1998

ANNUAL REPORT TO CONGRESS

National Transportation Safety Board

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1998 Annual Report to Congress

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

NTSB/SPC-00/02

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Abstract: This report summarizes the activities and accomplishments of the Safety Board during the 1998 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.

Recent publications are available in their entirety on the Web at <http://www.ntsb.gov>. Other information about available publications also may be obtained from the Web site or by contacting:

National Transportation Safety Board
Public Inquiries Branch, RE-51
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Safety Board publications such as accident reports and safety studies may be purchased, by individual copy or by subscription, from the National Technical Information Service.

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Foreword

The National Transportation Safety Board (NTSB) is an independent agency charged with determining the probable causes 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 appeals of enforcement actions involving airman certificates and civil penalties by the Federal Aviation Administration and seaman certificates by the U.S. Coast Guard.

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 Board's efforts to improve the safety of the Nation's transportation system.

The NTSB's origins can be found in the Air Commerce Act of 1926, in which Congress charged the Department of Commerce with investigating the causes of aircraft accidents. Later, that responsibility was given to the Civil Aeronautics Board's Bureau of Safety. In 1967, Congress consolidated all transportation agencies into a new Department of Transportation (DOT) and established the NTSB as an independent agency within the DOT. In creating the NTSB, Congress envisioned that a single organization with a clearly defined mission could more effectively promote a higher level of safety in the transportation system than the individual modal agencies 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 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 in 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 isssues; and,

- the need to maintain a database so that trends can be identified and projected.

Since its inception, the NTSB has investigated more than 100,000 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 around the world to investigate significant accidents, developing a factual record and safety recommendations, with one aim – to ensure that such accidents never happen again.

To date, the NTSB has issued over 10,000 safety recommendations pertaining to the various transportation modes to more than 1,250 recipients. As 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 regulatory agencies and the transportation industry.

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," Mr. Hall has worked tirelessly to improve the safety of all modes of transportation during his tenure.

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 Florida Everglades; TWA flight 800 off Long Island, NewYork; and Korean Air flight 801 in Guam.

On average, the Board investigates some 2,000 aviation accidents and 500 accidents in the other modes (rail, marine, highway, pipeline, and hazardous materials) 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, North Carolina; the February 1995 and August 1997 cargo plane crashes in Kansas City, Kansas, and Miami, Florida; and the August 1997 Amtrak accident in Kingman, Arizona.

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, Missouri; the February 1996 commuter train/Amtrak collision in Silver Spring, Maryland; and the TWA flight 800 crash. In addition, Mr. Hall chaired a safety forum on commercial air service in Alaska and has chaired international symposia on the impact of fatigue on transportation safety, preventing pipeline excavation damage, the effects of corporate culture on safety, and improving assistance to survivors and families of accident victims.

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

In September 1996, President Clinton named Mr. 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, Mr. 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, Mr. 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.

Prior to his appointment to the Board, Mr. 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.

Mr. 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. Mr. Hall’s term on the Board expires 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, NewYork, 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, which is a group composed of worldwide aviation experts who gather informally to share ideas on reducing human error in the cockpit.

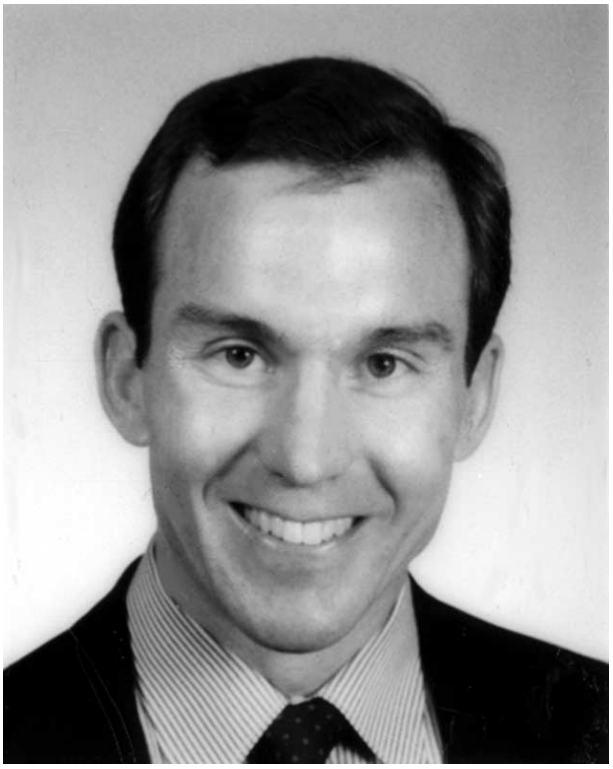
Prior to his appointment to the Safety Board, Mr. Francis served as Senior Representative for the Federal Aviation Administration (FAA) in Western Europe and North Africa and was based in Paris, France. Representing the FAA Administrator, he worked extensively on aviation safety and security issues with 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 Laurels 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 expires on August 14, 1999, and his appointment as a Member of the Safety Board expires 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 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 1997 Comair Embraer-120-RT 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 deadliest in Amtrak history.

In 1997, he chaired a 4-day public hearing in San Juan, Puerto Rico, on the deadliest pipeline accident ever investigated by the Board, an explosion that killed 33 people in San Juan. 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, Indiana. In 1994, he chaired the public

hearing in Charlotte, North Carolina, on the USAir DC-9 accident, 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 during 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 J. Goglia is an internationally recognized expert in aviation maintenance and aircraft operations. In August 1995, he was sworn in as a Member of the National Transportation Safety Board.

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, Mr. Goglia is a leading advocate regarding the evaluation of human factors in the aviation workplace. He developed the Maintenance Resource Management Program which combined 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. He was the Team Coordinator of the International Association of Machinists and Aerospace Workers' (IAM) Accident Investigation Team, and for over 21 years served as the IAM's Flight Safety Representative. He was the IAM's principal specialist on aviation issues, serving as liaison to the Federal Aviation Administration (FAA), NTSB, DOT, and other executive branch agencies, as well as the U.S. Congress. He represented the IAM on the

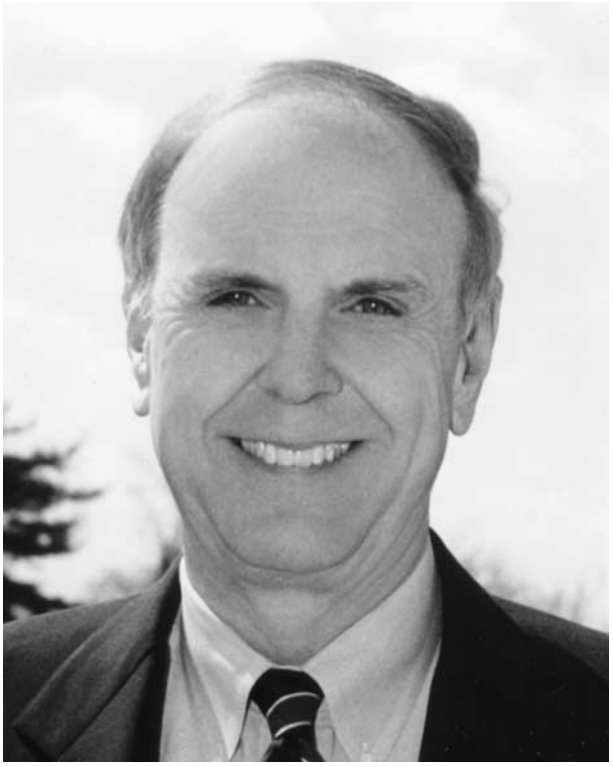
Aviation Rulemaking Advisory Committee, which evaluates and recommends changes regarding aviation safety and operational regulations.

Mr. 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 advancing safety and professionalism throughout the aviation maintenance industry. He is an internationally known speaker and author, addressing aviation safety issues, lecturing at world symposia, and serving as contributing editor to several industry periodicals. In 1960, Mr. Goglia learned to fly in a Piper J2-J3. For more than 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.

Mr. Goglia's term expires in December 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 a registered professional engineer. While at Georgia Tech, Mr. Black worked on one of the original Multi-Disciplinary Traffic Crash Investigation Teams funded by the DOT.

Mr. 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. Mr. 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.

Mr. 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 Engineers' Edmund R. Ricker Traffic Safety Award.

Since his appointment to the Board, Mr. Black has been the on-scene Board Member for several accidents including Delta Airlines 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, he has been on scene at a propane gas explosion in San Juan, Puerto Rico; a fatal interstate bus crash in Cheesequake, New Jersey, and school bus accidents in Monticello, Minnesota, and Holmdel, New Jersey.

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

The NTSB and Congress in Calendar Year 1998

The National Transportation Safety Board Members and staff testified before congressional committees six times in 1998.

On February 11, appearing before the House Appropriations Committee, Transportation and Related Agencies Subcommittee, Chairman Jim Hall discussed the Safety Board's fiscal year 1999 budget request for $53.2 million and requested an increase of full-time employee positions from 381 to 402. Additionally, the Board requested that its Emergency Fund be increased to $2 million from its current $1 million level. The Chairman also asked that the language for the fund be modified to permit use of the fund to provide assistance to families of accident victims. The Chairman further testified about the major investigations concluded by the Board in 1998.

On February 25, Vice Chairman Bob Francis appeared before the Senate Committee on Commerce, Science and Transportation, Subcommittee on Surface Transportation and Merchant Marine. He testified on railroad safety, highlighting the issues of management responsibility and oversight, along with positive train separation and human fatigue. Vice Chairman Francis also stressed the need for the Federal Railroad Administration (FRA) -- as well as the railroad industry -- to work to change a corporate culture that should more strongly emphasize safety.

On April 1, Robert C. Lauby, Director, Office of Railroad Safety, appeared before the House Committee on Transportation and Infrastructure, Subcommittee on Railroads. He testified regarding railroad hardware and mechanical issues, noting that these safety issues often play a dual role by either precluding accidents or, in some cases, being the direct cause of the accident. Mr. Lauby discussed two relevant safety issues that are also on the NTSB's Most Wanted List: positive train separation and the safety of passengers in railroad cars. He also discussed other safety issues, including track safety standards and grade crossing safety.

On April 29, Chairman Jim Hall appeared before the House Committee on Transportation and Infrastructure, Subcommittee on Railroads regarding the FRA's reauthorization. He specifically addressed human factors issues relating to railroad safety and noted that the FRA's data for 1996 show that nearly 80 percent of train collisions were caused by human factors, a similar number to the previous year's number. Chairman Hall stressed the Safety Board's concerns with several human factors issues, including substance abuse, training of operating employees, and decision-making issues. He noted that one of the more disturbing human factors issues frequently seen by NTSB investigators is human fatigue.

On August 6, the NTSB's General Counsel, Daniel D. Campbell, appeared before the House Committee on Transportation and Infrastructure, Subcommittee on Aviation regarding H.R. 1846, a bill that addressed the FAA's use of emergency authority to revoke airmen or air carrier certificates. Although the Board took no position on the pending bill, it did note procedural difficulties with the legislation.

On September 16, before the Senate Committee on Commerce, Science, and Transportation, Subcommittee on Surface Transportation and Merchant Marine, Dr. Vernon S. Ellingstad, Director, Office of Research and Engineering, testified on fatigue and its safety effects on the commercial motor vehicle and railroad industries. It was noted that the factors contributing to fatigue are becoming increasingly prominent, that the fatigue issue is on the Board's Most Wanted List, and that 80 fatigue-related safety recommendations have been issued by the Board since 1972.

Finally, Chairman Hall testified before the House Committee on Transportation and Infrastructure, Subcommittee on Aviation, in November regarding the increasing number of aircraft mishaps on the Nation's runways.

"Most Wanted" List of Safety Improvements

The Safety Board uses its "Most Wanted" list of safety improvements 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. The Board believes the recommendations on the Most Wanted list should be acted on as soon as possible because they have the most potential to improve safety, save lives, and reduce accidents and injuries.

At a public meeting in April, the Safety Board issued an updated "Most Wanted" list of 10 safety improvement goals covering all modes of transportation: aviation, highway, rail, marine, and pipeline. The Board also removed several items from the list because of substantial progress in implementing many of the recommendations.

