accidents and Accident Rates by NTSB Classification, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121 (since March 20, 1997 includes aircraft with 10 or more seats formerly operated under 14 CFR 135)

Year	Accidents				Hours Flown (millions)	Accidents per Million Hours Flown			
	Major	Serious	Injury	Damage		Major	Serious	Injury	Damage
1982	3	4	6	5	7.040	0.426	0.568	0.852	0.710
1983	4	2	9	8	7.299	0.548	0.274	1.233	1.096
1984	2	2	7	5	8.165	0.245	0.245	0.857	0.612
1985	8	2	5	6	8.710	0.918	0.230	0.574	0.689
1986	4	0	14	6	9.976	0.401	0.000	1.403	0.601
1987	5	1	12	16	10.645	0.470	0.094	1.127	1.503
1988	4	2	13	10	11.141	0.359	0.180	1.167	0.898
1989	8	4	6	10	11.275	0.710	0.355	0.532	0.887
1990	4	3	10	7	12.150	0.329	0.247	0.823	0.576
1991	5	2	10	9	11.781	0.424	0.170	0.849	0.764
1992	3	3	10	2	12.360	0.243	0.243	0.809	0.162
1993	1	2	12	8	12.706	0.079	0.157	0.944	0.630
1994	4	0	12	7	13.124	0.305	0.000	0.914	0.533
1995	3	2	14	17	13.505	0.222	0.148	1.037	1.259
1996	6	0	18	14	13.746	0.436	0.000	1.309	1.018
SEE NOTE BELOW									
1997	2	4	24	19	15.838	0.126	0.253	1.515	1.200
1998	0	3	21	26	16.846	0.000	0.178	1.247	1.543
1999	2	1	20	29	17.428	0.115	0.057	1.148	1.664

Notes: Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.

Definitions of NTSB Classifications

Major - an accident in which any of three conditions is met:

- a Part 121 aircraft was destroyed, or
- there were multiple fatalities, or
- there was one fatality and a Part 121 aircraft was substantially damaged.

Serious - an accident in which at least one of two conditions is met:

- there was one fatality without substantial damage to a Part 121 aircraft, or
- there was at least one serious injury and a Part 121 aircraft was substantially damaged.

Injury - a nonfatal accident with at least one serious injury and without substantial damage to a Part 121 aircraft.

Damage - an accident in which no person was killed or seriously injured, but in which any aircraft was substantially damaged.

Table 3. Passenger Injuries and Injury Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121 (since March 20, 1997 includes aircraft with 10 or more seats formerly operated under 14 CFR 135)

<i>Year</i>	<i>Passenger Fatalities</i>	<i>Passenger Serious Injuries</i>	<i>Total Passenger Enplanements (millions)</i>	<i>Million Passenger Enplanements per Passenger Fatality</i>
1982	210	17	299	1.4
1983	8	8	325	40.6
1984	1	6	352	352.0
1985	486	20	390	0.8
1986	4	23	427	106.8
1987	213	39	458	2.2
1988	255	44	466	1.8
1989	259	55	468	1.8
1990	8	23	483	60.4
1991	40	19	468	11.7
1992	26	14	494	19.0
1993	0	7	505	No Fatalities
1994	228	16	545	2.4
1995	152	15	561	3.7
1996	319	19	592	1.9
SEE NOTE BELOW				
1997	2	19	626	313.0
1998	0	10	631	No Fatalities
1999	10	36	634	63.4

Notes: Injuries exclude flight crew and cabin crew.
Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.

Table 4. Number and Rate of Destroyed Aircraft, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121 (since March 20, 1997, includes aircraft with 10 or more seats formerly operated under 14 CFR 135)

<i>Year</i>	<i>Hull Losses</i>	<i>Aircraft Hours Flown (millions)</i>	<i>Hull Losses per Million Aircraft Hours Flown</i>
1982	3	7.040	0.426
1983	2	7.299	0.274
1984	2	8.165	0.245
1985	8	8.710	0.918
1986	2	9.976	0.200
1987	5	10.645	0.470
1988	3	11.141	0.269
1989	7	11.275	0.621
1990	3	12.150	0.247
1991	5	11.781	0.424
1992	3	12.360	0.243
1993	1	12.706	0.079
1994	3	13.124	0.229
1995	3	13.510	0.222
1996	4	13.963	0.364
SEE NOTE BELOW			
1997	2	15.290	0.126
1998	0	16.846	0.000
1999	2	17.428	0.115

Note: Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.

Table 5. Accidents, Fatalities, and Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121, Scheduled and Nonscheduled Service (Airlines) (since March 20, 1997, includes aircraft with 10 or more seats formerly operated under 14 CFR 135)

Year	Accidents		Fatalities		Flight Hours	Miles Flown	Departures	Accidents per 100,000 Flight Hours		Accidents per 100,000 Miles Flown		Accidents per 100,000 Departures	
	All	Fatal	Total	Aboard				All	Fatal	All	Fatal	All	Fatal
1982	18	5	235	223	7,040,325	2,938,513,000	5,351,133	0.241	0.057	0.0058	0.0014	0.318	0.075
1983	23	4	15	14	7,298,799	3,069,318,000	5,444,374	0.315	0.055	0.0075	0.0013	0.422	0.073
1984	16	1	4	4	8,165,124	3,428,063,000	5,898,852	0.196	0.012	0.0047	0.0003	0.271	0.017
1985	21	7	526	525	8,709,894	3,631,017,000	6,306,759	0.241	0.080	0.0058	0.0019	0.333	0.111
1986	24	3	8	7	9,976,104	4,017,626,000	7,202,027	0.231	0.020	0.0057	0.0005	0.319	0.028
1987	34	5	232	230	10,645,192	4,360,521,000	7,601,373	0.310	0.038	0.0076	0.0009	0.434	0.053
1988	29	3	285	274	11,140,548	4,503,426,000	7,716,061	0.251	0.018	0.0062	0.0004	0.363	0.026
1989	28	11	278	276	11,274,543	4,605,083,000	7,645,494	0.248	0.098	0.0061	0.0024	0.366	0.144
1990	24	6	39	12	12,150,116	4,947,832,000	8,092,306	0.198	0.049	0.0049	0.0012	0.297	0.074
1991	26	4	62	49	11,780,610	4,824,824,000	7,814,875	0.221	0.034	0.0054	0.0008	0.333	0.051
1992	18	4	33	31	12,359,715	5,039,435,000	7,880,707	0.146	0.032	0.0036	0.0008	0.228	0.051
1993	23	1	1	0	12,706,206	5,249,469,000	8,074,393	0.181	0.008	0.0044	0.0002	0.285	0.012
1994	23	4	239	237	13,124,315	5,478,118,000	8,242,903	0.168	0.030	0.0040	0.0007	0.267	0.049
1995	36	3	168	162	13,505,257	5,654,069,000	8,451,606	0.266	0.022	0.0064	0.0005	0.426	0.035
1996	38	5	380	350	13,746,112	5,873,108,000	8,554,000	0.278	0.037	0.0066	0.0009	0.444	0.058
SEE NOTE BELOW													
1997	49	4	8	6	15,290,000	6,691,693,000	10,313,826	0.309	0.025	0.0073	0.0006	0.475	0.039
1998	50	1	1	0	16,846,063	6,744,171,000	10,985,904	0.297	0.006	0.0074	0.0001	0.455	0.009
1999	52	2	12	11	17,428,000	6,793,000,000	11,636,000	0.298	0.011	0.0077	0.0003	0.447	0.017

Notes: 1999 data are preliminary.
 Flight hours, miles, and departures are compiled by the Federal Aviation Administration.
 Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.
 The 62 total fatalities in 1991 includes the 12 persons killed aboard a Skywest commuter aircraft and the 22 persons killed aboard the USAir airliner when the two aircraft collided.
 The following suicide/sabotage cases are included in "Accidents" and "Fatalities" but are excluded from accident rates in this table.