Issues highlighted on the "Most Wanted" list were:

- ***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. Modern recording devices do much more than help solve accidents. They are valuable tools in spotting safety trends and preventing accidents.
- ***Positive train separation (PTS).*** Mandate the installation of automated systems to stop trains when crewmembers make signal or speed mistakes, or are incapacitated. FRA data show that more than 1,000 train accidents could have been prevented by PTS systems.
- ***Human fatigue in transportation operations.*** Translate the latest human fatigue research into new, meaningful time and duty-hour regulations and educational materials for workers in all modes of transportation. Government and industry have already spent $20 million on human fatigue research.
- ***Airport runway incursions.*** Move forward with current and new programs aimed at preventing accidents involving aircraft while they are on the ground at airports. This is vitally important because the number and rate of runway incursions has shown an alarming 4-year increase.
- ***Youth highway crashes.*** Toughen and enforce minimum drinking and driving laws and enact laws mandating a provisional license system and nighttime restrictions for young novice drivers.
- ***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. Outside damage is the leading cause of pipeline ruptures.

- ***Recreational boating safety.*** Require States to implement a series of boating safety improvements, educational programs, and regulations. More than 800 people were killed in recreational boating accidents in 1997 and more than 700 the year before. The quick growth of personal watercraft has been accompanied by an increase in accidents and deaths.
- ***Highway vehicle occupant protection.*** Require a series of safety improvements to vehicle seatbelt, air bag, and child restraint design, installation, and usage.
- ***Airframe structural icing.*** Revise Federal aircraft 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 fuel tanks of large aircraft.

In letters to Transportation Secretary Rodney Slater and other modal administrators, Chairman Hall urged the Federal government's regulatory agencies to implement the "Most Wanted' list items.

Chairman Hall also outlined the Board's decision to remove 10 items from last year's list because of positive action by Federal and State safety regulators. "I am convinced that the Most Wanted list, since it was established in 1990, has had an impact on upgrading transportation safety and that has allowed the Board to remove many items from the list," he said.

For example, the NTSB had been urging the FAA to require fire detection and suppression systems in many passenger aircraft cargo holds. Those recommendations were added to the Most Wanted List last year. The heightened exposure of the issue and the intense media attention surrounding the NTSB's investigation of the 1996 ValuJet accident prompted the FAA to act.

Earlier this year, the FAA issued a final rule mandating fire detection and suppression systems in 3,700 passenger and cargo aircraft. As a result, the Board removed that issue from the list. Other issues were removed from the list because the NTSB documented substantial safety progress. Although they are no longer on the priority list, NTSB continues to monitor these recommendations until action is completed. Issues removed from the list were:

- ***Fishing vessel safety.*** The Board noted progress in fishing vessel safety and a decline in accident and death rates.
- ***Aircraft wake vortex turbulence.*** New aircraft weight classifications and separation distances behind other jets have been implemented.

- ***Administrative revocation of drivers' licenses.*** Forty States have enacted laws to revoke drivers' licenses for refusing to take or for failing a chemical test for alcohol.
- ***School bus safety.*** Major improvements have been made in school bus fire safety, emergency exits, and school bus design.
- ***Heavy commercial truck safety.*** Truck drivers are subject to more thorough driver records checks, tighter medical standards, and medical assessments.
- ***Small passenger vessel safety.*** The small passenger vessel industry has developed new safety standards including better safety equipment and passenger emergency instructions.
- ***Midair collision avoidance alerts for general aviation aircraft***. More than 60 airport terminals have been upgraded with Mode C intruder logic — an airborne collision avoidance computer software.
- ***Aircraft pilot background checks.*** Congress passed legislation requiring pertinent pilot training records be provided to potential employers by previous employers.
- ***Passenger rail car safety***. Government regulators and the rail industry are moving to require better emergency crew training, equipment, exits, and information on passenger rail cars.

Family Affairs

The Office of Family Affairs coordinated Federal services for transportation accident victims and their families during the investigation of 15 accidents in 1998. These accidents included the cruise ship fire aboard the *Ecstasy*; a mid-air collision in Atlanta, Georgia; and the Burnt Cabins, Pennsylvania, highway accident involving a Greyhound bus and two semitrailers. In addition to accidents in which the Safety Board led the investigation, at the request of the Department of State, members of the family affairs staff also assisted following the accident of Swissair flight 111 in Halifax, Nova Scotia, an investigation conducted by the Transportation Safety Board (TSB) of Canada.

In October 1998, nearly 2 years after the Congress enacted the Aviation Disaster Family Assistance Act, the NTSB held an international symposium to discuss the role of government and industry in the care of victims and their families following major transportation disasters. The Safety Board hosted this event in an effort to promote an understanding of the Federal government's role at major transportation disasters.

The 2-day event was attended by more than 500 persons from over 30 countries, including various segments of the transportation industry; government, emergency response and support, and relief agencies; and family members – all dedicated to achieving the same objective: improving the way in which we deal with victims and their families. Additionally, the symposium educated individuals and organizations responding to these events by allowing them to publicly discuss experiences and new techniques in disaster resource management.

A recent initiative in the Office of Family Affairs has been the creation and implementation of an extensive outreach program. Designed to educate organizations and individuals that assist the Safety Board at accident sites, the program has targeted State and local emergency management agencies, law enforcement agencies, medical examiners, coroner associations, airport management, and other support organizations. Throughout the year, Family Affairs has also worked with domestic and international carriers in the development of their emergency response plans to include participation in airline training and emergency drills.

Recently, the Aviation Disaster Family Assistance Act has been extended to require foreign carriers flying in or out of the United States to file with the DOT and the NTSB their plans to assist victims and their families in the event of an aviation accident involving their carrier on U.S. soil. This addition to the original law was passed by the Congress following the KAL flight 801 accident in Guam, which highlighted the need to establish a requirement for all carriers operating in and out of the United States and its territories.

Transportation Fatalities

The number of persons who died in transportation accidents in the United States and its territories declined in 1998. Deaths from transportation accidents in the United States in 1998 totaled 43,920. The overall number, derived from all modes of transportation, showed a decline from the 1997 total of 44,659 fatalities. (See table 1.)

The number of persons killed in all aviation accidents declined from 976 to 683 in 1998. There were no passenger fatalities in the commercial airline category; one ground crew worker was killed. In the general aviation category, the number of fatalities decreased from 646 to 621.

Fatalities involving rail transportation rose from 749 in 1997 to 831 in 1998, with the majority being persons walking along or crossings tracks. A significant portion of the increase is due to fatalities occurring on light rail, heavy rail, or commuter rail, which reported 192 fatalities in 1998, as compared with 105 in 1997. Deaths among train passengers dropped from 6 to 4. (Because of peculiarities in reporting requirements, there may be some duplication in the numbers for intercity rail and commuter rail in table 1.)

Highway fatalities, again accounting for more than 94 percent of the transportation deaths this year, declined to 41,480. The number of fatalities decreased in most highway vehicle categories; however, an increase in highway deaths occurred in the category of light trucks and vans, which recorded 503 more fatalities in 1998 than in 1997. Motorcycle fatalities also increased with 126 more fatalities in 1998 than in 1997.

Marine deaths decreased only slightly from 911 to 908. Recreational boating fatalities decreased from 821 to 808. These represented the largest category of marine-related deaths. Fatalities in marine cargo transportation declined while commercial fishing increased from 54 in 1997 to 76 in 1998.

Pipeline fatalities almost doubled, from 10 in 1997 to 18 in 1998.

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

		1997	1998[a]
Highway:	Passenger cars	22,200	21,240
	Light trucks and vans	10,257	10,760
	Pedestrians	5,321	5,254
	Motorcycles	2,116	2,242
	Pedalcycles	814	794
	Medium and heavy trucks	753	723
	Buses	18	27
	All other	534	440
	Total	**42,013**	**41,480**
Grade Crossings[b]:		(461)	(431)
Rail:	Intercity		
	Trespassers and nontrespassers[c]	590	601
	Employees and contractors	48	34
	Passengers on trains	6	4
	Light, heavy, and commuter rail[d] [e]	105	192
	Total	**749**	**831**
Marine:	Recreational boating	821	808
	Cargo transport	36	24
	Commercial fishing[f]	54	76
	Total	**911**	**908**
Aviation:	General aviation	646	621
	Airlines	8	1
	Air taxi	40	45
	Commuter	46	0
	Foreign / unregistered[g]	236	16
	Total	**976**	**683**
Pipeline:	Gas	10	17
	Liquids	0	1
	Total	**10**	**18**
Grand Total:		**44,659**	**43,920**

a. 1998 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 Aadministration (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.

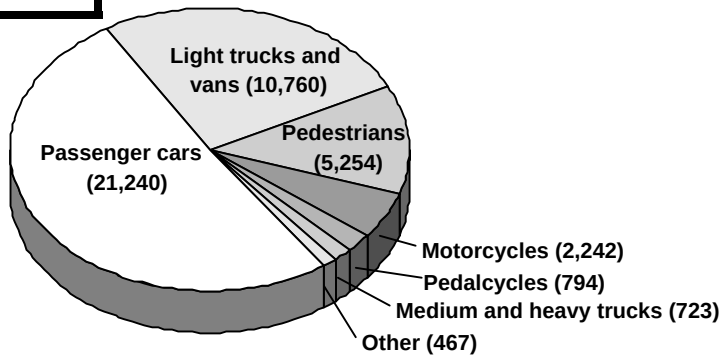
e. Fatalities reported to the FTA for commuter rail operations may also be reported to the Federal Rail Administration and included in the intercity railroad fatalities.

f. Refers to only operational fatalities.

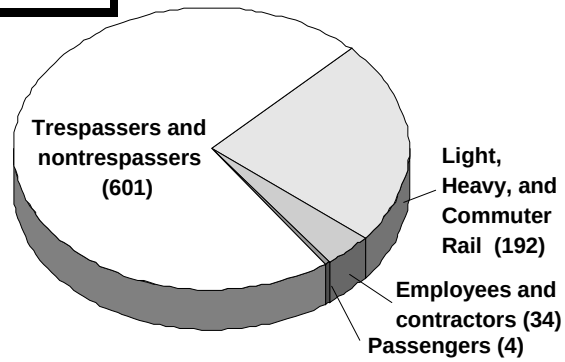
g. Includes non-U.S. registered aircraft involved in accidents in the U.S.

43,920 Transportation Fatalities in 1998

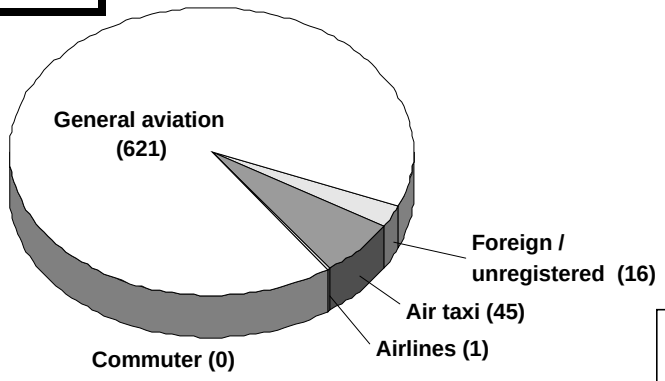
Highway: 41,480



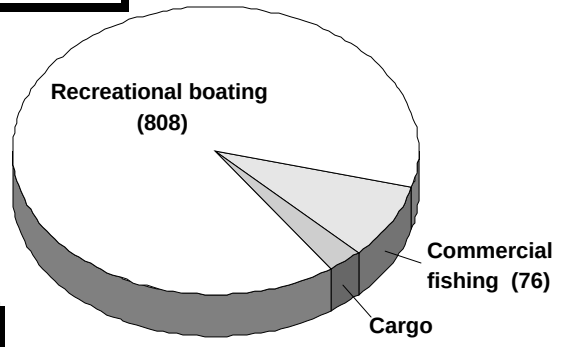
Rail: 831



Aviation: 683



Marine: 908



Pipeline: 18

Office of Aviation Safety

In 1998, for the first time since the NTSB began compiling statistics, there were no passenger fatalities on U.S. scheduled airlines and commuters.

General aviation accidents in 1998 totaled 1,907; up from 1,858 accidents in 1997. Because of an increase in estimated flight hours, the overall general aviation accident rate per 100,000 flight hours decreased from 7.29 to 7.12, the lowest general aviation accident rate in at least 17 years. The fatal accident rate declined from 1.40 to 1.35 and is the lowest fatal accident rate in the period.

In 1998, Office of Aviation Safety staff from the Washington D.C. headquarters investigated 101 accidents and assisted in 66 foreign accidents. Safety Board staff from aviation regional offices, also investigated 2,179 accidents, assisted in 47 foreign aviation investigations, and traveled to 7 foreign nations to assist in accident investigations. The following is a summary of the office's activities.

Completed Major Aviation Investigations

Monroe, Michigan — Embraer-120 Icing Accident

The NTSB issued a final report on a January 1997 accident in which Comair flight 3272, an Embraer-120 RT, crashed after a rapid descent and uncommanded roll near Monroe, Michigan. All 29 passengers and crew were killed. The NTSB said the probable cause was the FAA's failure to establish adequate certification standards for flight in icing conditions; the FAA's failure to ensure that an FAA/Centro Tecnico Aeroespacial of Brazil-approved procedure for the accident airplane's deicing system operation was implemented by U.S.-based air carriers; and FAA's failure to require the establishment of adequate minimum airspeeds for icing conditions, which led to the loss of control when the airplane accumulated a thin rough accretion of ice on its lifting surfaces. Contributing to the accident were the flight crew's decision to operate in icing conditions near the lower margin of the operating airspeed envelope (with flaps retracted) and Comair's failure to establish and adequately disseminate unambiguous minimum airspeed values for flap configurations and for flight in icing conditions. There were 20 recommendations issued in this final report to the FAA and the National Aeronautics and Space Administration. Previously, as a result of this accident, on May 21, 1997, the Safety Board issued four safety recommendations to the FAA regarding EMB-120 minimum airspeed information, ice protection system operational procedures, and ice detection/warning systems.

Table 1. Accidents, Fatalities, and Rates, 1998 Preliminary Statistics
U.S. Aviation

	Accidents		*Fatalities*				*Accidents per 100,000 Flight Hours*		*Accidents per 100,000 Departures*	
	All	*Fatal*	*Total*	*Aboard*	*Flight Hours*	*Departures*	*All*	*Fatal*	*All*	*Fatal*
U.S. air carriers operating under 14 CFR 121										
Scheduled	41	1	1	-	15,678,000	9,921,000	0.262	0.006	0.413	0.010
Nonscheduled	7	-	-	-	830,000	397,000	0.843	-	1.763	-
U.S. air carriers operating under 14 CFR 135										
Scheduled	8	-	-	-	513,000	791,206	1.559	-	1.011	-
Nonscheduled	79	17	45	41	2,537,500	n/a	3.11	0.67	n/a	n/a
U.S. general aviation	1,907	361	621	615	26,796,000	n/a	7.12	1.35	n/a	n/a
U.S. civil aviation	2,040	377	663	656						
Other accidents in the U.S.										
Foreign registered aircraft	18	5	10	10						
Unregistered aircraft	7	4	6	6						
Military aircraft that collided with civil aircraft	1	1	1	-						
U.S. registered aircraft operated abroad by foreign air carriers	1	-	-	-						

Notes

All data are preliminary.

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.

Pensacola, Florida — MD-88 Engine Failure Accident

The NTSB issued a final report on a Delta Air Lines MD-88 accident in July 1996. Two people were killed when an engine ruptured shortly before takeoff from the Pensacola, Florida, airport. The NTSB said the left engine's front compressor fan hub fractured because Delta's engine inspection failed to find a detectable crack. The crack grew because of an undetected manufacturing drilling defect by a contractor to Pratt & Whitney, the engine's maker.

The Safety Board discussed the limitations of the blue etch anodize process, manufacturing defects, standards for the fluorescent penetrant inspection process, the performance of nondestructive testing, the use of alarm systems for emergency situations, and instructions regarding emergency exits. The Safety Board made 11 recommendations to the FAA including:

- have all manufacturers of titanium rotating engine components reevaluate their manufacturing specifications and procedures;
- find ways to improve the likelihood that abnormal microstructure will be detected; establish and require adherence to a uniform set of standards for the fluorescent penetrant inspection process;
- require that all heavy rotating titanium engine components receive appropriate nondestructive testing inspections (multiple inspections, if needed) based on probability of detection and, as an interim measure, require that critical rotating titanium engine components that have been in service for at least 2 years receive a fluorescent penetrant inspection, eddy current, and ultrasonic inspection of the high stress areas at the engine's next shop visit or within 2 years, whichever occurs first;
- require that all newly manufactured passenger-carrying airplanes operated under 14 CFR Part 121 be equipped with independently powered evacuation alarm systems; and,
- require that all newly manufactured airplanes be equipped with cockpit indicators showing open exits, including overwing exit hatches, and that these cockpit indicators be connected to emergency power circuits.

Miami, Florida — DC-8 Cargo Accident

The NTSB issued a final report on an August 1997 accident in which a Fine Air DC-8 cargo plane crashed after takeoff from Miami International Airport, Miami, Florida. Three flightcrew members and one security guard on board were killed, and a motorist was killed on the ground. The NTSB said the accident, which resulted from the airplane being misloaded, stemmed from the failure of Fine Air to exercise operational control over the cargo loading process and the failure of a cargo handler to load the airplane as specified by Fine Air. Contributing to the accident was the failure of the FAA to adequately monitor Fine Air's operational control responsibilities for cargo loading and the failure of the FAA to ensure that known cargo-related deficiencies were corrected at Fine Air.

As a result of the accident investigation, the Safety Board issued 15 safety recommendations to the FAA, including the following:

- Conduct an audit of all Part 121 supplemental cargo operators to ensure that proper weight and balance documents are being used, that the forms are based on manufacturer's data or other approved data applicable to the airplane being operated, and that FAA principal inspectors confirm that the data are entered correctly on the forms;
- Require carriers operating under Part 121 to develop and use loading checklists to positively verify that all loading steps have been accomplished for each loaded position on the airplane and that the condition, weight, and sequencing of each pallet is correct;
- Require training for cargo handling personnel and develop advisory material for carriers operating under Part 121 and principal operations inspectors that addresses curriculum content that includes but is not limited to, weight and balance, cargo handling, cargo restraint, and hazards of misloading and require all operators to provide initial and recurrent training for cargo handling personnel consistent with this guidance; and
- Review its NASIP and RASIP procedures to determine why inspections preceding these accidents failed to identify systemic safety problems at ValuJet and Fine Air and, based on the findings of this review, modify these inspection procedures to ensure that such systemic indicators are identified and corrected before they result in an accident.

As part of the investigation, the Safety Board's investigators noted that the airplane's flight data recorder (FDR) was not functioning properly at the time of the accident. Therefore, the Board recommended required maintenance checks every 12 months for all airline FDRs until the effectiveness of the proposed advisory circular and new FAA inspection guidance on continuing FDR airworthiness (maintenance and inspection) is proven. Documentation should be maintained to verify that these checks were performed.

Newburgh, New York — DC-10 Cargo Fire Accident

The NTSB issued a final report on a September 1996 accident in which a DC-10, operated by Federal Express, made an emergency landing at Stewart International Airport, Newburgh, New York, after the flightcrew determined that there was smoke in the cabin cargo compartment. Three crewmembers and two passengers evacuated the airplane. The captain and flight engineer were injured while evacuating. The airplane was destroyed by fire. The flight was operating as a cargo flight from Memphis, Tennessee, to Boston, Massachusetts. The NTSB said the accident was caused by an in-flight cargo fire. Although the specific cargo bin was identified, the source of the fire was not.

Ongoing Major Aviation Investigations

Pittsburgh, Pennsylvania — 737 Accident

In September 1994, a USAir 737 crashed on approach to Pittsburgh, Pennsylvania, killing all 132 on board. The investigation, the longest in NTSB history, is focusing on the aircraft's rudder system and pilot training and actions. A final report is expected in early 1999.

Long Island, New York — 747 Accident

The NTSB continued to expend substantial resources for the ongoing investigation into the crash of TWA flight 800 that killed all 230 on board near East Moriches, New York, in July 1996.

Montrose, Colorado — Scenic Airlines, Cessna 208 Caravan accident

The NTSB continued to investigate the October 8, 1997, accident involving a Scenic Airlines Cessna 208 Caravan in Montrose, Colorado. The Bureau of Land Management had chartered the aircraft that was not equipped with a flight data recorder or a cockpit voice recorder. The pilot and eight passengers were killed.

Newark, New Jersey — MD-11 Cargo Accident

The NTSB continued to investigate the hard landing and fire that destroyed a Federal Express MD-11 cargo plane at Newark International Airport, New Jersey, in July 1997. The crew of two and three company employees received minor injuries.

Guam — 747 Accident

The NTSB continued to investigate the crash of Korean Air flight 801 that crashed on approach to Guam in August 1997, killing 228 of the 254 aboard. A 3-day public hearing was held in March in Honolulu, Hawaii.

West Palm Beach, Florida — A-300 Incident

The NTSB continued to investigate a May 1997 American Airlines Airbus A-300 that experienced an upset near West Palm Beach, Florida. At 16,000 feet, the airplane departed controlled flight. The pilots recovered control at about 12,500 feet. The investigation is examining autoflight systems and flightcrew actions.

Pacific Grove, California — Aircraft Accident

The NTSB continued its investigation of an October 12, 1997, accident involving an experimental category, amateur-built Adrian Davis Long-EZ airplane, that crashed near Pacific Grove, California. The pilot, singer John Denver, was killed and the airplane was destroyed.

Aviation Investigations Initiated

Among the accidents and incidents investigated by the Safety Board in 1998 were the following:

London, England — 767 Emergency Landing

The NTSB provided assistance to the British government in its investigation of an emergency landing of a United Airlines 767 at London due to electrical problems. The aircraft was on a flight from Zurich to Washington, D.C. One flight attendant and several passengers were injured during the emergency evacuation at Heathrow Airport. Initial examination showed evidence of a wire bundle fire in the electrical equipment bay.

Houston, Texas — Learjet Accident

A Gates Learjet operated by American Corporate Aviation crashed while on approach to Intercontinental Airport, Houston, Texas. Two pilots were killed on the short flight from Houston's Hobby Airport.

Philippines — DC-9 Controlled Flight Into Terrain Accident

NTSB provided technical assistance to the Philippine government in its investigation into the crash of a Cebu Pacific Air DC-9. The aircraft slammed into a mountain on a flight from Manila to Mindanao, killing all 104 on board.

Chicago, Illinois — 727 Landing Accident

An American Airlines 727 crashed when the aircraft landed short of a runway at Chicago O'Hare Airport in foggy conditions, severing the landing gear and damaging approach lights. There were no injuries.

Beaumont, Texas — Embraer Commuter Fire

An Embraer 145, operated by Jet Link, Inc. as Continental Express, caught fire during takeoff from Jefferson County Airport, Beaumont, Texas. There were four injuries and substantial damage to the instructional flight that skidded off the runway.

Birmingham, Alabama — Fokker Runway Accident

A US Airways Fokker 100 experienced a loss of directional control and ran off the runway while landing at Birmingham International Airport, Birmingham, Alabama. The airplane was substantially damaged. The 5 crewmembers and 87 passengers were not injured. The flight originated from the Charlotte/Douglas International Airport, Charlotte, North Carolina.

Clarksville, Tennessee — Cessna Cargo Accident

A Cessna 208B, registered to Federal Express and operated by Baron Aviation Services, Inc., as a nonscheduled domestic cargo flight from Memphis, Tennessee, to

Bowling Green, Kentucky, crashed near Clarksville, Tennessee. The aircraft was destroyed and the pilot was killed.

Fort Lauderdale, Florida — 727 Engine Fire

A Royal Airlines 727 charter bound for Toronto, Canada, from Fort Lauderdale, Florida, carrying 186 passengers, aborted takeoff after the number one main engine failed and caught fire. Seventeen people were taken to hospitals after being injured while sliding down the plane's emergency chutes. Investigators from Canada's TSB are part of the team.

LaGuardia, New York — DC-9/Airbus Near-Midair Collision

NTSB is investigating a near-midair collision between a US Airways DC-9 and an Air Canada Airbus A-320 at LaGuardia Airport, New York. The A-320 was in an initial climb departing from a runway and the DC-9 was executing a go-around from an intended landing on another runway. The go-around was performed in response to an air traffic control instruction from the local controller. According to the report filed by the US Airways captain, his aircraft passed below the A-320 and had an estimated minimum separation of 85 feet vertical, 75 feet horizontal.

Roswell, Georgia — Cessna Midair Collision

A midair collision near Roswell, Georgia, killed four people on a Cessna business jet and one on a Cessna 172N. A house was damaged by burning wreckage.

On-scene investigation at midair collision near Roswell, Georgia.

Debris from mid-air collision in Roswell, Georgia.

Bogota, Colombia — 727 Accident

The NTSB provided assistance to the Colombian government in its investigation of the crash of an Air France 727 near Bogota, Colombia. All 53 people aboard the aircraft, bound for Quito, Ecuador, were killed when the plane slammed into a mountain shortly after takeoff. The aircraft was leased from and operated by Ecuador's military-run TAME airline.