Year	Location	Operator	Fatalities Total	Fatalities Aboard
1982	Honolulu, HI	Pan American	1	1
1986	Near Athens, Greece	Trans World	4	4
1987	San Luis Obispo, CA	Pacific Southwest	43	43
1988	Lockerbie, Scotland	Pan American	270	259
1994	Memphis, TN	Federal Express	0	0

Table 6. Accidents, Fatalities, and Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121, Scheduled Service (Airlines) (since March 20, 1997 includes aircraft with 10 or more seats formerly operated under 14 CFR 135)

Year	Accidents		Fatalities		Flight Hours	Miles Flown	Departures	Accidents per 100,000 Flight Hours		Accidents per 100,000 Miles Flown		Accidents per 100,000 Departures	
	All	Fatal	Total	Aboard				All	Fatal	All	Fatal	All	Fatal
1982	16	4	234	222	6,697,770	2,806,885,000	5,162,346	0.224	0.045	0.0053	0.0011	0.291	0.058
1983	22	4	15	14	6,914,969	2,920,909,000	5,235,262	0.318	0.058	0.0075	0.0014	0.420	0.076
1984	13	1	4	4	7,736,037	3,258,910,000	5,666,076	0.168	0.013	0.0040	0.0003	0.229	0.018
1985	17	4	197	196	8,265,332	3,452,753,000	6,068,893	0.206	0.048	0.0049	0.0012	0.280	0.066
1986	21	2	5	4	9,495,158	3,829,129,000	6,928,103	0.211	0.011	0.0052	0.0003	0.289	0.014
1987	32	4	231	229	10,115,407	4,125,874,000	7,293,025	0.306	0.030	0.0075	0.0007	0.425	0.041
1988	28	3	285	274	10,521,052	4,260,785,000	7,347,575	0.257	0.019	0.0063	0.0005	0.367	0.027
1989	24	8	131	130	10,597,922	4,337,234,000	7,267,341	0.226	0.075	0.0055	0.0018	0.330	0.110
1990	22	6	39	12	11,524,726	4,689,287,000	7,795,761	0.191	0.052	0.0047	0.0013	0.282	0.077
1991	25	4	62	49	11,139,166	4,558,537,000	7,503,873	0.224	0.036	0.0055	0.0009	0.333	0.053
1992	16	4	33	31	11,732,026	4,782,825,000	7,515,373	0.136	0.034	0.0033	0.0008	0.213	0.053
1993	22	1	1	0	11,981,347	4,936,067,000	7,721,975	0.184	0.008	0.0045	0.0002	0.285	0.013
1994	19	4	239	237	12,292,356	5,112,633,000	7,824,802	0.146	0.033	0.0035	0.0008	0.230	0.051
1995	34	2	166	160	12,776,679	5,328,969,000	8,105,570	0.266	0.016	0.0064	0.0004	0.419	0.025
1996	32	3	342	342	12,971,676	5,449,997,000	7,851,298	0.247	0.023	0.0059	0.0006	0.408	0.038
SEE NOTE BELOW													
1997	44	3	3	2	15,061,662	6,334,559,000	9,920,569	0.292	0.020	0.0069	0.0005	0.444	0.030
1998	43	1	1	0	15,941,951	6,350,964,000	10,541,040	0.270	0.006	0.0068	0.0002	0.408	0.009
1999	48	2	12	11	16,500,000	6,367,000,000	11,160,000	0.291	0.012	0.0075	0.0003	0.430	0.018

Notes: 1999 data are preliminary.
 Flight hours, miles, and departures are compiled by the Federal Aviation Administration.
 Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.
 The 62 total fatalities in 1991 includes the 12 persons killed aboard a Skywest commuter aircraft and the 22 persons killed aboard the USAir airliner when the two aircraft collided.
 The following suicide/sabotage cases are included in "Accidents" and "Fatalities" but are excluded from accident rates in this table.

Year	Location	Operator	Fatalities Total	Fatalities Abroad
1982	Honolulu, HI	Pan American	1	1
1986	Near Athens, Greece	Trans World	4	4
1987	San Luis Obispo, CA	Pacific Southwest	43	43
1988	Lockerbie, Scotland	Pan American	270	259
1994	Memphis, TN	Federal Express	0	0

Table 7. Accidents, Fatalities, and Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 121, Nonscheduled Service (Airlines)

Year	Accidents		Fatalities		Flight Hours	Miles Flown	Departures	Accidents per 100,000 Flight Hours		Accidents per 100,000 Miles Flown		Accidents per 100,000 Departures	
	All	Fatal	Total	Aboard				All	Fatal	All	Fatal	All	Fatal
1982	2	1	1	1	342,555	131,628,000	188,787	0.584	0.292	0.0152	0.0076	1.059	0.530
1983	1	0	0	0	383,830	148,409,000	209,112	0.261	0	0.0067	0	0.478	0
1984	3	0	0	0	429,087	169,153,000	232,776	0.699	0	0.0177	0	1.289	0
1985	4	3	329	329	444,562	178,264,000	237,866	0.900	0.675	0.0224	0.0168	1.682	1.261
1986	3	1	3	3	480,946	188,497,000	273,924	0.624	0.208	0.0159	0.0053	1.095	0.365
1987	2	1	1	1	529,785	234,647,000	308,348	0.378	0.189	0.0085	0.0043	0.649	0.324
1988	1	0	0	0	619,496	242,641,000	368,486	0.161	0	0.0041	0	0.271	0
1989	4	3	147	146	676,621	267,849,000	378,153	0.591	0.443	0.0149	0.0112	1.058	0.793
1990	2	0	0	0	625,390	258,545,000	296,545	0.320	0	0.0077	0	0.674	0
1991	1	0	0	0	641,444	266,287,000	311,002	0.156	0	0.0038	0	0.322	0
1992	2	0	0	0	627,689	272,091,000	365,334	0.319	0	0.0074	0	0.547	0
1993	1	0	0	0	724,859	313,402,000	351,303	0.138	0	0.0032	0	0.285	0
1994	4	0	0	0	831,959	365,485,000	413,504	0.481	0	0.0109	0	0.967	0
1995	2	1	2	2	728,578	325,100,000	351,895	0.275	0.137	0.0062	0.0031	0.568	0.284
1996	6	2	38	8	774,436	423,111,000	377,512	0.775	0.258	0.0142	0.0058	1.589	0.530
1997	5	1	5	4	776,447	357,134,000	393,257	0.644	0.129	0.0140	0.0028	1.271	0.254
1998	7	0	0	0	904,112	393,207,000	444,864	0.774	0	0.0178	0	1.574	0
1999	4	0	0	0	928,000	426,000,000	476,000	0.431	0	0.0094	0	0.840	0

Notes: 1999 data are preliminary.
Flight hours, miles, and departures are compiled by the Federal Aviation Administration.

Table 8. Accidents, Fatalities, and Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 135, Scheduled Service (since March 20, 1997 only aircraft with fewer than 10 seats)

Year	Accidents		Fatalities		Flight Hours	Miles Flown	Departures	Accidents per 100,000 Flight Hours		Accidents per 100,000 Miles Flown		Accidents per 100,000 Departures	
	All	Fatal	Total	Aboard				All	Fatal	All	Fatal	All	Fatal
1982	26	5	14	14	1,299,748	222,355,000	2,026,691	2.000	0.385	0.1169	0.0225	1.283	0.247
1983	17	2	11	10	1,510,908	253,572,000	2,328,430	1.125	0.132	0.0670	0.0079	0.730	0.086
1984	22	7	48	46	1,745,762	291,460,000	2,676,590	1.260	0.401	0.0755	0.0240	0.822	0.262
1985	21	7	37	36	1,737,106	300,817,000	2,561,463	1.209	0.403	0.0698	0.0233	0.820	0.273
1986	15	2	4	4	1,724,586	307,393,000	2,798,811	0.870	0.116	0.0488	0.0065	0.536	0.071
1987	33	10	59	57	1,946,349	350,879,000	2,809,918	1.695	0.514	0.0940	0.0285	1.174	0.356
1988	19	2	21	21	2,092,689	380,237,000	2,909,005	0.908	0.096	0.0500	0.0053	0.653	0.069
1989	19	5	31	31	2,240,555	393,619,000	2,818,520	0.848	0.223	0.0483	0.0127	0.674	0.177
1990	16	4	7	5	2,341,760	450,133,000	3,160,089	0.641	0.171	0.0333	0.0089	0.475	0.127
1991	22	8	99	77	2,291,581	433,900,000	2,820,440	1.004	0.349	0.0530	0.0184	0.815	0.284
1992	23	7	21	21	2,335,349	507,985,000	3,114,932	0.942	0.300	0.0433	0.0138	0.706	0.225
1993	16	4	24	23	2,638,347	554,549,000	3,601,902	0.606	0.151	0.0289	0.0072	0.444	0.111
1994	10	3	25	25	2,784,129	594,134,000	3,581,189	0.359	0.108	0.0168	0.0050	0.279	0.084
1995	11	2	9	9	2,627,866	550,377,000	3,220,262	0.457	0.076	0.0218	0.0035	0.373	0.062
1996	11	1	14	12	2,756,755	590,727,000	3,515,040	0.399	0.036	0.0186	0.0017	0.313	0.028
SEE NOTES BELOW													
1997	16	5	46	46	982,764	251,650,000	1,394,096	1.628	0.509	0.0636	0.0199	1.148	0.359
1998	8	0	0	0	353,765	50,773,000	707,071	2.261	0	0.1576	0	1.131	0
1999	13	5	12	12	269,000	42,000,000	530,000	4.833	1.859	0.3095	0.1190	2.453	0.943

Notes: 1999 data are preliminary.

Flight hours, miles, and departures are compiled by the Federal Aviation Administration.

Effective March 20, 1997, aircraft with 10 or more seats must conduct scheduled passenger operations under 14 CFR 121.

The 99 total fatalities in 1991 includes the 12 persons killed aboard a Skywest commuter aircraft and the 22 persons killed aboard the USAir airliner when the two aircraft collided.

The following attempted suicide case is included in "Accidents" and "Fatalities" but is excluded from accident rates in this table.

Year	Location	Operator	Fatalities Total	Fatalities Aboard
1992	Lexington, KY	Mesaba Airlines	0	0

Table 9. Accidents, Fatalities, and Rates, 1982–1999, for U.S. Air Carriers Operating Under 14 CFR 135, Nonscheduled Service (On-demand Air Taxis)

Year	Accidents		Fatalities		Flight Hours	Accidents per 100,000 Flight Hours	
	All	Fatal	Total	Aboard		All	Fatal
1982	132	31	72	72	3,008,000	4.39	1.03
1983	142	27	62	57	2,378,000	5.93	1.14
1984	146	23	52	52	2,843,000	5.14	0.81
1985	157	35	76	75	2,570,000	6.11	1.36
1986	118	31	65	61	2,690,000	4.39	1.15
1987	96	30	65	63	2,657,000	3.61	1.13
1988	102	28	59	55	2,632,000	3.88	1.06
1989	110	25	83	81	3,020,000	3.64	0.83
1990	107	29	51	49	2,249,000	4.76	1.29
1991	88	28	78	74	2,241,000	3.93	1.25
1992	76	24	68	65	1,967,000	3.86	1.22
1993	69	19	42	42	1,659,000	4.16	1.15
1994	85	26	63	62	1,854,000	4.58	1.40
1995	75	24	52	52	1,707,000	4.39	1.41
1996	90	29	63	63	2,029,000	4.44	1.43
1997	82	15	39	39	2,250,000	3.64	0.67
1998	77	18	48	44	2,538,000	3.03	0.71
1999	76	12	38	38	2,809,000	2.71	0.43

Notes: 1999 data are preliminary.
Flight hours are estimated by the Federal Aviation Administration (FAA).

Table 10. Accidents, Fatalities, and Rates, 1982–1999, U.S. General Aviation

Year	Accidents		Fatalities		Flight Hours	Accidents per 100,000 Flight Hours	
	All	Fatal	Total	Aboard		All	Fatal
1982	3,233	591	1,187	1,170	29,640,000	10.90	1.99
1983	3,077	556	1,069	1,062	28,673,000	10.73	1.94
1984	3,017	545	1,042	1,021	29,099,000	10.36	1.87
1985	2,739	498	956	945	28,322,000	9.66	1.75
1986	2,583	475	969	881	27,073,000	9.54	1.75
1987	2,495	447	838	823	26,972,000	9.25	1.65
1988	2,385	460	800	792	27,446,000	8.69	1.68
1989	2,233	431	768	765	27,920,000	7.98	1.53
1990	2,215	443	767	762	28,510,000	7.77	1.55
1991	2,175	433	786	772	27,678,000	7.85	1.56
1992	2,073	446	857	855	24,780,000	8.36	1.80
1993	2,039	398	736	732	22,796,000	8.94	1.74
1994	1,994	403	725	718	22,235,000	8.96	1.80
1995	2,053	412	734	727	24,906,000	8.23	1.64
1996	1,908	360	632	615	24,881,000	7.67	1.45
1997	1,853	353	643	637	25,464,000	7.28	1.39
1998	1,909	365	623	617	26,796,000	7.12	1.36
1999	1,908	342	628	622	27,080,000	7.05	1.26

Notes: 1999 data are preliminary.

Flight hours are estimated by the Federal Aviation Administration.

Suicide/sabotage cases included in "Accidents" and "Fatalities" but excluded from accident rates in this table are: 1982 (3 acc., 0 fatal acc.); 1983 (1, 0); 1984 (3, 2); 1985 (3, 2); 1987 (1, 1); 1988 (1, 0); 1989 (5, 4); 1990 (1, 0); 1991 (3, 2); 1992 (1, 1); 1993 (1, 1); 1994 (2, 2); 1995 (4, 3).

Since April 1995, the NTSB has been required by law to investigate all public-use aircraft accidents. The effect upon the number of general aviation accidents has been an increase of approximately 1 3/4 percent.

Table 11. Fatal Accidents, 1999

Preliminary Data for All Operations Under 14 CFR 121 and for Scheduled Operations Under 14 CFR 135

Date	Location	Operator	Service	Aircraft	Fatalities			Total	No. Aboard	Circumstances
					Psg	Crew	Other			
Scheduled 14 CFR 121										
6/1/99	Little Rock, AR	American Airlines	Psg	MD-82	10	1	-	11	145	Landing overrun and collision with approach light structure
7/28/99	Little Rock, AR	Continental Express	Psg	ATR-42	-	-	1	1	36	Rotating propeller struck ground crewmember
Nonscheduled 14 CFR 121										
None in 1999										
Scheduled 14 CFR 135										
4/14/99	Kotzebue, AK	Camai Air	Psg/ Cargo	Cessna 207A	-	1	-	1	1	Crashed into an ice- and snow-covered lagoon
6/11/99	Tanana, AK	Larry's Flying Service	Psg/ Cargo	Piper PA 31	-	1	-	1	1	Collided with trees, then crashed into a river after take-off
9/3/99	Bettles, AK	Servant Air	Psg/ Cargo	Piper PA 32R	-	1	-	1	1	Crashed into mountainous terrain
9/5/99	Westerly, RI	New England Airlines	Psg	Piper PA 32	2	1	-	3	5	Crashed shortly after takeoff
12/7/99	Bethel, AK	Grant Aviation	Psg	Cessna 207	5	1	-	6	6	Collided en route with remote snow-covered terrain

Highway Safety

Each year highway accidents take tens of thousands of lives and cost the Nation billions of dollars in lost productivity and property damage. In 1999, approximately 41,611 people were killed and 3,200,000 were injured in motor vehicle traffic crashes. The human and economic costs are staggering, costing about \$137 billion in medical costs and property damage losses. That equates to about \$375 million each day lost on highway crashes.

Because of the limited number of highway staff, the Safety Board concentrates resources on investigating those accidents that are most likely to have a significant impact on the public's confidence in the highway transportation system or the saving of the greater number of lives and injuries. The Board's objective is to investigate accidents that will result in safety recommendations to prevent similar types of accidents from happening in the future. Other considerations are made for accidents that generate high public interest or highlight important safety issues that have been selected for emphasis by the Safety Board.

Previously, the Office of Highway Safety primarily investigated single major crashes. While these accidents generally involve large loss of life and property damages, in many cases they are not representative of the typical highway crashes that occur daily on our Nation's highways.

During 1999, the Office of Highway Safety, to more effectively address accident causation, focused on identifying emerging highway safety issues from research and accident data. The Office investigated groups of similar crashes to identify potential root causes and appropriate countermeasures. For example, the Office started projects to improve heavy vehicle transportation safety. The Office undertook this initiative because large trucks continue to be involved in fatal accidents nationwide.

The Office of Highway Safety addressed truck and bus safety issues in four public hearings, provided testimony to Congress, and completed a series of special investigation reports. The Office will continue to use this strategy for all new investigative projects.

The Safety Board initiated 40 new highway accident investigations in 1999. The safety issues identified from these accidents will be analyzed in either individual or multi-accident Safety Board reports. Many of these investigations are still ongoing because of the increasing complexity of the collisions and the use of new vehicle technologies.

SPECIAL INVESTIGATIONS

In addition to accident investigations, the Office of Highway Safety conducted three proactive studies on issues significant to highway safety. The studies examined selective motorcoach issues, pupil transportation in vehicles not meeting Federal school bus standards, and bus crashworthiness issues. Twelve accidents were investigated in support of these reports.



Vero Beach, Florida. Collision of school bus and a tractor trailer.

Selective Motorcoach Issues

The Special Investigation Report *Selective Motorcoach Issues* adopted on February 11, 1999, was conducted as a result of two motorcoach accidents. The first accident occurred on October 13, 1995, in Indianapolis, Indiana. The bus overturned on its left side while entering an exit ramp. Two passengers sustained fatal injuries, and 13 passengers received serious injuries.

The second accident occurred on July 29, 1997, in Stony Creek, Virginia. One passenger was fatally injured, 4 occupants sustained serious injuries, and 28 passengers received minor injuries when the bus drifted off the roadway, went down an embankment, and became partially submerged in water.

The report addressed the following issues: bus driver fatigue, Federal oversight of bus carriers, and emergency egress of passengers on motorcoaches. As a result, the Safety Board issued 18 recommendations to the DOT, the National Highway Traffic Safety Administration (NHTSA), the American Bus Association, and the United Motor Coach Association regarding these safety issues. In addition, this report was the first product of the Safety Board's truck and bus safety initiative.

Pupil Transportation in Vehicles not Meeting Federal School Bus Standards

On June 8, 1999, the Special Investigation Report *Pupil Transportation in Vehicles not Meeting School Bus Standards*¹ was adopted by the Safety Board. This special investigation analyzed 4 accidents involving nonconforming buses that resulted in 9 fatalities and 36 injuries. The accidents occurred in Sweetwater, Florida, on March 25, 1998; Lenoir City, Tennessee, on March 26, 1998; East Dublin, Georgia, on December 8, 1998; and Bennetsville, South Carolina, on February 16, 1999.

These accidents revealed safety issues related to the adequacy of occupant crash protection and crashworthiness of nonconforming buses transporting school children, adequacy of existing regulations and guidelines governing vehicles used to transport school children, and adequacy of laws governing the use of restraint systems in vehicles transporting school children.

As a result, the Safety Board issued 7 recommendations to the Department of Health and Human Services, Governors of the 50 States, and various childcare and youth activity groups. The recommendations were designed to improve the crashworthiness and occupant protection, and the use of available occupant restraints in nonconforming buses.