Chattanooga, Tennessee — DC-9 Emergency Landing

An AirTran DC-9 traveling from Atlanta, Georgia, to Chicago, Illinois, diverted to Chattanooga, Tennessee, due to hail damage. The windshield was cracked and the radar dome was missing. There were two injuries and minor damage to the aircraft during the incident.

Kanai, Hawaii — Helicopter Accident

A sightseeing Aerospatial helicopter crashed in Kanai, Hawaii. The pilot and five passengers were killed.

St. George Island, Alaska — Swearingen Accident

A Swearingen turboprop, operated by FS Air, crashed when it hit terrain on approach to St. George Island, Alaska. Two crewmembers, the only occupants, were killed.

San Juan, Puerto Rico — Airbus Engine Fire

An American Airlines Airbus A300, on a flight from San Juan, Puerto Rico, to Miami, Florida had a fire in the number one engine during climb after takeoff. The aircraft returned safely to San Juan. Several minor injuries were reported during evacuation.

Anchorage, Alaska — YAK 54 Accident

A Russian-built YAK 54 aircraft collided with trees and terrain near Anchorage, Alaska, killing two pilots. The owner and one of the pilots was the U.S. Air Force commander of Alaskan Command, and Eleventh Air Force, Elmendorf AFB.

Brest, France — Beech Midair Collision

The NTSB is assisting the French BEA in the investigation of a midair collision over the Atlantic Ocean near Brest, France. A Beech 1990D, operated by Proteus Airlines, collided with a privately-owned Cessna 177, killing all 15 people on both planes.

Denver, Colorado — Beech Propeller Accident

A propeller failed on a Great Lakes Aviation Beech 1900, operated as United Express from Denver, Colorado, to Rock Springs, Wyoming. The propeller penetrated the cabin and injured one passenger. The aircraft returned to Denver and landed safely.

Halifax, Nova Scotia — MD-11 Accident

The NTSB is providing substantial assistance to the TSB of Canada in its investigation of the crash of a Swissair MD-11 off the coast of Nova Scotia, Canada. Flight 111, en route from JFK Airport, New York, to Geneva, Switzerland, crashed in the North Atlantic killing all 229 passengers and crew.

Pacific Ocean — 747 Turbulence Incident

An incident of severe turbulence occurred over the Pacific Ocean involving a China Air 747. The aircraft landed safely in Honolulu, Hawaii, and 11 passengers were injured.

Caribbean — Midair Collision

Two planes operated by the U.S. Customs Service collided over the Caribbean Sea, 160 miles southwest of Puerto Rico. The aircraft were both twin engine turbo-props. One pilot was killed, another injured. Two pilots of the second plane were not injured.

Atlanta, Georgia — 737 Accident

An AirTran 737 en route from Atlanta, Georgia, to Dallas, Texas, experienced system hydraulic failures. The aircraft returned to Atlanta. During the landing the nose gear collapsed and the aircraft skidded off the runway. There were nine minor injuries.

Baltimore, Maryland — Helicopter Accident

A Schweizer 269C helicopter was destroyed when it collided with terrain during a forced landing in Baltimore, Maryland. The pilot/police officer was killed and the aerial observer received serious injuries. The Baltimore Police Department operated the helicopter.

Airai, Republic of Palau — Cessna Accident

The NTSB is assisting the Republic of Palau in investigating the crash of a Cessna 207, operated by Paradise Air of Palau. The aircraft crashed during a landing attempt during heavy rain near the Palau International Airport, located in Airai, Republic of Palau. There were nine fatalities.

Miami, Florida — 747 Fire

During refueling, a Tower Air 747 caught fire, in Miami, Florida. There was extensive damage to the aircraft's wing. There were no passengers on the plane and no injuries.

Bangkok, Thailand — Airbus Accident

The NTSB assisted Thai aviation investigators in reading out the FDR and CVR from a fatal accident. A Thai Airways Airbus A310, on a domestic flight from Bangkok, Thailand, crashed in heavy rain on its third attempt to land at the Surat Thani airport, 330 miles southwest of the capital. The accident killed 101 of the 146 people on board.

Public Hearings

Guam — 747 Accident

The NTSB convened a public hearing March 24-26 in Honolulu, Hawaii, on the crash of a Korean Air 747, which took 228 lives when it slammed into a hill on approach to Guam in August 1997. The hearing focused on controlled flight into terrain accidents, fire and rescue response, air traffic control, airport equipment and navigational aids, government oversight of foreign air carriers, and airline pilot procedures and training.

Other Activities of Note

U.S.-Russia Accident Investigation Pact

The United States and Russia signed a memorandum of understanding on aircraft accident incident investigation and prevention between the two countries. In general, the Interstate Aviation Committee (MAK) is responsible for the leadership of accident investigations involving U.S.-registered, -operated, -designed, or -manufactured aircraft that occur in Russia. Federal Aviation Authority of Russia (FAAR) is responsible for incident investigations involving U.S. interests that occur in Russia. For accidents involving Russian-registered, -operated, -designed, or -manufactured aircraft that occur in the United States, MAK provides an accredited representative leading the Russian team to support the NTSB in accordance with the International Civil Aviation Organization. FAAR will provide the same leadership for incidents involving Russian interests in the United States.

Argentina Aircraft Maintenance Conference

An aviation safety conference, sponsored by a major labor union in Argentina, drew more than 300 participants from Argentina and several other nations. The NTSB was the major conference contributor with presentations focusing on how an independent accident investigation agency functions. Information sessions included NTSB organization and functions, on-scene accident investigation procedures, written accident reports, safety recommendation process, principal causes of aviation accidents, and case studies of recent accidents. Topics also included aircraft maintenance and human factors and safety of flight, and maintenance case studies. United Airlines also briefed the conference on the development of its human factors training program for its maintenance employees. The conference was sponsored by La Association del Personal Tecnico Aeronautico and was held in Buenos Aires, November 23-24.

Review of NTSB Training, Party System

The RAND Institute of Civil Justice is conducting a research study for the NTSB focusing on the personnel and parties involved in accident investigations. The RAND study is designed to assist the NTSB in assessing its resources and training needs for the future and focusing on the challenges posed by emerging technologies as the transportation industry continues to grow. The study will also review the “party system” used by the NTSB in accident investigations.

The broad scope of the study will be applicable to all modes of accident investigations; however, the study itself focuses on major aviation accidents. The goal of the study is to ensure that the essential mission of the agency -- the independent investigation of transportation accidents and the issuance of recommendations to improve transportation safety -- continues to be carried out with the highest degree of public accountability, accuracy, and timeliness.

Focus Groups

The National Transportation Safety Board conducted two focus group meetings on human factors. The goal of the meetings, which were facilitated by Purdue University staff, was to identify the successes and hurdles associated with the human factors programs and to concentrate on advancing the effectiveness of the programs.

Participants at the meetings, which were held in Indianapolis, Indiana, and Daytona Beach, Florida, had an opportunity to learn about the latest techniques in human factors training, gather lessons learned by other facilities, and benchmark individual activities against the best in the aviation industry. Using the small focus group approach, the onus was on the attendees to bring information and ask questions that would be beneficial to everyone and to share training methods that are used throughout the industry.

In an effort to glean various training methods used throughout the world and to ultimately provide safer and more productive air carrier operations, the NTSB invited dozens of airlines, universities and colleges, associations, and various government agencies to participate in these meetings. These organizations provided a wealth of insight into current human factors training activities related to aviation maintenance from around the world.

Office of Highway Safety

Each year, highway traffic crashes cost the Nation more than 40,000 lives and 5 million injuries. Medical costs, lost productivity, and property damage amount to $137 billion, or $375 million each day.

The NTSB's Office of Highway Safety is charged with investigating highway accidents that it selects in cooperation with State authorities. The office also assists in the investigation of railroad grade crossing collisions. However, the Board's limited highway resources prevent it from investigating most highway accidents. Its resources are devoted to accidents that have a significant impact on the public's confidence in highway safety, generate high public interest, or concern technical safety issues that cause or contribute to accidents or injuries on a national scale.

In-depth investigations, therefore, tend to focus on collisions involving multiple fatalities and substantial injuries and/or property damage. Under current highway accident selection criteria, the Safety Board will generally investigate:

- Crashes involving a passenger bus with fatalities or serious injuries on the bus;
- Crashes involving a school bus with a fatality or serious injury on the school bus;
- Grade crossing collisions involving a hazardous materials carrier, school bus, passenger bus or van, or emergency vehicles;
- Highway bridge collapses or closures;
- Highway crashes with five or more fatalities; or
- Highway crashes involving a heavy truck resulting in three or more fatalities.

Investigative areas selected by the Safety Board for special emphasis include:

- Intrastate trucks not subject to Federal/State oversight;
- School bus passenger protection;
- Transit bus oversight;
- Motor coach oversight; and
- Aggressive driving in commercial vehicles.

During 1998, the Safety Board completed action on three highway investigation reports, one special investigation, two public hearings, and one safety study report. Additionally, the Safety Board investigated 46 highway accidents nationwide.

Completed Major Highway Investigations

Slinger, Wisconsin — Multiple-Vehicle Collisions

In February 1997, the Safety Board investigated a multiple-vehicle collision on U.S. 41 in Slinger, Wisconsin. A northbound tractor double-trailer lost control and crossed over the snow-covered 50-foot depressed median into the southbound lanes. A southbound tractor pulling a flatbed trailer loaded with lumber collided with the northbound truck, lost control, and crossed over the median into the northbound lanes. A passenger van carrying nine adult occupants struck and under-rode the right front side of the flatbed trailer. A two-axle refrigerator truck, also traveling northbound, struck the right rear side of the flatbed trailer. Eight of the nine van occupants suffered fatal injuries and the remaining occupant suffered serious injuries.

Issues examined in the final report include judgment and experience of the double-trailer truck driver; stability of double trucks; effectiveness of highway snow and ice removal; adequacy of the American Association of State Highway and Transportation Officials (AASHTO) divided freeway median barrier warrants; adequacy of the States' accident report forms to capture cross-median accident data, and the availability and use of occupant restraints.

The Safety Board issued 28 recommendations to Federal, State, and industry groups. These recommendations addressed the improvement of occupant restraint use, heavy truck stability safety features, heavy truck simulator use for driver training, highway deicing techniques, warrants for median barriers, and accident data.

Normandy, Missouri — Transit Bus Accident

In June 1997, the Safety Board investigated a single-vehicle collision between a transit bus and several pedestrian shelters in Normandy, Missouri. The bus, operated by a trainee driver who was being monitored by a line trainer, lunged forward at a bus terminal and struck two passenger shelters and several other fixed objects. The accident resulted in four fatalities and numerous injuries to pedestrians.

In March 1998, the Board conducted a public hearing in St. Louis, Missouri to address safety issues arising from this accident. The public hearing focused on the safety oversight of transit bus operations including driver qualifications, training, hours of service, and vehicle inspection and maintenance.

Issues addressed in the final report include: pedestrian protection provided by saw-tooth parking bay design and the need for positive separation between the roadway and pedestrian areas of parking facilities.

The Safety Board issued seven recommendations to Federal and industry groups to improve pedestrian protection and transit bus safety.

Yonkers, New York — Collision and Fire

In October 1997, a tractor cargo tank semitrailer carrying 8,800 gallons of gasoline was struck by a sedan in the right side of the cargo tank external loading/unloading lines. About 28 gallons of gasoline were released, and a fire ensued destroying both vehicles and a highway overpass. The driver of the car was killed and property damage was estimated at $7 million.

The primary issue addressed in the final report was the danger of operating a truck when its cargo tank loading lines are carrying hazardous materials.

The Safety Board issued a recommendation to the DOT to prohibit carrying hazardous materials in external piping (loading lines) of cargo tanks.

Transit Bus Safety Oversight — Special Investigation

After the Safety Board conducted several accident investigations involving transit buses (Normandy, Missouri; Cosmopolis, Washington; New York, New York; and Nashville, Tennessee) and held a public hearing on transit bus safety in March 1998, it found substantial safety deficiencies and discovered that little Federal or State government safety oversight existed within the transit bus industry.

The findings from the public hearing and the four accident investigations formed the basis for this special investigation report. The safety issues discussed in the report are the federal and state safety oversight of transit bus operations, adequacy of transit bus accident data to identify potential safety issues, and safety program guidelines for transit operators.

The Safety Board issued seven recommendations. Recommendations to the DOT included implementing a safety oversight program for transit buses and collecting more accurate data in order to assess the causes of transit bus accidents. The Safety Board recommended that the DOT develop a model comprehensive safety program for transit bus agencies.