Bus Crashworthiness Issues

The Special Investigation Report *Bus Crashworthiness* adopted on September 21, 1999, was the result of Safety Board investigations involving several bus accidents in which occupant protection and vehicle crashworthiness were primary issues. The Safety Board initiated this special investigation to determine the current causes of injuries in buses and what additional occupant protection may be needed.

School bus accidents in Flagstaff, Arizona; Easton, Maryland; Buffalo, Montana; Monticello, Minnesota; Holyoke, Colorado; and Holmdel, New Jersey, along with 36 other bus accidents were used to analyze vehicle crashworthiness issues and occupant kinematics in all types of collision scenarios. Advanced computer simulation software was used in these analyses. In addition, bus classification and accident, fatality, and injury data collection issues were analyzed.

¹ A nonconforming bus is any vehicle designed to carry more than 10 passengers that is used to transport children to and from school or school-related activities.

As a result of this investigation, the Safety Board issued 14 recommendations to the DOT, National Association of Governors' Highway Safety Representatives, and bus manufacturers to address occupant protection and crashworthiness issues in motorcoaches and school buses.

PUBLIC HEARINGS

To emphasize to the public the serious nature of heavy vehicle transportation safety issues, the Office of Highway Safety conducted public hearings on oversight of commercial vehicle safety, technology applications for heavy vehicle safety, and highway safety issues surrounding the North American Free Trade Agreement (NAFTA).

The public hearing on oversight of commercial vehicle safety, held in Washington, D.C., in April 1999, examined how well regulators and the industry ensure the safe transport of passengers and goods by trucks and buses over our Nation's highways. It also explored whether the oversight performed by the various governmental agencies and the industry is adequate to meet the changing needs of this vital transportation industry. A wide range of witnesses participated, including truck and bus drivers, members of advocacy groups, Federal and State government officials, and industry representatives.

Nashville, Tennessee, was the site of the August 1999 public hearing regarding technology applications for heavy vehicle safety that included a product showcase featuring state-of-the-art safety technology. Also exhibited were three heavy trucks equipped with safety features such as electronic braking systems, collision warning systems, lane departure warning systems, and systems that allow the driver to receive satellite and land communications, track fuel mileage, and check system diagnostics. A wide range of witnesses participated in the hearing.

The public hearing regarding highway safety issues surrounding NAFTA held in Los Angeles in October 1999, focused on ensuring that highway safety remains a priority as open trade is encouraged between the United States, Mexico, and Canada. Topics included harmonization of vehicle safety standards, hours of service, and exchange of data across international borders. A wide range of witnesses participated, including truck and bus drivers, advocacy groups, Federal and State government officials, and industry representatives.

A fourth public hearing regarding Commercial Driver's License (CDL) oversight, is scheduled to be held in early January 2000 in New Orleans, Louisiana.

MAJOR ACCIDENT INVESTIGATIONS

Amtrak City of New Orleans - Bourbonnais, Illinois

The Safety Board is investigating the grade crossing accident that occurred on March 15, 1999, near Bourbonnais, Illinois. The accident involved a collision between an Amtrak passenger train and a tractor semitrailer at an active crossing protected with lights and gates. As a result of the collision, 11 train passengers were fatally injured, 122 passengers and crewmembers sustained serious or minor injuries, and the estimated damages for the accident exceeded \$14 million.

In September 1999, a public hearing was held in Chicago to investigate the safety issues being examined in this accident, including the effectiveness and reliability of active grade crossing warning devices; State, Federal, and Amtrak oversight programs; train and large truck interface at grade crossings; and new technologies in grade crossing safety.



Bourbonnais, Illinois. Aerial view of wreckage of Amtrak train City of New Orleans that crashed on March 15, 1999.

Custom Bus, New Orleans, Louisiana

The Safety Board is investigating an accident involving a motorcoach operated by Custom Bus Charters of New Orleans that occurred on May 9, 1999, in New Orleans, Louisiana. This accident resulted in the deaths of 22 passengers; the busdriver died several months after the accident.

Although the investigation is ongoing, the safety issues being examined include the CDL process and medical qualifications, speed, passenger ejection, and bus crashworthiness. This accident was the impetus for the CDL public hearing.



New Orleans, Louisiana. Side view of passenger motorcoach involved in May 9, 1999, accident.

Marine Safety

The NTSB is authorized to investigate marine accidents involving U.S. and foreign-flagged vessels in U.S. territorial waters and U.S. vessels in international waters. 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. There are no marine personnel assigned to any of the Board's modal field offices. To carry out its marine safety program, the Board maintains a small staff of professional investigators with industry and/or U.S. Navy or Coast Guard experience. These investigators include licensed master mariners, marine engineers, and naval architects who possess a wealth of hands-on maritime experience.

About 3,000 accidents involving commercial vessels and more than 8,000 accidents involving recreational boats occur each year in the United States or under U.S. jurisdiction. Given this number of accidents, the Board must decide whether the severity of an accident and the safety issues involved require an NTSB investigation. In practice, the Board tries to target only those accidents that appear to involve the most significant safety issues. 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.

Investigative areas selected by the Board for special emphasis include:

- Large passenger vessels, including ocean cruise ships, ferries, and gaming vessels;
- Small passenger vessels carrying more than six passengers and excursion vessels;
- Maritime technology and communications;
- Tank ships and tank barges;
- Fatigue and hours of service on all vessels;

- Commercial fishing vessels;
- Collisions and groundings involving oceangoing vessels; and
- Inland tow vessel rammings.

The Safety Board has the option of requesting that the Coast Guard investigate an accident without NTSB participation. In such cases, the Coast Guard will send the accident file to the Board when the investigation is completed. If the Board decides to investigate a marine accident, it coordinates with the Coast Guard on whether the investigation will be conducted jointly under Coast Guard rules or independently under NTSB rules.

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

The Board completed action on a major marine accident and a summary report. Below is a description of each.

The sinking of the sailing vessel Morning Dew, in Charleston Harbor, Charleston, South Carolina.

During the early morning hours of December 29, 1997, the sailing vessel *Morning Dew* was underway en route from Myrtle Beach, South Carolina to Jacksonville, Florida. The vessel was manned by the owner, age 49, his two sons ages 16 and 13, and his nephew, age 14.

About 2:15 a.m. on December 29, the vessel struck the north side of the north jetty about one mile from shore at the entrance to Charleston Harbor. At 2:17 a.m., a mayday distress call was broadcast by the youngest of the owner's sons. The radio watchstander at Coast Guard Group Charleston, South Carolina, heard part of the weak message, and believed he heard "*Coast Guard come in*" repeated twice. The radio watchstander responded several times, but there was no reply from the caller. About 4 minutes later, the radio watchstander heard a brief radio transmission, also characterized by static, and again responded, but there were no further transmissions from the caller. The watchstander assumed that the call may have been a radio check or call by a distant vessel and took no further action.

At 6:28 a.m., the Coast Guard radio watchstander who had received the original call was preparing to leave the station when he received a call from another vessel advising that cries for help had been heard in the water. The watchstander told his relief radio watchstander and the Operations Duty Officer (ODO) of the contents of the call and

to expect a return call from the other vessel. The Coast Guard did not initiate a search at this time.

Later that morning, the Coast Guard ODO received a call from the local police department reporting the discovery of two bodies in the surf. A search and rescue (SAR) operation was initiated, and a Coast Guard helicopter located a third body in the ocean about a mile northeast of the north jetty. Three weeks later, the last victim was also found in the ocean.

The issues involved in this accident included:

- Adequacy of operator's decision-making and judgment;
- Adequacy of safety and lifesaving equipment on the *Morning Dew* for voyage along the U.S. Atlantic Coast;
- Adequacy and effectiveness of the communications and operations duty watch system;
- Adequacy of the training of communications watchstanders;
- Adequacy of directives for the communications watchstander regarding reporting and playing back messages for better understanding; and
- Adequacy of Coast Guard station communication and direction finding equipment.

On October 5, 1999, the Safety Board found that the probable cause of the sinking of the *Morning Dew* was the operator's failure to adequately assess, prepare for, and respond to the known risks of the journey into the open ocean. Contributing to the loss of life in this accident was the substandard performance of U.S. Coast Guard Group Charleston in initiating a SAR response to the accident.

As a result of this investigation, the Safety Board made 15 recommendations to the U.S. Coast Guard. These included recommendations to:

- develop and implement a course or training program to develop communications watchstanders' judgment and decision-making skills;
- institute procedures to provide improved management oversight of communications and operations center performance, including periodically reviewing the tapes of recorded radio transmissions and telephone calls;
- take the steps necessary to immediately begin to provide all Coast Guard SAR and communications centers with the capability for watchstanders to easily and instantly replay the most recent recorded radio transmissions; and
- immediately begin to equip all Coast Guard SAR communications centers with the currently available, commercial, off-the-shelf direction-finding systems that provide, at a minimum, the capability to establish a position fix and to record position data for later retrieval and analysis.

In addition, the Safety Board made recommendations to the 50 States, the National Association of State Boating Law Administrators, the U.S. Coast Guard Auxiliary, the U.S. Power Squadrons, the National Safe Boating Council and the Boat Owners Association of the United States.

The capsizing of the fishing vessel Evanick, in the Shelikof Strait, Alaska

On April 25, 1998, the fishing vessel *Evanick* capsized in the Shelikof Strait while en route to fishing grounds near Togiak, Alaska. On April 24, 1998, in preparation for the 650-mile voyage, the *Evanick's* 17-foot-long, 5,000-pound skiff, which was used for handling the fishing nets, was stowed on the vessel's afterdeck. This stowage configuration raised the vessel's center of gravity, thereby reducing its stability.

The Coast Guard SAR aircraft, responding to a distress signal from the vessel, located the *Evanick* floating in a capsized condition. There were no signs of any of the four crewmembers. In subsequent search operations, no crewmembers of the *Evanick* were found.

The issues in this accident include fishing vessel safety, stability for weather conditions experienced, life raft stowage, and hydrostatic release activation.

The NTSB determined that the probable cause of the capsizing of the *Evanick* was the fishing vessel's less-than-adequate stability for the sea conditions. Contributing to the loss of life was the probable suddenness of the capsizing, which did not afford the crew time to don their immersion suits before they entered the water.

ONGOING MARINE INVESTIGATIONS

The sinking of the Miss Majestic in Lake Hamilton, Hot Springs, Arkansas

Shortly before noon, on Saturday, May 1, 1999, the *Miss Majestic*, one of four amphibious excursion (DUKW) boats operated by White and Yellow Duck Sightseeing Tours, entered Lake Hamilton in Hot Springs, Arkansas, as a regular part of an excursion tour of the area. On board were 20 passengers and 1 operator. Upon entering the water, the vessel began to list to port and then to sink rapidly by the stern. The rapidity at which the vessel flooded did not allow sufficient time for passengers to escape before the vessel sank in 50 feet of water. Thirteen of the 20 passengers, including 3 children, lost their lives.

The issues in this accident include emergency egress, certification, maintenance, vessel stability, licensing, and crew requirements.



Hot Springs, Arkansas. The amphibious tour boat *Miss Majestic* is salvaged from Lake Hamilton where it sank on May 1, 1999.

PUBLIC HEARINGS

Sailing Vessel Morning Dew

On February 3-4, 1999, the Safety Board conducted a public hearing in Charleston, South Carolina, to examine the issues raised by the Board's investigation into the sinking of the *Morning Dew* and to provide an opportunity for public comment by interested parties. At the hearing, the Board heard testimony from the Group Charleston watchstander and operations duty officer who were involved in the accident response; higher level Coast Guard officials, including the commander of the Seventh Coast Guard District; the commander of Group Charleston; the chief of the Coast Guard Office of Search and Rescue; the operator of the pilot boat that conducted a search for survivors; personnel from the South Carolina Department of Natural Resources; and the Charleston coroner. In addition, testimony was taken from a communications expert from the U.S. Naval Surface Warfare Center, an official from the Canadian Coast Guard, and the widow of the deceased operator of the *Morning Dew*. Parties to the hearing included the U.S. Coast Guard, the South Carolina Department of Natural Resources, the Charleston coroner, and the Charleston Harbor Pilots.

The hearing focused on the actions of the communication watchstanders, their training, management oversight of their performance, the Coast Guard's release of information to investigative personnel and the public, and the adequacy of Coast Guard station communication and direction-finding equipment. Information gathered at the hearing was used in the preparation of the final report and determination of probable cause adopted by the Safety Board on October 5, 1999.

Cruise Ship Ecstasy

On February 17-18, 1999, the Safety Board conducted a public hearing in Miami, Florida, to examine the issues raised by the investigation into the fire aboard the cruise ship *Ecstasy* and to provide an opportunity for public comment by interested parties. The fire on the stern mooring deck of the ship consumed a substantial amount of polypropylene mooring rope, which resulted in huge clouds of black smoke that were visible for miles. Fortunately there were no serious injuries, but the fire damage was over \$15 million. At the hearing, the Board heard testimony from the U.S. Coast Guard; Carnival Cruise Lines engineering, safety, and operating personnel; and officials from the Florida State Fire Marshal's office and the Miami-Dade County Fire Rescue Department.

The hearing discussion focused on *Ecstasy* shipboard operations in response to the fire, the adequacy of emergency procedures, the adequacy of fire detection and suppression on the *Ecstasy*, the adequacy of engineering systems, and the adequacy of Coast Guard and company management oversight of shipboard operations.



Miami, Florida. Fire damage to the cruise ship *Ecstasy*.

Pipeline and Hazardous Materials Safety

PIPELINE INVESTIGATIONS

Crisscrossing the United States are approximately 1.9 million miles of natural gas pipelines, over 165,000 miles of pipeline carrying hazardous liquids, and almost 2,200 miles of carbon dioxide pipelines. This vast network of pipelines is managed by almost 900 transmission and gathering operators; over 1,400 distribution operators; 106 liquefied natural gas operators; and about 52,000 master meter operators. Transporting hazardous materials is a critical process that requires careful and strict procedures in order to ensure the safety of the people working on and living near the pipelines, as well as to protect the environment.

The Safety Board is responsible for investigating all pipeline accidents in which there is a fatality, substantial property damage, extensive release of highly volatile liquids, or a significant impact on the environment. The Board may also investigate additional selected accidents that highlight safety issues of national importance or that involve a selected accident prevention issue. Under a Memorandum of Understanding with the Office of Pipeline Safety (OPS) the Board can delegate to the OPS the investigation of any accident that meets these criteria. However, such delegation occurs only when the Board is unable to respond due to insufficient resources. The Board may also ask the applicable State agency to perform an accident investigation when necessary.

COMPLETED MAJOR PIPELINE INVESTIGATIONS

During 1999, the Office of Pipeline and Hazardous Materials Safety completed the following pipeline accident investigations.

Natural Gas Pipeline Rupture, Indianapolis, Indiana

The issue addressed by the Safety Board in this investigation was the adequacy of company procedures to ensure that existing pipelines are not damaged by directional drilling activities conducted in proximity to them.

On July 21, 1997, in Indianapolis, Indiana, a 20-inch-diameter steel natural gas transmission pipeline owned and operated by Citizens Gas & Coke Utility ruptured shortly after it had been repressurized following the completion of pipeline realignment and road construction work. The pipeline ruptured near a residential neighborhood. The released natural gas ignited, killing one resident and injuring another. Six homes were destroyed and 65 others sustained damage. The investigation revealed that the pipeline had been damaged approximately 2 months before the rupture during a directional drilling operation. Directional drilling is a more environmentally friendly method of laying

pipelines in which no excavation is done or trenches dug to put in the lines. The soil is drilled directly in the path that the pipeline will take, like a tunnel, and the pipeline is then pushed through.

On April 20, 1999, the Safety Board determined that the probable cause of the accident was the failure of Citizens Gas & Coke Utility and Miller Pipeline Corporation to have adequate controls in place to ensure that directional drilling operations would not damage underground facilities. As a result of this accident investigation, the Safety Board issued 11 safety recommendations to the Research and Special Programs Administration (RSPA), ASME International, the American Gas Association, the Directional Crossing Contractors Association, the Association of Oil Pipelines, and other organizations in order to prevent a similar accident from happening in the future.

Gasoline Pipeline Rupture, Sandy Springs, Georgia

On March 30, 1998, a 40-inch-diameter steel pipeline owned and operated by Colonial Pipeline Company buckled and cracked in a landfill resulting in the release of 920 barrels (38,640 gallons) of gasoline. Approximately 30,000 gallons of gasoline were released in the rupture. Only about half of the volume released (17,000 gallons) was eventually recovered.

On March 22, 1999, the Safety Board determined that the probable cause of the accident was settlement of soil and trash underneath the pipeline, which resulted from the failure of Colonial Pipeline Company to adequately support the pipeline. Contributing to the pipeline failure were activities of GreenCycle Recycling Center, which subjected the pipeline to stresses, and the failure of Colonial's aerial patrols to report that recycling activities were ongoing on the pipeline right-of-way. No safety recommendations were made as part of this report.

Liquid Pipeline Overpressure and Rupture, Murfreesboro, Tennessee

On November 5, 1996, near Murfreesboro, Tennessee, an 8-inch diameter steel pipeline owned and operated by Colonial Pipeline Company suffered an overpressure rupture, sending diesel fuel into underground caverns, which polluted subsurface water.

The rupture occurred during an operation that required that a section of pipeline be isolated and purged of product. Colonial planned to begin the operation by blocking the line at the Murfreesboro station and allowing product to drain into the Nashville facility. At the last minute, the operation plans changed and the Nashville facility was to be reopened; however, the controller did not release the closed valve at the Murfreesboro facility before pumping resumed. The increased pressure in the pipeline caused a rupture and release of approximately 84,700 gallons of diesel fuel.

Recovery efforts were complicated because of the difficult geologic formations in the rupture area. Although no fire or injuries resulted, property damage estimates were in excess of \$5.7 million.

On April 29, 1999, the Safety Board determined that the probable cause of the accident was the failure of Colonial Pipeline's pipeline operator to follow company procedures for operating the pipeline and the failure of Colonial's control and monitoring system to inform the controller of unsafe conditions prior to the rupture. Contributing to the severity of the accident was the delay in recognizing that a leak had occurred, which delayed shutting down the pipeline and isolating the rupture. No safety recommendations were made as a result of this investigation.