Ongoing Investigations

Burnt Cabins, Pennsylvania — Motorcoach Accident

On June 20, 1998, about 4 a.m., a 1997 MCI 47-passenger motorcoach was traveling westbound on the Pennsylvania Turnpike when it veered off the right side of the roadway and struck the rear of a parked tractor-semitrailer pushing it into another parked tractor-semitrailer. The bus driver and 6 passengers were killed, and the remaining 16 passengers were injured. Two occupants of the first tractor-semitrailer that was struck were injured. The occupants of the second tractor-semitrailer were uninjured.

Potential issues to be examined include motor carrier oversight, driver fatigue, the use of over-the-counter drugs while operating a commercial vehicle, and motorcoach emergency lighting and signage.

NTSB investigator examines Greyhound bus involved in highway accident in Burnt Cabins, Pennsylvania.

Old Bridge, New Jersey — Motorcoach Accident

On December 24, 1998, a motorcoach traveling south on the Garden State Parkway lost traction, veered off the highway, overturned, and traveled down a snow-covered embankment before coming to rest. Several passengers were ejected from the bus during the overturn sequence. The accident resulted in eight fatalities and numerous injuries to occupants on board the bus. No other vehicles were involved.

Issues being examined include bus crashworthiness, occupant protection, and oversight of motor carrier operations.

Ongoing Special Investigations

Motorcoach Safety

In an average year, more than 360 million bus passengers travel 28 billion passenger miles in North America. The motorcoach industry estimates that more than 30,000 commercial buses are currently in use for charters, tours, regular route services, and special operations in North America. According to industry estimates, 4,000 motorcoach companies are operating in the United States. Bus accident statistics are limited; however, the National Highway Traffic Safety Administration's (NHTSA's) Fatality Analysis Reporting System (FARS) data for 1993 to 1997 indicate that 141 motorcoaches were involved in accidents that, in total, resulted in the deaths of 21 occupants and injuries to 442 occupants.

The NTSB investigated two accidents in 1995 and 1997 that are typical of the motorcoach accidents it has investigated over the years. These accidents involved factors that the Safety Board has repeatedly identified as being issues in accidents and having the potential for catastrophic consequences, namely driver fatigue and poorly maintained or out-of-adjustment brakes. In both cases, the carriers involved had satisfactory safety ratings. Therefore, the Safety Board initiated a special investigation to examine the Federal Highway Administration's (FHWA's) safety fitness criteria for motorcoaches. A special investigation will be completed early in 1999, and will address the following safety issues:

- busdriver fatigue;
- Office of Motor Carriers (OMC) safety rating methodology;
- emergency egress; and
- passenger safety briefings.

Bus Crashworthiness

As a result of a review of 40 prior Safety Board motorcoach accidents that resulted in full or partial ejections, the Office of Highway Safety is conducting a special investigation into the safety issue of motorcoach occupant protection. With the advent of the modern touring bus, with its large windshield and passenger window area, concern is that the glazing material frequently failed during crashes and rollovers, which permitted occupant ejection. This has raised questions concerning the effectiveness of several Federal Motor Vehicle Safety Standards (FMVSSs), including FMVSS 205, Glazing Materials, and FMVSS 217, Bus Emergency Exits and Window Retention and Release, as they are applicable to larger buses (gross vehicle weight greater than 10,000 pounds).

Although there are FMVSSs relating to passenger seating, crash protection and body joint strength applicable to large school buses, there are no such standards applicable to other large buses, including motorcoaches. In addition, no large buses sold or operated in the United States are required by any Federal regulation or standard to be equipped with active or passive occupant restraints for bus passengers.

The European Union and Australia are now requiring the installation of seat belts at all seating positions on certain types of buses. In addition to the evaluation of the effectiveness of FMVSSs 205 and 217, research will be conducted concerning the effectiveness of the new regulations in Europe and Australia as they relate to occupant safety.

In addition, the Safety Board has recently investigated several large school bus accidents in which occupants who were killed or seriously injured were not seated in the area of the impact. This is contrary to what was found in the accidents that were investigated for the 1987 Safety Board study, *Crashworthiness of Large Poststandard Schoolbuses*. In those accidents, the occupants who were fatally or seriously injured were seated in the area of intrusion.

Although the Safety Board believes that school buses are the safest way for children to be transported, there has been continuing debate as to whether occupant protection can be improved. Therefore, analysis of the most recent accidents will be conducted in order to determine, if possible, what occupant protection systems would have been appropriate for that particular accident. In 1998, the Safety Board investigated four accidents in support of this special investigation:

- February 1998 -- Sinton, Texas
- March 1998 -- Buffalo, Minnesota
- September 1998 -- Holmdel, New Jersey
- September 1998 -- Holyoke, Colorado

The special investigation is expected to be completed in the summer of 1999.

Nonconforming Buses Transporting School Children

In 1998, the Safety Board investigated several accidents involving nonconforming buses being used to transport children to and from school and school-related activities. The buses were not built to the stringent Federal safety requirements for school buses, and, therefore, did not afford the children the same level of crash protection as school buses. Several occupants in these accidents were ejected from the buses and sustained serious to fatal injuries.

Therefore, staff initiated a special investigation to address this issue. The special investigation will focus on the usage requirements for these buses and applicable occupant restraint laws. In 1998, the Safety Board investigated three accidents in support of this special investigation:

- March 1998 -- Sweetwater, Florida
- March 1998 -- Lenoir City, Tennessee
- December 1998 -- Dublin, Georgia

The special investigation is expected to be completed in the spring of 1999.

Front and side view following accident in Sweetwater, Florida, involving nonconforming schoolbus.

Investigations Supporting Safety Studies

In 1998, the Safety Board initiated at least seven highway investigations in support of the safety study on intrastate truck operations not subject to Federal and State oversight:

- January 1998 -- Killeen, Texas
- February 1998 -- Bothell, Washington
- March 1998 -- Pollocksville, North Carolina
- April 1998 -- Chappell Hill, Texas
- June 1998 -- Canton, Georgia
- August 1998 -- Dunlap, Tennessee
- September 1998 -- Holyoke, Colorado

Public Hearings

Normandy, Missouri — Transit Bus Accident

In March 1998, the Safety Board conducted a public hearing in St. Louis, Missouri to address safety issues arising from this accident. The public hearing focused on the safety oversight of transit bus operations including driver qualifications, training, hours of service, and vehicle inspection and maintenance.

Bus Crashworthiness

In August 1998, the Safety Board conducted a public hearing in Las Vegas, Nevada, to address bus safety issues raised in seven recent school bus accidents. Bus crashworthiness and occupant survivability were central issues in all seven accidents. Topics addressed in the hearing were: types of possible restraints to be used in buses; types of injury-producing mechanisms; sources of accident data; and, standards applicable to buses in this and other countries. Information gained from the public hearing will assist in the writing of the special investigation report on bus safety.

Safety Studies

Passive Grade Crossing Study

About 4,600 vehicles annually are involved in accidents at railroad grade crossings that kill about 500 persons and injure more than 1,800. The Safety Board's highway and railroad modal offices investigated 60 grade crossing accidents that occurred between December 1995 and August 1996 in support of the grade crossing safety study. The Safety Board studied accidents involving a collision between a train and a highway vehicle occurring at a passive grade crossing, where the highway vehicle was damaged sufficiently to require towing. The sample of accidents was not intended to be statistically representative of the entire population of accidents at passive grade crossings during the study period, but rather to illustrate a range of passive grade crossing accidents. Rail staff in the regional offices investigated 20 of the accidents; highway staff at headquarters and in the regional offices investigated 40 of the accidents. The study was completed in July 1998. The study findings and recommendations are discussed in detail in the safety study section.

Office of Marine Safety

During 1998, the Office of Marine Safety investigated six major accidents and nine other accidents. The office also convened a public hearing about the accident involving the *President Casino on The Admiral*, a gambling vessel permanently moored in the Port of St. Louis, and conducted a special study on Personal Watercraft Safety. Three major accident reports were approved, as well as two accident report briefs.

Major Investigations

Miami, Florida — Cruise Ship Safety

On July 20, 1998, the Liberian passenger ship *Ecstasy* was departing the Port of Miami, Florida bound for Key West, Florida, with 2,565 passengers and 916 crew on board. As the vessel proceeded outbound in Outer Bar Cut, a fire was observed on the aft mooring station on Deck 4 (Riviera Deck). Flames and large volumes of black smoke were seen issuing from the stern of the vessel. A short time later, the U.S. Coast Guard, monitoring the departure of cruise ships on a video display, saw the smoke and flame and radioed the *Ecstasy* and instructed the master to proceed to the anchorage located to the north of the sea buoy. Just as the master was turning the vessel in compliance with these instructions, the vessel lost propulsion power and steering and began to drift. The master requested tug assistance and remained on the navigation bridge supervising the navigation of the vessel while various ship's officers proceeded to the fire scene to organize the firefighting operations. With the assistance of four responding tugs, the fire was brought under control and extinguished. The ship was returned to its berth in Miami, where the passengers were safely disembarked. There was 1 serious injury and 23 minor injuries.

The issues in this accident investigation are the cause and origin of the fire, the adequacy of fire detection and suppression on the *Ecstasy,* the adequacy of Coast Guard and management oversight of shipboard operations, the adequacy of emergency procedures, and the adequacy of engineering systems.

In November 1998, 4 months after the fire aboard the *Ecstasy,* the Safety Board issued urgent recommendations to 22 cruise ship companies, asking that they immediately clean their laundry ducts to help prevent fire propagation and to establish a continuing maintenance program.

A laundry room fire aboard the *Ecstasy* caused the ship to return to the Port of Miami.

Charleston Harbor, South Carolina — Sailing Vessel Morning Dew *Sinking*

In April 1998, several Members of Congress asked the Safety Board to investigate an accident involving the loss of the sailing vessel, the *Morning Dew.* During the early morning hours of December 29, 1997, the *Morning Dew* was underway on its auxiliary diesel engine in the Atlantic Ocean, 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.

The vessel struck the north jetty about 1 mile from shore at the entrance to Charleston Harbor. Approximately 2 minutes later, a Mayday (distress) call was broadcast on channel 16 VHF/FM by the youngest of the owner's sons. The radio watchstander at Coast Guard Group Charleston, South Carolina, heard part of the message, which was weak and obscured by static, and assumed that the call may have been a radio check or call by a distant vessel and took no further action.

About 6:20 a.m., approximately 4 hours after the Mayday call was sounded by the *Morning Dew* crew, the pilot of the automobile carrier vessel, *Pearl Ace*, which was entering Charleston Harbor, was told by the captain that the boatswain of the *Pearl Ace* had heard cries for help off the starboard side of the ship. The pilot of the *Pearl Ace* called the operator of the boat and requested its operator to search the area and to call the Coast Guard and inform them of the circumstances.

At 6:28 a.m., the Coast Guard radio watchstander who received the original call at 2:17 a.m. was preparing to leave the station. During his preparation to end his workday, he received the call from the pilot dispatcher who reported that the pilot boat operator had found nothing. The overnight watchstander also informed his relief and the Operations Duty Officer (ODO) of the call and to expect a return call from the pilot dispatcher. At 6:48 a.m., a call was received by the relief radio watchstander from the pilot dispatcher that nothing unusual was found. The ODO was informed of this call.

At approximately 11:15 a.m., the Coast Guard ODO received a call from the Sullivan's Island Police Department reporting the discovery of two bodies in the surf in the vicinity of Fort Moultrie. Two more victims were found later. All four victims had been aboard the *Morning Dew.*

The issues to be reviewed include the adequacy of the Coast Guard communications system at Charleston to receive distress calls and to determine the location of vessels making the calls; the adequacy of the initial Search and Rescue (SAR) response; coordination of local agencies for conducting SAR activities; and the Coast Guard's policy for release of information. A public hearing was recommended in early 1999.

Completed Major Marine Investigations

During 1998, the Safety Board completed three major marine accident investigations and a marine safety study. Some of the issues examined during the investigation of the accidents were emergency preparedness, postaccident drug and alcohol testing, weather, company oversight of vessel maintenance, and evacuation. The special study addressed personal watercraft design, safety equipment, and operator training.

New Orleans, Louisiana — The Bright Field

On January 13, 1998, the Safety Board adopted a final report of the December 14, 1996, accident of the fully loaded Liberian bulk carrier *Bright Field,* which temporarily lost propulsion power as the vessel was navigating outbound in the Lower Mississippi River at New Orleans, Louisiana. The vessel struck a wharf adjacent to a populated commercial area that included a shopping mall, a condominium parking garage, and a hotel. No fatalities resulted from the accident, and no one aboard the *Bright Field* was injured. However, 4 serious injuries and 58 minor injuries were sustained during evacuations of shore facilities, a gaming vessel, and an excursion vessel located near the impact area. Total property damage to the *Bright Field* and to shoreside facilities was estimated at about $20 million.