ONGOING PIPELINE INVESTIGATIONS

Natural Gas Explosion and Fire, Bridgeport, Alabama

On January 22, 1999, in downtown Bridgeport, Alabama, a backhoe operator working for a contractor pulled a gas company's 3/4-inch-diameter steel gas service line. Gas escaping from the damaged service line found its way into a building. As a result of the accumulated gas, an explosion destroyed three structures, killing three and seriously injuring five persons.

The safety issues being addressed by the Safety Board in this investigation include the adequacy of contractor excavation, the adequacy of gas company procedures for responding to natural gas leaks, State oversight of a gas company's emergency procedures and training, and Federal oversight of a State pipeline safety program.

Liquid Pipeline Rupture, Knoxville, Tennessee

On February 9, 1999, a leak involving a 10-inch-diameter pipeline owned by Colonial Pipeline occurred in Knoxville, Tennessee. Product totaling 42,000 gallons flowed from the pipeline into the Tennessee River. The pipeline had a brittle circumferential rupture across the top half of the pipe.

The safety issues being addressed by the Safety Board in this investigation include the adequacy of pipe toughness; adequacy of fire department response to identify the source of odor complaints; adequacy of pipeline controller training; and adequacy of the pipeline company system to detect and alarm in response to a rupture.

Liquid Pipeline Rupture, Bellingham, Washington

On June 10, 1999, a 16-inch-diameter steel pipeline ruptured and released approximately 250,000 gallons of gasoline into Whatcom Creek in Bellingham, Washington. The gasoline ignited, killing three persons, injuring eight, and causing significant property and environmental damage.

The safety issues being addressed by the Safety Board in this investigation include adequacy of internal inspection of pipelines, adequacy of control operations, human performance issues, and adequacy of corporate management and oversight of pipeline operations.



Bellingham, Washington. Cracked pipeline involved in the June 10, 1999, accident.

HAZARDOUS MATERIALS INVESTIGATIONS

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 the Nation's transportation system each day in all modes, nearly a two-fold increase over 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. For 1998, the last full year that data are available, 15,343 hazardous materials incidents were reported, an increase of 200 percent over the 7,560 incidents reported in 1989. Similarly, the damages from these incidents have also nearly doubled in this 10-year period, from \$26 million in 1989 to nearly \$46 million in 1998. Although the reported injuries and fatalities have fluctuated in the past 10 years, there were a total of 220 fatalities and about 5,000 injuries reported for 1989 through 1998 attributed to the release of hazardous materials.

During 1999, the Office of Pipeline and Hazardous Materials Safety completed or made significant contributions to the following hazardous materials accident investigations.

COMPLETED MAJOR HAZARDOUS MATERIALS INVESTIGATIONS

Gasoline Storage Tank Overflow, Biloxi, Mississippi

On August 9, 1998, a truck driver was transferring gasoline from a cargo tank to underground storage tanks. An underground storage tank containing regular unleaded gasoline overflowed. An estimated 550 gallons of gasoline flowed from the storage tank, across the station lot into the adjacent highway, through an intersection, and into a storm drain. The gasoline ignited, and fire engulfed three vehicles near the intersection, which ultimately resulted in the deaths of five occupants and the serious injury of one. Damages were estimated at \$55,000.

Safety issues addressed by the Safety Board in this report include the adequacy of dispatch and product unloading practices and procedures, adequacy of driver training, and adequacy of Federal regulations to ensure timely notification of hazardous materials accidents.

The NTSB determined that the probable cause of the accident was the failure of Premium Tank Line, Inc.'s officials to follow established company procedures in hiring and training new drivers; the company's lack of adequate procedures for dispatching drivers and delivering cargo to customer facilities; and the failure of R.R. Morrison and Son, Inc., to have adequate safety procedures for accepting products offered for delivery at

its Fast Lane stations. Contributing to the accident was the truck driver's operating errors during the gasoline transfer process that led to the underground storage tank overfill. As a result of its investigation of this accident, the Safety Board made recommendations to the Federal Highway Administration (FHWA), RSPA, the Environmental Protection Agency (EPA), Premium Tank Lines, Inc., R.R. Morrison and Son, Inc., and other organizations.

Cargo Tank Release, Stock Island, Florida

On June 29, 1998, at Stock Island, Key West, Florida, a Dion Oil Company driver/operator was on top of a cargo tank when flammable vapors ignited within the cargo tank. The fire and a series of at least three explosions injured the driver and destroyed the straight truck, a tractor, the front of the semitrailer, and a second nearby straight-truck cargo tank. Damage was estimated at more than \$185,000.

Safety issues addressed in this report include the adequacy of product transfer procedures and training, and the adequacy of Federal and State safety oversight of gasoline storage facilities.

In the report adopted on September 21, 1999, the Safety Board determined that the probable cause of the accident was Dion's lack of adequate procedures and driver training, resulting in the driver's pouring a mixture of gasoline and diesel fuel from a plastic bucket into a cargo-tank compartment that contained a mixture of explosive vapors.

As a result of the investigations, the Safety Board made recommendations to the FHWA, Dion Oil Company, the Florida State Fire Marshal, the Florida DOT, the Florida Department of Agriculture, the Florida Department of Environmental Protection, the National Fire Prevention Association, the National Association of State Fire Marshals, and the International Association of Fire Chiefs.

ONGOING HAZARDOUS MATERIALS INVESTIGATIONS

Rupture and Explosion of Tank Car with Hazardous Wastes, Clymers, Indiana

Shortly after midnight on February 18, 1999, tank car UTLX 643593 sustained a catastrophic rupture from an internal explosion or overpressurization at a cement plant near Clymers, Indiana. As a result of the rupture and explosion, the tank car was propelled an estimated 800 feet over fixed storage tanks. There were no injuries or fatalities. The tank car contained slightly more than 14,000 gallons of a hazardous waste generated from the production of toluene diisocyanate, a chemical used to manufacture foam cushions.

Safety issues to be addressed by the Safety Board include procedures for heating and offloading of highly viscous and flammable materials from railroad tank cars, design of railroad tank cars without an access opening for visual examination of the product, and proper operation and sizing of the tank car's safety relief valve.

Train Derailment, Bourbonnais, Illinois

On March 15, 1999, Amtrak train No. 59 derailed after striking a tractor-semitrailer vehicle loaded with steel reinforcing bars in Bourbonnais, Illinois. The derailed locomotive unit traveled approximately 500 feet south of the crossing and struck a mix cut of 10 loaded and empty standing cars including a covered hopper car, released approximately 10,000 pounds of hazardous waste (steel mill electric arc furnace dust).

Aircraft Cargo Fire, Los Angeles, California

On April 28, 1999, two cargo pallets containing lithium batteries and other items caught fire in the Northwest Airlines cargo facility at Los Angeles International Airport. The two pallets had arrived from Osaka, Japan, on NWA flight 0026, a passenger-carrying flight. Northwest personnel and the airport fire department had difficulty extinguishing the fire. Most of the boxes of lithium batteries and some of the other items on the pallets were destroyed. There were no reported injuries or evacuations.

Safety issues addressed by the Safety Board as a result of this investigation focus on the safety of transporting lithium batteries aboard passenger aircraft. As a result of this investigation, the Safety Board made recommendations to the FAA and RSPA.

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. Projected growth rates show that there will be 600 million train miles completed in the year 2002, an increase of 108 million 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.

Due to 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.

The Office of Railroad Safety launched on 4 major accidents and 19 regional accidents in 1999. The four major launches were freight train collisions in Bryan, Ohio and in Momence, Illinois; and Amtrak grade crossing accidents in Bourbonnais, Illinois and Lissie, Texas. The Office also completed four major investigations and presented these reports to the Board during the summer of 1999.



Mokena, Illinois. Track damage caused by derailment.



Lissie, Texas. On July 8, 1999, Amtrak train No. 2 struck a tanker truck at a passive grade crossing. Two locomotives and 8 cars derailed.

The four reports presented to and adopted by the Safety Board were on the derailment and hazardous materials spill that occurred in Cox Landing, West Virginia; on a train collision that occurred between a Conrail train and a Norfolk Southern train in Butler, Indiana; on the grade crossing collision between a Northern Indiana Commuter Transit District (NICTD) train and a truck carrying rolls of steel in Portage, Indiana; and a special investigation and safety assessment of the NICTD, the agency involved in the Portage, Indiana, accident.

As a result of the four major reports and additional regional reports completed in 1999, the Safety Board issued 54 railroad safety recommendations. These recommendations addressed crew resource management; the need for the Federal, State, and private agencies to work to permanently resolve safety problems at the Midwest Steel grade crossing; the continued need for in-cab audible recording devices on trains to provide essential details for accident investigations; and the importance of emergency response management in railroad accidents involving hazardous materials.

Railroad investigators conducted two public hearings in 1999. The first hearing was a followup to the Union Pacific (UP) hearing conducted in March 1998 in which the Safety Board discussed safety concerns related to 15 accidents that occurred on the UP. The Safety Board reconvened in February 1999 to determine what improvements UP operations had implemented in the period between the 1998 and 1999 hearings.

The deadliest railroad accident investigated by the Safety Board in 1999 was the grade crossing accident in Bourbonnais, Illinois. Eleven passengers were killed when Amtrak train No. 59, the City of New Orleans, struck a truck hauling steel at an active grade crossing on March 15. In September 1999, the Safety Board conducted a 3-day public hearing in Chicago, Illinois, to discuss safety issues in the Bourbonnais accident. Witnesses at this hearing included eyewitnesses to the accident, members of the Amtrak train crew, and representatives of the local emergency responders. In addition, representatives of the grade crossing signals manufacturer, the railroads involved, trade organizations, and the State and Federal government provided testimony at the hearing.



Bourbonnais, Illinois. NTSB Board Member John Goglia addresses media regarding the crash of Amtrak's "City of New Orleans" train on March 15, 1999.

COMPLETED MAJOR RAILROAD INVESTIGATIONS

CSX Transportation, Cox Landing, West Virginia

Issues addressed by the Safety Board include:

- track and roadbed conditions on the CSX's Ohio River Subdivision;
- the effectiveness of Cabell County's emergency response procedures;
- the effective use of available hazardous materials information; and

- the coordination of safety-critical operations during wreckage-clearing operations.

On June 20, 1998, 30 of the 148 cars making up eastbound CSX Transportation, Inc., (CSX) train Q316 derailed at Cox Landing, West Virginia. Of the derailed cars, three were loaded with hazardous materials and eight others contained hazardous material residue. Two of the loaded cars were damaged in the pileup and leaked a combined volume of about 21,500 gallons of formaldehyde solution. No one was injured during the derailment of the train; however, 15 persons reported minor injuries as a result of the release of formaldehyde. Total damages in the accident exceeded \$2.6 million.

On June 29, 1999, the NTSB adopted the Cox Landing report and determined that the probable cause of the derailment was an unstable roadbed that resulted from inadequate or ineffective measures taken by CSX Transportation, Inc., to permanently correct known drainage problems in the accident area. As a result of the investigation, the Board made nine recommendations to CSX, Cabell and Wayne County Emergency Planning Committee, and the Mountaineer Gas Company.

Norfolk Southern Railroad, Butler, Indiana

Issues addressed by the Safety Board include:

- crew resource management;
- deficiencies in the Norfolk Southern Railroad (NS) engineer training program; and
- deficiencies in signal defect notification procedures and recordkeeping.

On March 25, 1998, NS train 255L5, en route south from Detroit, Michigan, to Fort Wayne, Indiana, struck the 6th head car of eastbound Conrail train TV-220 at a railroad crossing. Two crewmembers from the NS train were injured when they jumped from the moving train before the collision. The conductor was fatally injured during the collision. Both locomotive units of the NS train passed completely through the Conrail train at a recorded speed of 30 mph. Damages were estimated at \$552,500.

On July 13, 1999, the NTSB adopted the final report and determined that the cause of this accident was the failure of the engineer and conductor of the NS train to comply with operating rules, specifically their failure to observe and confirm signal aspects and their failure to continuously and directly supervise the student engineer. Also mentioned in the probable cause finding was the failure of NS Corporation to ensure employees' compliance with operating rules.

The Safety Board's final report included 19 safety recommendations made to the FRA, NS Corporation, Amtrak, the American Short Line and Regional Railroad Association, the Brotherhood of Locomotive Engineers, the United Transportation Union, and the Dekalb County Emergency Management Agency.

Northern Indiana Commuter Transportation District, Portage, Indiana

Issues addressed by the Safety Board include:

- grade crossing design;
- load securement;
- toxicology testing;
- vehicle conspicuity;
- crashworthiness of passenger cars; and
- grade crossing oversight and responsibility.

On June 18, 1998, a westbound Northern Indiana Transportation Commuter District (NICTD) two-car passenger train struck the second trailer of a long combination vehicle that consisted of a tractor pulling two flatbed semitrailers loaded with steel coils at a grade crossing near Portage, Indiana. When the vehicles collided, the second semitrailer broke away and was dragged by the train, while a chain securing a steel coil to the second semitrailer broke. The released coil entered the train's lead car through the front bulkhead and moved into the passenger compartment. The accident resulted in three fatalities and five minor injuries.

On July 21, 1999, the NTSB determined that the probable cause of the collision at the National Steel Corporation's Midwest Steel grade crossing was ineffective action by Federal, State, and private agencies to permanently resolve safety problems at the Midwest Steel grade crossing, which they knew to be a hazardous crossing. Ten subsequent recommendations were made to the DOT, the FRA, the FHWA, Indiana Department of Transportation, National Steel Corporation, Midwest Steel Division, and the Northern Indiana Commuter Transportation District.

Special Investigation of Northern Indiana Commuter Transportation District (NICTD)

Issues addressed by the Safety Board include:

- safety of NICTD grade crossings;
- adequacy of the NICTD safety-related reporting system;
- implementation of the NICTD System Safety Program Plan; and
- effectiveness of the NICTD corporate safety culture.

The Safety Board conducted a special investigation that examined NICTD's accident history, infrastructure and operating practices, statistical safety record, safety programs, and corporate safety culture. The intent of this special investigation was not to determine whether NICTD is a "safe" or "unsafe" railroad, but to examine those elements of its overall operation known to affect safety and to indicate where improvements could

be made in these areas. The Safety Board recognizes that factors not examined in this investigation may also affect NICTD safety either positively or negatively.

As a result of its special investigation, the Safety Board made 16 safety recommendations to NICTD, the Indiana Department of Transportation, and the Boards of Commissioners of Indiana's Lake, LaPorte, Porter, and St. Joseph Counties.

Research and Engineering

The Office of Research and Engineering provides scientific and engineering support for accident investigations and safety studies in all modes of transportation and manages the Board's technological infrastructure and information resources. The Office comprises six divisions and a set of related technical support functions.

Safety Studies and Data Analysis

The Safety Studies and Data Analysis Division, in collaboration with the modal investigative offices, conducts field studies of safety issues in all transportation modes and performs analyses of accident statistics to detect trends and patterns. The safety studies address chronic or emerging transportation safety problems from a strategic point of view by examining a series of accidents, accident trends, or technological changes. The studies seek to stimulate improvements in the policies, programs, or statutory authority of government agencies, or to advance technological improvements in a transportation system or component. In selecting subjects for safety studies, the Board identifies ongoing or potential safety problems or issues of national significance, giving close consideration to matters that have the potential for reducing accident losses, improving the safety effectiveness of other agencies, and attaining implementation of previous Board safety recommendations. The division also evaluates the effectiveness of Federal, State, and local government and industry transportation safety programs by examining policy issues and performance. The division's safety studies, which contain recommendations for corrective action, are published and distributed to the public.

The division also manages the Safety Board's aviation accident database, the official census of U.S. civil aviation accidents, and performs periodic statistical reviews of aviation accident data as well as special data retrievals and analyses to support safety studies and accident investigations.

Information Technology

The Information Technology Division maintains a distributed computer network that serves the NTSB headquarters in Washington, D.C., as well as nine regional offices across the United States. The Board's network supports the office automation functions of the Board's staff as well as the specialized computational capabilities of the Board's laboratories.

The division's systems analysts and programmers have developed many agency-specific software applications and maintain numerous agency databases, including docket material scanning and electronic storage; accident data; safety recommendations; and Freedom of Information Act (FOIA) request tracking. The office also provides support for computer systems within the agency such as the financial management system and the connection infrastructure that allows our systems to communicate with those of other agencies and organizations.

The Technical Support Branch within the Information Technology Division consists of a staff of network engineers and equipment analysts who administer, support, and troubleshoot the Board's computer system.

Materials Laboratory

The Materials Laboratory Division conducts or coordinates all of the materials failure analysis and testing in support of accident investigations, special investigations, and safety studies by each of the Safety Board's modal offices. The laboratory staff has extensive experience in all aspects of failure analysis, particularly fractography and microstructural interpretation. In analyzing and testing components submitted by field accident investigators to the laboratory, the staff uses a complete line of failure analysis equipment, including binocular microscopes, disassembly and measurement tools, metallographic equipment, and a scanning electron microscope with semiquantitative chemical X-ray energy and wavelength capability. Each step of a component's failure analysis is photographically documented. The staff produces approximately 200 reports on findings per year.

For most failure analysis investigations, the entire project is conducted in the materials laboratory at NTSB headquarters in Washington, D.C. However, the laboratory also utilizes outside facilities (private and government) to conduct specialized tests for which in-house capability is not available. Depending on the requirements of each investigation, these tests can include quantitative chemical or molecular analysis, mechanical testing, nondestructive testing (such as X-ray inspection), and residual stress measurement.

Materials laboratory personnel also examine components at accident sites when specialized expertise is needed quickly to identify important fractures or understand breakup and damage patterns.

Vehicle Recorders

The Vehicle Recorder Division recovers, validates, and analyzes the information recorded by vehicle recording systems from all transportation modes. Division staff also supports domestic and international technical committees and working groups for the development of recorder carriage requirements and technical standards.