The safety issues discussed in this report were the adequacy of the ship's main engine and automation systems; the adequacy of emergency preparedness and evacuation plans of vessels moored in the Poydras Street wharf area; and the adequacy of port risk

assessment for activities within the Port of New Orleans. The report also addressed three other issues: the actions of the pilot and crew during the emergency, the lack of effective communication (as it relates to the actions of the pilot and crew aboard the *Bright Field* on the day of the accident), and the delay in administering toxicological tests to the vessel crew.

As a result of its investigation, the NTSB issued recommendations to the U.S. Coast Guard, the U.S. Army Corps of Engineers, the State of Louisiana, the Board of Commissioners of the Port of New Orleans, the Crescent River Port Pilots Association, and others.

Some of the Safety Board's recommendations include:

- implementing risk-management and risk-mitigation initiatives that will ensure the safety of people and property in the Port of New Orleans;
- reassessing the risk of locating passenger vessels along the left desending bank of the Mississippi River, and determining whether to remove the vessels to a less vulnerable location or putting physical barriers that will protect these vessels from ramming by riverborne traffic; and
- performing a baseline engineering assessment of the *Bright Field's* engineering plant.

Portland, Maine — The Julie N

On May 5, 1998, the Safety Board adopted its report on the September 27, 1997, accident involving the *Julie N*, a 560-foot-long ship that was carrying a cargo of heating oil while en route to the Rolling Mills terminal in Portland, Maine. As the vessel approached the Portland-South Portland (Million Dollar) Bridge, the pilot intended to issue a starboard rudder order to swing to the right and align the vessel for passage through the bridge. However, the pilot inadvertently ordered the rudder to port. The *Julie N* struck the south bascule pier of the Portland-South Portland Million Dollar Bridge. The accident resulted in a 30-foot-long hole in the vessel's hull beneath the waterline and about 4,000 barrels of oil spilled into the harbor. The vessel sustained about $660,000 in damage and the cost for the cleanup of the oil was approximately $43 million. Repairs to the bridge were about $232,000.

Following the accident of the *Julie N*, the pilot of the vessel reported to a clinic for postaccident testing. Although partial testing did not show the presence of drugs, the pilot did not have his blood or breath tested for alcohol, stating that he was unaware that postaccident testing required such testing.

Over the course of several major accident investigations, including the *Julie N*, the Safety Board has been unable to definitively rule out alcohol or drugs as causal factors because of serious deficiencies in the testing process. Additionally, the Safety Board has observed confusion and lack of understanding on the part of marine employees regarding postaccident testing requirements and responsibilities.

The Safety Board determined that the *Julie N* accident was caused by pilot error. Contributing to the accident was the narrow horizontal clearance of the bridgespan.

The Board recommended that the Coast Guard ensure that operational guidance for vessels navigating Portland harbor developed by the Port Safety Forum or by the Captain of the Port be published in a source readily available to vessels masters and pilots, such as the *U.S. Coast Pilot*.

In addition, the Board recommended that alcohol testing is time-sensitive. Therefore, there should be language incorporated into postaccident testing regulations that clearly states that alcohol testing should be conducted ahead of drug testing.

Port Judith, Rhode Island — The Scandia

Currently, there are more than 6,200 towboats in the United States constituting, after fishing vessels, the second largest segment of the U.S. commercial vessel industry. These vessels push or tow more than 31,000 barges along the U.S. coasts, inland waterways, rivers, harbors, bays, and the Great Lakes. About two-thirds of these vessels are involved in the transportation of hazardous materials and petroleum products.

On July 14, 1998, the Safety Board issued its final report on the January 19, 1996, grounding of the tug *Scandia*. The tug had an engineroom fire while towing the unmanned U.S. tank barge *North Cape*, 4.5 miles off Point Judith, Rhode Island. All six crewmembers abandoned the *Scandia* amid 10-foot waves and 25-knot winds; however, no one was injured. The crew was unsuccessful in its attempts to release the anchor of the barge, which ran aground and spilled 828,000 gallons of home heating oil, causing the largest pollution incident in Rhode Island's history, an incident that led to the closing of local fisheries.

The Safety Board determined that the probable cause of the fire damage aboard the tug *Scandia* and the subsequent grounding of and pollution from the barge *North Cape* was the Eklof Marine Corporation's inadequate oversight of maintenance and operations aboard those vessels, which permitted a fire of unknown origin to become catastrophic and eliminated any realistic possibility of arresting the subsequent drift and grounding of the barge. Contributing to the accident was the lack of adequate U.S. Coast Guard and industry standards addressing towing vessel safety.

As a result of its investigation of this accident, the Safety Board made recommendations to the U.S. Coast Guard, the Eklof Marine Corporation, and the American Waterways Operators, Inc.

The Safety Board’s recommendations included the following:

- Require towing vessel companies to develop and implement procedures whereby management officials communicate with ship captains at sea in times of potential or actual emergencies and during safety-critical periods of a voyage;
- Require approved fixed firefighting systems in the enginerooms of existing towing vessels; and
- Require Coast Guard station search and rescue personnel to conduct a mandatory pre-deployment briefing for all search and rescue missions to ensure that the on-scene weather and sea conditions are assessed accurately so that the proper rescue boat is selected.

Other Board Actions

During the year, the Safety Board approved two marine accident report briefs.

Grand Bahamas Island, Bahamas —Passenger Vessel Vistafjord *Fire*

On April 6, 1997, about 1:12 a.m., the Bahamian-registered passenger ship *Vistafjord*, carrying 569 passengers and 422 crewmembers, was en route from Fort Lauderdale, Florida, to Funchal, Madeira Islands, when it experienced a fire in the laundry storeroom. One crewmember fatality resulted, and 13 people suffered from smoke inhalation.

The major safety issue discussed in this report was the notification of the passengers and the crew in the event of a fire on board ship. On April 29, 1997, the Board issued two urgent recommendations to Commodore Cruise Lines, and Cunard Lines Ltd., concerning the installation of automatic locally sounding smoke alarms.

Togiak, Alaska — Fishing Vessel Evanick *Capsizing*

On April 25, 1998, between 7 a.m. and 11:28 a.m., the fishing vessel *Evanick*, with four crewmembers, capsized in the Shekilof Strait while en route to fishing grounds near Togiak, Alaska. Coast Guard SAR aircraft, responding to a distress signal from the vessel, located the *Evanick* floating in a capsized condition. None of the crew was found.

On December 15, 1998, the Safety Board determined that the probable cause of the capsizing of the *Evanick* was the fishing vessel's less-than-adequate stability for the sea conditions.

Public Hearing

St. Louis, Missouri — Gaming Vessel The Casino on The Admiral *Accident*

As part of the Safety Board investigation of an accident involving The *Casino on The Admiral*, a gaming vessel moored in the St. Louis Harbor, the Board conducted a 2-day public hearing in St. Louis, Missouri. On April 4, 1998, barges in the tow of the *Anne Holly*, a towboat working in the river, rammed the Missouri Pier of the center span of the Eads Bridge. Eight barges, each about 195 feet long and 35 feet wide, broke away. The *Admiral*, a former excursion vessel that had been converted into a gaming vessel, was struck by barges that broke loose from the tow. Nine of the *Admiral's* 10 mooring lines parted, and the vessel broke loose from its mooring. Approximately 2,300 persons were aboard the vessel at the time of the accident. The vessel swung around in the river until the operator of the *Anne Holly* positioned his boat on the bow of the *Admiral* and held it in place.

Following the accident, two passenger boats were used to transport more than 1,700 passengers to shore. There were 31 reported injuries. During the hearing, the Safety Board addressed safety issues identified during the accident, including the adequacy of federal, state and local government oversight of gaming vessels and permanently moored public waterfront facilities (casinos and restaurants); port emergency preparedness; and other factors affecting navigation safety on the river. Unlike Coast Guard inspected passenger vessels, permanently moored facilities like the *Admiral* are not regulated by the Coast Guard and the requirements for emergency drills are less vigorous. The Board also explored the level of safety oversight exercised over these vessels.

Safety Study

Personal Watercraft Safety

Personal watercraft (PWC) are a type of recreational boat that has become increasingly popular in recent years. They account for more than one-third of new recreational boat sales in the United States, and comprise about 1 million of the 12 million recreational boats in this country. A safety study conducted by the Safety Board determined that PWC, such as "Jet Skis," "Sea-Doos," or "Waverunners," can be dangerous without proper operator training and experience. The Board recommended better operator training and education along with design changes to reduce the number of accidents and injuries.

The Safety Board initiated the study to more closely examine fatalities, injuries, and accidents in the fast-growing boating population. This study follows a 1993 Safety Board recreational boating safety study.

When the 1993 study was conducted, there were 26 PWC fatalities a year and the Board believed that a separate study was not warranted. Since then, the annual number of

fatal accidents has more than tripled. In addition to this increase, the Safety Board noted that PWC are different from other recreational boats because the leading cause of death is not drowning but blunt force trauma.

Collisions between two PWC are the most frequent type of accident. Head, neck, and facial injuries were suffered by one of every four persons involved in the PWC accidents examined in the 1998 study. The intent of the study was to identify the major issues involved in PWC accidents, not to estimate accident rates.

The Safety Board noted that operators of rented PWC have less experience than operators of privately owned PWC. This lack of experience is important because PWC have unique operating characteristics, such as the loss of control during off-throttle steering. The Board concluded that some of the operator control problems may be attributed to the operating design of PWC.

As a result of this safety study, the Safety Board issued recommendations to the manufacturers of PWC, the U.S. Coast Guard, the United States Coast Guard Auxiliary, the National Association of State Boating Law Administrators (NASBLA), the PWC Industry Association, and the States and Territories.

Recommendations issued by the Safety Board included:

- Evaluating PWC designs and making changes to improve operator control to help prevent personal injuries;
- Developing comprehensive safety standards that are specific to the risks of PWC;
- Including information on the safe operation of a PWC in all recreational boating courses;
- Enacting or revising recreational boating laws to require rental businesses to provide safety instruction training to all persons who operate rented PWC; and
- Enacting legislation to require the use of personal flotation devices while operating PWC.

Office of Pipeline and Hazardous Materials Safety

The Safety Board is responsible for investigating pipeline accidents where there is major loss of life, substantial property damage, or significant damage to the environment. In the United States, there are more than 1.6 million miles of pipeline carrying natural gas to approximately 60 million customers. Additionally, there are about 155,400 miles of hazardous liquid pipeline subject to Federal safety jurisdiction. Below is a summary of accidents involving pipeline and hazardous materials accidents investigated by the Board during the year.

Completed Major Hazardous Materials Investigations

Pasadena, Texas — Failure of Tank Car TEAX 3417 and Subsequent Release of Liquefied Petroleum Gas

On November 2, 1997, at the Georgia Gulf Corporation chemical plant in Pasadena, Texas, employees discovered a leak from the bottom center of a tank car containing 140,377 pounds (29,054 gallons) of a mixture of propylene/propane, a liquefied, flammable gas. Most of the cargo was transferred to storage tanks, and the residual materials offloaded to a cargo tank truck. No injuries or fatalities were reported as a result of the failure of this tank car. Investigation revealed that the product was released through a circumferential crack in the bottom center of the tank that showed indications of brittle fracture from a single event that had cooled the tank to less than -50° F. The car had been purged with cryogenic nitrogen about 1 month before the accident. Approximately 53,000 of the 230,000 tank cars in the North American fleet are used to transport liquefied gases, and although the number of tank cars purged per year is variable, purging is nonetheless a common procedure. This accident demonstrates that, without adequate safeguards, nitrogen purging can have the potential result of thermal shock failure of the tank.

The Board determined that the accident resulted from the thermal shock failure and the subsequent leakage of product from tank car TEAX 3417, caused by insufficient safeguards for ensuring that nitrogen was properly warmed before it was injected into the tank car during nitrogen purging.

The hazardous materials safety issue addressed was the safe threshold temperature for nitrogen used in purging of tank cars that is based on an engineering analysis of ductile-to-brittle transition temperatures of tank car steels.

The Board made recommendations to the Compressed Gas Association, Inc., the FRA, and the Association of American Railroads (AAR) to cooperate in revising the

Recommended Procedures for Nitrogen Purging of Tank Cars to specify a minimum threshold temperature for nitrogen that is based on an engineering analysis of ductile-to-brittle transition temperatures of tank car steels.