Aviation - The cockpit voice recorder (CVR) and flight data recorder (FDR) laboratories employ state-of-the-art hardware and software capable of recovering and analyzing the recordings produced by all flight recorders manufactured in the United States since recorders were introduced over 30 years ago. The FDR laboratory's readout stations transform recorded signals to engineering units that can be displayed in tables, plots, and computer animations. A listening room is maintained within the CVR laboratory to transcribe acoustic recordings from a variety of sources, such as personal audio or video recorders, air traffic control facility recordings, and security video recordings. The CVR/Audio laboratory also utilizes hardware and software to enhance the intelligibility of the recordings and to perform comprehensive spectrum analyses of acoustic data.

Railroad - The Vehicle Recorder Division also maintains a railroad event recorder (RRER) readout facility. The RRER readout equipment and software can process the data from the wide variety of formats and recording media used by the rail industry and can present the data in tabular and plot formats.

Highway and Marine - The Vehicle Recorder Division also provides technical support for the readout and presentation of data from truck, bus, and other motor vehicle recorders, as well as marine course recorders and voyage data recorders.

Video Recording and Processing - The proliferation of inexpensive video recorders frequently provides investigators with images of accidents as they occurred. The capability to analyze, copy, edit, and extract data from these video recordings is frequently a useful analytic tool in accident investigation.

Information Products

The Information Products Division comprises staff for publication layout, Internet and Intranet Web site management, graphics production, and audio/visual support. Also included in this division is the Public Inquiries Branch, which is the distribution point for public information products, including accident reports, publications, and videotapes. The staff also fills requests for information on safety recommendations and coordinates responses to Freedom of Information Act (FOIA) requests.

Vehicle Performance

The Vehicle Performance Division consists of staff trained in aeronautical, mechanical, biomechanical, civil, and electrical engineering who work to solve technical problems associated with vehicle and occupant motion during an accident. Solving these problems often requires defining the trajectory and orientation of the vehicle and occupants throughout the accident sequence and determining the physical forces that produced these motions. Staff also participates and directs research into other physical sciences, such as thermodynamics and gas dynamics, when a deeper investigation into the physical phenomena underlying an accident is required.

The Vehicle Performance Division also works continuously to improve the methods and tools used to gather, process, and present information during investigations. Efforts in this area include the acquisition and development of computer programs for vehicle and occupant motion simulation; radar and flight recorder data analysis; computer graphics modeling of vehicles, occupants, and accident environments; and computer-generated video animations that combine environment, vehicle, and occupant models into a comprehensive visual reconstruction of the accident.

Technical Support

Related technical support functions include fire and explosion investigation, medical and toxicological factor evaluation, and information/knowledge management technologies. Office of Research and Engineering investigators provide on-scene accident investigation of fire and explosion issues in all modes of transportation, including coordination of investigation groups, conduct of fire and explosion cause and origin determinations, documentation of accident scenes, and collection of physical evidence.

The Office of Research and Engineering also employs a medical officer with specialties in internal medicine and aerospace medicine to provide medical consultation in accident investigations, including interpretation of autopsy and toxicology results, reviews of medical records, evaluation of injury-producing mechanisms, and evaluation of a transportation operator's fitness for duty.

Administrative Law Judges

Since 1967, the Safety Board has served as the “court of appeals” for airmen, aircraft mechanics or mariners whenever a certificate action is taken by the Federal Aviation Administration (FAA) or the U. S. Coast Guard (Coast Guard).

Under 49 U.S.C. Section 1133 and 49 CFR Part 821, the Board’s administrative law judges hear, consider, and issue initial decisions on appeals of FAA certificate actions taken under 49 U.S.C Sections 44106, 44709, and 44710. Also covered are petitions from airmen whose applications for certification have been denied under 49 U.S.C. Section 44703.

Under the FAA Civil Penalty Administrative Assessment Act of 1992 (codified at U.S.C Sections 46301, *et. seq.*) the Board’s judges hear all civil penalty appeals to the NTSB of enforcement cases involving pilots, engineers, mechanics, and repairmen where the amount in controversy is less than \$50,000.

Under the Equal Access to Justice Act (EAJA), codified at 5 U.S.C Section 504, the NTSB's judges also review and decide applications for attorneys fees and expenses from airmen who prevail against the FAA in cases brought pursuant to 49 U.S.C Section 44709. Applications filed in connection with actions brought by the FAA under 49 U.S.C Section 46301(d) (civil penalty cases) also are decided by the Board's judges and, on appeal from the judges' decisions, by the full Safety Board.

The judges’ decisions in these cases may be appealed to the five-member Safety Board by either the certificate holder or the FAA. 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 a decision made by the five-member Board to the U.S. Court of Appeals, if the Administrator 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*.

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 1999, two marine appeals were filed with the NTSB and no cases were closed by the Board.

There were 417 aviation certificate appeals filed with the Board's Office of Administrative Law Judges in 1999; 136 of these cases were from emergency orders. The Board's judges held 107 hearings and closed 420 cases in 1999.

During 1999, 66 of the judges' decisions were appealed to the full five-member Safety Board for review. The Board decided 61 appeals, reversing the judges' decisions in 8 cases. Fifteen of the Board's decisions were appealed to the U.S. Court of Appeals, which rendered 15 decisions in 1999, affirming the Board in 10 of these and reversing the Board in 1 case. (The remaining four cases were dismissed or voluntarily withdrawn.)

There were four EAJA applications filed with the Board's administrative law judges in 1999, and six EAJA cases were decided by the judges. In 1999, two of the judges' EAJA decisions were appealed to the full Board, which issued rulings in four EAJA cases.

Public Forums and Symposia Held in 1999

May 3-5, 1999 **International Symposium on Transportation
Recorders
Washington, D.C.**

The Safety Board cohosted the symposium with the International Transportation Safety Association in order to bring together, for the first time, international professionals from all modes of transportation to share information and experiences gained from the use of recorded information to investigate transportation accidents and to improve transportation safety and efficiency.

During the 2-day meeting, experts from all modes of transportation, including government and industry, discussed the current state of recorder technology, including cockpit voice recorders and flight data recorders used in commercial aviation, voyage recorders installed on cruise ships, on-board computers/recorders installed in trucks, event recorders installed on trains, and the recording devices used throughout the pipeline industry.

June 30, 1999 **Preventing Damage to Underground Facilities**
(Information available on DOT, OPS Web site)

The National Transportation Safety Board and the DOT, Office of Pipeline Safety held a joint symposium to review the findings of the Best Practices Study on Damage Prevention to Protect Underground Utilities. One hundred and seventy individuals participated in the study from all aspects of the utility and construction industry and they produced a document known as "Common Ground," Study of One-Call Systems and Damage Prevention Best Practices.

August 30, 1999 **Aviation Maintenance Repair Facilities**
Chicago, Illinois

With nearly half of all air carrier maintenance work now performed by contract repair facilities, the Safety Board's forum focused on the practices used by the airlines who outsource maintenance to ensure the quality of the work and inspections done by contract maintenance firms. The forum was held as a result of past Safety Board investigations which uncovered serious problems with the oversight of contract maintenance.

Experts invited to participate as parties to the forum included the Air Transport Association, the Regional Airline Association, the Aeronautical Repair Station Association, the Flight Safety Foundation, and the FAA.

**December 8-9, 1999 Safety Issues Involving the Operation of Amphibious
Passenger Vessels Known As "Ducks"
Memphis, Tennessee**

During the forum, the Safety Board reviewed safety issues involving the operation of amphibious passenger vessels known as "Ducks." True to their original design and use during World War II, Ducks that are in service today operate on both land and water. Currently, these vehicles transport more than 1 million passengers a year, usually as part of a tourist excursion, and are in service in more than 16 states. Like other watercraft, the amphibious vessels are required to be inspected. Ducks operating on Federal waters that carry more than six passengers are regulated and inspected by the Coast Guard. Those operating on waters under State supervision fall under the jurisdiction of the State.

The Safety Board is currently investigating the May 1, 1999, Duck (*Miss Majestic*) accident in Hot Springs, Arkansas. This accident claimed 13 lives.

**December 15-16, 1999 Child Restraints in Aircraft
Arlington, Virginia**

The Safety Board, as well as officials from the FAA, airlines, Transport Canada, researchers, and child seat manufacturers examined the latest developments for protecting young children, and highlighted problems and challenges that will need to be resolved to enable this protection to be easily afforded to all young children flying on aircraft.

Gathered experts discussed the history of child restraints for aircraft, issues confronting parents and airlines, who should use the seats, regulations covering their use in this country and abroad, who should supply the seats, and design requirements.

Public Hearings Held in 1999

February 3-4	Sinking of the pleasure craft <i>Morning Dew</i> December 29, 1997	Charleston, SC
February 17-18	Fire aboard the cruise ship <i>Ecstasy</i> July 20, 1998	Miami, FL
February 24-25	Union Pacific Railroad	Dallas, TX
April 14-16	Truck/Bus Safety	Washington, DC
August 30	Aviation Maintenance Repair Facilities	Chicago, IL
August 31 - September 2	Advanced Safety Technologies for Trucks and Buses	Nashville, TN
September 13-15	Fatal grade crossing accident Bourbonnais, Illinois, March 15, 1999	Chicago, IL
October 20-22	Highway Transportation Safety Aspects of NAFTA	Los Angeles, CA