Memphis, Tennessee — Tank Car Failure and Release of Corrosive and Poisonous Liquid, Illinois Central Railroad Yard

On April 2, 1997, a railroad inspector at the Illinois Central Railroad yard in Memphis, Tennessee, noticed leakage from tank car ACAX 80010 during switching operations. The tank car was filled with anhydrous hydrogen fluoride, a corrosive and poisonous liquid. Vapor appeared to be leaking from a weld at a 2- by 3-foot repair patch in the tank wall, which was done in February 1997. Approximately 150 people were evacuated from a 1/2-mile radius around the yard for 17 hours while the leak was controlled and the remaining material transferred to another tank car.

The Safety Board determined that the failure of the tank car was a result of the inadequate heat treatment to reduce the hardness of the weld material used in the repair of the tank to a level that would retard or prevent hydrogen-assisted cracking and inadequate testing to determine whether the weld material hardness exceeded established limits.

The hazardous materials safety issues addressed included the use of TC 128 type steel for repair patches on tank cars in anhydrous hydrogen fluoride service; the conversion of tank cars made of TC 128 type steel to anhydrous hydrogen fluoride service; and practices for heat treatment and hardness testing of weld repairs to prevent tank car weld failures due to hydrogen-assisted cracking.

The Safety Board made several recommendations to the FRA:

- Inform all tank car repair facilities of the circumstances of the April 2, 1997, failure of a railroad tank car and release of anhydrous hydrogen fluoride in Memphis, Tennessee, and urge them to review and modify, if necessary, their practices for heat treatment and hardness testing of weld repairs to prevent additional tank car weld failures from hydrogen-assisted cracking; and
- Prohibit the transportation of anhydrous hydrogen fluoride in tank cars manufactured of TC 128 steel.

Completed Major Pipeline Investigations

Tiger Pass, Louisiana — Natural Gas Pipeline Rupture and Fire

On October 23,1996, the crew of the Bean Horizon Corporation (Bean) dredge *Dave Blackburn* dropped a stern spud or large steel shaft to the bottom of the channel in Tiger Pass, Louisiana, in preparation for continued dredging operations. The spud struck and ruptured a 12-inch-diameter submerged natural gas steel pipeline owned by the Tennessee Gas Pipeline.

The rupture released natural gas at 930 psig pressure that enveloped the stern of the dredge and accompanying tug, the *G.C. Linsmier.* The gas ignited, destroying both the dredge and tug. The crew of 28 escaped without injury.

The Safety Board determined that the probable cause of the accident was the failure of Tennessee Gas Pipeline to accurately locate the company's pipeline across Tiger Pass before that location was dredged. Contributing to the accident was revocation by the Research and Special Programs Administration (RSPA) of Federal requirements for all pipeline operators to install and maintain markers to identify the locations at which their pipelines cross navigable waterways.

As a result of this accident, the Safety Board addressed the following safety issues: adequacy of Tennessee Gas Pipeline's practices and procedures for locating, marking, and maintaining markers for gas transmission pipelines through navigable waterways; lack of Federal requirements for placing and maintaining permanent markers where gas and hazardous liquid pipelines cross navigable waterways; and adequacy of Bean Horizon Corporation's vessel emergency and crew accounting procedures.

The Board made recommendations to the RSPA, Tennessee Gas Pipeline, Bean Horizon Corporation, Western Dredging Association, Interstate Natural Gas Association of America, and the American Petroleum Institute. These recommendations include:

- Inform association members of the circumstances of the pipeline rupture and fire, and urge them to take the actions necessary to ensure that all their pipelines that cross navigable waterways are accurately located and marked.

- Require pipeline operators to precisely locate and place permanent markers at sites where their gas and hazard liquid pipelines cross navigable waterways.
- Review your supervisory control and data acquisition systems and make the modification necessary to increase the likelihood that any critical event involving the company's pipelines is quickly and accurately reported to pipeline controllers, allowing them to take timely actions to correct or limit the effects of any failure in the pipeline system.

Fork Shoals, South Carolina — Pipeline Rupture and Release of Fuel Oil Into the Reedy River

On June 26, 1996, a 36-inch-diameter Colonial Pipeline Company pipeline ruptured where a corroded section of the pipeline crossed the Reedy River at Fork Shoals, South Carolina. The ruptured pipeline released about 957,600 gallons of fuel oil into the Reedy River and surrounding areas. There were no injuries. Cost to clean up the fuel oil and settlement with the state of South Carolina was estimated at $20.5 million by Colonial.

The Safety Board determined that the probable cause of the rupture was the corrosion-weakened pipeline at the Reedy River crossing, which resulted from the failure of Colonial Pipeline Company to have adequate management controls in place to protect the corroded pipeline at the Reedy River crossing and to ensure that pipeline controllers were adequately trained to both recognize and respond properly to operational emergencies, abnormal conditions, and pipeline leaks.

As a result of this accident, the Safety Board addressed the following safety issues: effectiveness of Colonial's management in ensuring that the pipeline is operated within safe pressure limits; adequacy of the training given to pipeline controllers and shift supervisors as it relates to preparing them to recognize and effectively respond to abnormal conditions, emergency situations, and leaks in the pipeline; and effects of Colonial's controller work schedules on safe pipeline operation.

The Safety Board made recommendations to the RSPA and to Colonial Pipeline Company, including:

- Develop and implement management procedures requiring that proper engineering or hydraulic evaluation and analysis be performed before changes are made to line operating parameters that have been set by company management; and
- Review your drug and alcohol testing program and ensure that all operating employees and managers are familiar with the program and program requirements, to include the distinction between tests for alcohol and other drugs.

Lively, Texas — Pipeline Rupture, Liquid Butane Release and Fire

On August 24, 1996, an 8-inch-diameter steel products pipeline, transporting liquid butane, ruptured and released a butane vapor cloud in the Oak Circle Estates subdivision, near Lively, Texas. Two residents were fatally burned after the pickup truck they rode in entered and ignited the butane vapor cloud. Koch Pipeline Company (Koch) estimated losses that resulted from the rupture of its highly volatile liquid pipeline at $217,000.

The Safety Board determined that the probable cause of this accident was the failure of Koch, to adequately protect its pipeline from corrosion.

As a result of this accident, the Board addressed the following safety issues: adequacy of Koch's corrosion inspection and mitigation actions, and the effectiveness of Koch's public education program, particularly with respect to educating residents near the pipeline about recognizing hazards and responding appropriately during a pipeline leak.

The Safety Board made recommendations to the RSPA, the Koch Pipeline Company, and NACE International. These recommendations included:

- Establish a procedure to promptly evaluate all data related to pipeline corrosion; and
- Develop a standard for microbial sampling and testing of external surfaces on an underground pipeline.

Gramercy, Louisiana — Pipeline Rupture and Release of Unleaded Gasoline Into the Blind River

On May 23, 1996, Marathon Pipe Line Company reported that its Garyville station to Zachary station products pipeline had ruptured near Gramercy, Louisiana, releasing about 11,308 barrels of unleaded gasoline within a common wetland utility right-of-way.

The escaping gasoline quickly flowed within the wetland utility right-of-way, downstream of Marathon Oil Company's Garyville Refinery, before entering the Blind River. The gasoline caused extensive environmental damage and killed marine, plant, and wildlife living in the river and tidal-influenced marshland. Fortunately, there were no injuries to citizens.

The Safety Board determined that the probable cause of this accident was damage done to Marathon's pipeline during excavations of a nearby pipeline operated by LaRoche Industries, Inc., which resulted from the failure of LaRoche either to take adequate measures to ensure that the excavations performed under its supervision did not damage underground utilities or to notify Marathon that those excavations may have damaged the Marathon pipeline. Contributing to the severity of the accident was Marathon's delay in recognizing the rupture, which delayed shutting down the pipeline and isolating the rupture.

As a result of this accident, the Safety Board identified and addressed the following safety issues: adequacy of pipeline controller training; adequacy of supervisory control and data acquisition critical information display interface with pipeline controllers; adequacy of facilitating rapid isolation of damaged or leaking pipeline; and adequacy of excavator's procedures to prevent damage to pipelines and notify operators if suspected damage occurs.

The Safety Board issued recommendations to LaRoche Industries on establishing and implementing comprehensive written excavation procedures to ensure that if suspected damage to a facility occurs during excavation, all relevant authorities or entities are notified so that the situation can be evaluated and any corrective actions needed can be undertaken promptly.

Waterloo, Iowa — Natural Gas Explosion Resulting From a Broken Plastic Service Line

On October 17, 1994, Buzz's Bar in Waterloo, Iowa, exploded as the result of a natural gas leak that killed six persons, injured seven others, and caused $250,000 in damage. The gas leak, at 25 psig pressure, migrated from a broken 1/2-inch-diameter plastic service line supplying gas to a nearby building.

The Safety Board determined that the probable cause of the natural gas explosion and fire in Waterloo, Iowa, was stress intensification, primarily generated by soil settlement at a connection to a steel main, on a 1/2-inch polyethylene pipe that had poor resistance to brittle-like cracking. This accident investigation helped to generate the following special investigation.

Sandy Springs, Georgia — Gasoline Pipeline Rupture

A rupture in a 40-inch-diameter steel pipeline that ran through the landfill in Sandy Springs, Georgia resulted in the release of more than 30,000 gallons of gasoline. No alarms were detected in the control center to signify that the line had failed. About 17,000 gallons were eventually recovered. Six months later, the costs of the Colonial Pipeline Company cleanup efforts and repair to the pipeline exceeded $3.2 million.

Chairman Jim Hall, right, views pipeline site with Congressman John Lewis (D-GA) at Sandy Springs, Georgia.

Special Investigation

Brittle-Like Cracking In Plastic Pipe for Gas Service

Despite the general acceptance of plastic piping as a safe and economical alternative to piping made of steel or other materials, the Safety Board notes that a number of pipeline accidents it has investigated have involved plastic piping that cracked in a brittle-like manner.

Recent accidents investigated by the Safety Board that involved brittle-like cracking of plastic pipe were at the following locations: Waterloo, Iowa, in 1994 -- plastic pipe manufactured in 1970 by Amdevco/Century; San Juan, Puerto Rico, in 1996 -- plastic pipe manufactured in 1982 by DuPont; and Lake Dallas, Texas, in 1997 -- plastic pipe manufactured in 1970 by Nipak.

As a result of these accidents, the Safety Board decided to conduct a special investigation to determine the safety issues involved with plastic pipe that may be subject to premature failure attributed to brittle-like cracking. The investigation addressed the following issues: the vulnerability of plastic pipe to premature failures due to brittle-like cracking; the adequacy of available guidance relating to installation and protection of plastic piping connections to steel mains; and performance monitoring of plastic pipeline systems as a way of detecting unacceptable performance in piping systems.

The Safety Board made a safety recommendation based on the results of the investigation to the Continental Industries, Inc., Dresser Industries, Inc., Inner-Tite Corporation, and Mueller Company to develop and publish recommendations and instructions for limiting shear and bending forces at locations where steel tapping tees are used to connect plastic service pipe to steel mains.

Recommendations were also made to the RSPA, Gas Research Institute, Plastics Pipe Institute, Gas Piping Technology Committee, American Society for Testing and Materials, American Gas Association, and MidAmerican Energy Corporation.

Office of Railroad Safety

During 1998, the Office of Railroad Safety investigated 3 major accidents and 43 regional accidents. The office also held a public hearing on the Union Pacific's safety record and conducted a safety study on passive grade crossings, a safety issue that has been on the Safety Board's "Most Wanted" list. Additionally, 61 rail-related safety recommendations were issued in 1998.

Completed Major Investigations

Kelso, California — Freight Train Derailment

On January 12, 1997, the Union Pacific Railroad (UP) unit freight train 6205 West derailed 68 cars on the UP Los Angeles Subdivision, milepost 238.7, near Kelso, California. The train consisted of 3 locomotive units and 75 loaded covered hopper cars. While descending Cima Hill, the engineer inadvertently activated the multiple-unit engine shutdown switch, which shut down all the locomotive unit diesel engines and eliminated the train's dynamic braking capability. The train rapidly accelerated beyond the 20-mph-authorized speed limit despite the engineer's efforts to increase the train's air braking, which the engineer placed in emergency 1 minute 13 seconds after dynamic braking loss. The train's consist weight was listed at an average of 13 tons per car less than the train actually weighed. The train eventually reached a speed of 72 mph and derailed 68 of its 75 cars while exiting a siding near Kelso. No fatalities, injuries, fires, or hazardous materials releases resulted from the accident. The total damage cost was $4,079,152.

The Safety Board determined that the probable cause of the derailment was a prolonged pattern of inattention and lack of action by UP management to protect effectively or relocate the multiple-unit engine shutdown switch in SD60M locomotives after the switch had repeatedly been recognized as subject to inadvertent activation. Additionally, the failure of UP management to adequately address critical safety issues such as dynamic braking system operational reliance and protection, and authorized maximum train speeds in the event of dynamic braking failure. Contributing to the severity of the accident was the failure of UP management to ensure accurate car weight assessment and training for operating personnel on retainer-setting procedures and effects.

Devine, Texas — Collision and Derailment of UP Freight Trains

On June 22, 1997, UP freight trains 5981 North and 9186 South collided head-on in Devine, Texas. The trains were operating on a single main track with passing sidings in dark (nonsignalized) territory in which train movement was governed by conditional track warrant control authority through a dispatcher. The conductor from 5981 North, the engineer from 9186 South, and two unidentified individuals who may have been riding on

5981 North were killed in the derailment and subsequent fire. The engineer from 5981 North received minor injuries, and the conductor from 9186 South was seriously burned. Estimated damages exceeded $6 million.

The Safety Board determined that the probable cause of this accident was the failure of the third-shift dispatcher to communicate the correct track warrant information to the traincrew and to verify the accuracy of the read-back information because the UP management had not established and implemented workload policies and operational procedures to ensure a safe dispatching system and the FRA had failed to provide standards and oversight in all aspects of train dispatching operations. Contributing to the accident was the lack of an installed positive train separation control system that would have prevented the trains from colliding by automatically intervening in their operation because of inappropriate actions being taken.

Cox Landing, West Virginia — Derailment

On June 20, 1998, 30 of the 148 cars making up eastbound CSX Transportation train Q316 derailed at Cox Landing, West Virginia. Three of the derailed cars were loaded with hazardous material, 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.

Kingman, Arizona — Derailment

On August 9, 1997, Amtrak train 4, the Southwest Chief, derailed on the Burlington Northern Santa Fe Railway (BNSF) tracks about 5 miles northeast of Kingman, Arizona. Amtrak train 4 was en route from Los Angeles, California, to Chicago, Illinois, and had just left the Kingman station. The train was traveling about 89 mph on the eastbound track when both the engineer and assistant engineer saw a “hump” in the track as they approached bridge 504.1S. They applied the train’s emergency brakes. The train derailed as it crossed the bridge. Subsequent investigation revealed that the ground under the bridge’s supporting structure had been washed away by a flash flood.

No fatalities resulted from the accident. However, 173 passengers and 10 Amtrak employees of the 294 passengers and 18 Amtrak employees on the train were injured. The damages were estimated to total approximately $7.2 million.

The Safety Board determined that the probable cause of this accident was displacement of the track due to the erosion and scouring of the inadequately protected shallow foundations supporting bridge 504.1S during a severe flash flood because the BNSF management had not provided adequate protection, either by inspection or altering train speeds to fit conditions. Contributing to the accident was the failure of the BNSF management to adequately address the erosion problems at bridge 504.1S.

Derailment at Cox Landing, West Virginia.

Office of Safety Recommendations

Safety at Passive Grade Crossings

In 1998, the Safety Board conducted its first passive grade crossing study. Participating in the study were Safety Board investigators from the Offices of Railroad and Highway Safety and staff from the Office of Research and Engineering. For this study, the Safety Board investigated 60 grade crossing accidents that occurred between December 1995 and August 1996. The accidents used in the study involved a collision between a train and a highway vehicle occurring at a passive grade crossing, wherein the highway vehicle was sufficiently damaged to require towing. The sample of accidents is not intended to be statistically representative of the entire population of accidents at passive grade crossings during the study period, but rather to illustrate a range of passive grade crossing accidents.

NTSB investigator addresses the media during the on-scene investigation of an accident involving a sanitation truck and a passenger train at a passive grade crossing in Round Rock, Texas, on May 5, 1998. An Amtrak train collided with a sanitation truck at a private crossing, killing the driver and derailing the train's locomotives; there were minor injuries to the crew and several passengers. The Safety Board is including this investigation as part of its safety study on passive grade crossings.

NTSB investigator documents distance and measurements at rail accident in Round Rock, Texas.

NTSB stages a reenactment following rail accident in Round Rock, Texas.

A probable cause was determined for each accident in the study. Overall, driver error was cited as the primary cause in 49 of the 60 accident cases: driver disregard for the stop sign in 13 cases, and the driver's failure to look for a train in 16 cases. In 7 of the remaining 11 cases, the probable cause was determined to be related to roadway conditions that affected the driver's ability to detect the presence of a passive crossing or an oncoming train; roadway and track conditions were cited as the probable cause in 3 of the 11 cases.

Public Hearings

In May 1997, the Safety Board convened a 2-day public forum in Jacksonville, Florida, to gather information about issues affecting safety at passive grade crossings. Witnesses included experts from the railroad industry; law enforcement; research groups; Operation Lifesaver; and Federal, State, and local government agencies. Those involved in grade crossing accidents, both highway vehicle occupants and traincrews, testified about their personal experiences. In addition, representatives from Canada and Italy discussed passive grade crossing issues and experiences in their countries.

Based on the results of the Safety Board's accident investigations and the information gathered at the public forum, the safety issues discussed in the report include the following:

- the adequacy of existing warning systems to alert the driver to the presence of a passive crossing and an oncoming train;
- roadway and track conditions that affect a driver's ability to detect the presence of an oncoming train;
- behavioral factors that affect a driver's ability to detect the presence of an oncoming train;
- the adequacy of existing driver education material regarding the dangers of passive grade crossings and driver actions required;
- the need for a systematic and uniform approach to passive grade crossing safety; and
- the need for improved signage at private passive crossings.

Union Pacific Public Hearing

As part of its special investigation into safety problems at the Union Pacific (UP), the Safety Board held a 3-day public hearing March 18-20 in Springfield, Virginia.

The Safety Board hosted this hearing to address safety problems at UP since its merger with Southern Pacific Railroad. The Federal government's oversight of UP and the

railroad's own safety program were the focus of the hearing. Information obtained during the public hearing, which was chaired by NTSB Member John Goglia, was used to determine what safety recommendations were needed to reduce accidents on UP lines. Prior to the hearing there were 15 accidents on UP lines in an 18-month period. The Safety Board was seeking to find out what was the underlying cause of these accidents so others could be prevented.

Office of Research and Engineering

The Office of Research and Engineering provides laboratory and technical support for NTSB investigations and conducts studies that examine safety issues in all transportation modes.

Laboratory specialists in this office analyze voice recordings from the CVR of accident aircraft, and extract, format, and analyze data from digital aircraft FDR.

The office also provides electronic engineering support for all accident investigation modes in examining communication and control systems, including digital and analog formats. Laboratory staff also extract information from recorders installed in locomotives, large ships, and some highway vehicles. Advanced computer technology is used to examine the performance characteristics of vehicles in accidents, including animated three-dimensional vehicular performance studies, and complex analytical studies of vehicle dynamics and operation.

Materials specialists provide engineering support for all transportation modes in areas such as fracture, deformation, and failure analysis; chemical composition and strength of materials; design, fabrication, and testing of components; friction, rolling contact, and wear; impact and crash reconstruction; instrument and system component inspection; and fire and explosion effects.

The office provides computer and data processing support for all NTSB offices and manages the aviation accident database. On an annual basis, the office publishes reviews of aviation accidents and statistical surveys and analyses of accident data. The office is also responsible for management of the NTSB Web site.

During 1998, the average number of hits per day on the Web site doubled. During 1998, the following improvements were made to the Web site:

- all NTSB publications since 1996 were made available;
- the aviation accident synopses were expanded to include the full narrative;
- an e-mail subscription list for safety recommendations and press releases was added;
- an area for General Counsel and Administrative Law Judges was added, including final Opinions and Orders issued since 1995;
- docket material and animations associated with public hearings and Board meetings were placed on the Web site;
- pages for family disaster assistance were added and are continuing to be improved (including special updates for family members); and
- a search engine was implemented to improve accessibility of documents.

Safety Studies

The Safety Studies 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 division also evaluates the effectiveness of Federal, State, and local government and industry transportation safety programs by examining policy issues and performances. Comprehensive reports containing recommendations for corrective action are prepared for public release.

Safety studies are performed 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 Safety Board identifies ongoing or potential safety problems or issues of national significance. Close consideration is given to matters that have the potential for reducing accident losses, improving the safety effectiveness of other agencies, and attaining implementation of previous Board recommendations. The adequacy of program resources committed by other governmental agencies, timeliness of studies with regard to transportation agency program planning and implementation, and the potential impact on regulatory or other safety programs are also considered.

The Safety Board's 1998 activity on safety studies is detailed in the following sections.

Passive Grade Crossing Study

Every year about 4,600 motor vehicles are involved in accidents at railroad grade crossings that kill about 500 and injure more than 1,800 persons. Two-thirds of all crossings have no train-activated warning devices, and these passive crossings are rarely targeted by Federal and State safety programs and research projects.

As part of the safety study on passive grade crossings, the Safety Board held a public forum on this issue in May 1997 in Jacksonville, Florida. Information from the forum was incorporated in the Board's final report, which was adopted by the Board in July 1998. Based on the results of the Board's 60 accident investigations that were conducted in conjunction with this study and the information gathered at the public forum, the safety issues discussed in the report included the following: the adequacy of existing warning systems to alert the driver to the presence of a passive crossing and an oncoming train; roadway and track conditions that affect a driver's ability to detect the presence of an oncoming train; behavioral factors that affect a driver's ability to detect the presence of an oncoming train; the adequacy of existing driver education material regarding the dangers of passive grade crossings and driver actions required; the need for a systematic and uniform approach to passive grade crossing safety; and the need for improved signage at private passive crossings.

As a result of this study, 19 safety recommendations were issued to various organizations, including the DOT, the FHWA, the NHTSA, the FRA, the States; and Operation Lifesaver.

These recommendations included:

- provide full funding within 3 years for the installation of stop and stop ahead signs at passive grade crossings;
- develop, in conjunction with the Advertising Council, Inc., a media campaign to inform motorists that stop signs will be installed at many of the Nation's passive crossings; and
- ensure that questions on safety at passive grade crossings are included in every version of the State's written driver examinations.

Office of Administrative Law Judges

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

Under 49 U.S.C. section 1133 and 49 CFR Part 821, the Board's Administrative Law Judges (ALJ) 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. The judges' decisions in these cases may be appealed to the five-member Safety Board by either the airman or the FAA.

The FAA Civil Penalty Administrative Assessment Act of 1992 (codified at U.S.C. sections 46301, *et. seq*.) transferred all civil penalty appeals for enforcement cases involving pilots, engineers, mechanics, and repairmen where the amount in controversy is less than $50,000 to the NTSB. That law also gave the FAA the right to appeal decisions of the five-member Board to the U.S. Courts of Appeals where the Administrator determines that the Board's decision "will have a significant adverse impact" with respect to aviation safety duties and powers to be carried out by the FAA. Airmen and mechanics have always had the right to appeal adverse Board decisions to the Federal appeals courts.

Under the Equal Access to Justice Act of 1980, as amended (EAJA), the NTSB's judges also review and decide applications for attorney fees and expenses from airmen who prevail against the FAA in cases brought pursuant to 49 U.S.C. sections 44709. Applications filed in connection with actions brought by the FAA under 49 U.S.C. sections 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 Board's review on appeal of its ALJ 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.

Upon review of the Board's decision, the U.S. Courts of Appeals have 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 judgment and decree of the Court of Appeals is subject to review by the U.S. Supreme Court on *certiorari.*

Marine certificate actions are heard first by a Coast Guard's ALJ, 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 1998, two marine appeals were filed with the NTSB, with no cases closed by the Board.

NTSB Publications Available On-Line

NTSB accident reports and safety studies for all modes of transportation from 1996, 1997, and 1998 are available on NTSB's Web site. With this new enhancement, Web site visitors can download the Safety Board's completed accident reports that include the probable cause, recommendations, and conclusions before paper copies are printed. These publications will soon be available on CD-ROM. Other NTSB publications will be available on the Web site in the near future.

Other features that have been on the Safety Board's Web site for many months are reports of thousands of aviation accident investigations going back to 1983, speeches by Board Members, press releases, and news advisories.

Publications are available at <http://www.ntsb.gov/publictn/publictn.htm>. To read these reports, the free Adobe Acrobat Reader must be installed; software may be downloaded from Adobe at <http://www.adobe.com/prodindex/acrobat/readstep.html>.

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