National Transportation Safety Board

Annual Report to Congress
1995

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CONTENTS

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FOREWORD

The National Transportation Safety Board (NTSB) is an independent agency charged with determining the "probable cause" of transportation accidents and promoting transportation safety. The Board investigates accidents, conducts safety studies, evaluates the effectiveness of other government agencies' programs for preventing transportation accidents, and reviews appeals of enforcement actions involving airman and seaman certificates and civil penalties by the Federal Aviation Administration and 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 safety in the nation's transportation system.

The NTSB's origins can be found in the Air Commerce Act of 1926, in which Congress charged the Department of Commerce with investigating the causes of aircraft accidents. Later, that responsibility was given to the Civil Aeronautics Board's Bureau of Aviation Safety. In 1967, Congress consolidated all transportation agencies into a new Department of Transportation (DOT), and established the National Transportation Safety Board as an agency within 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 re-established the NTSB as a completely separate entity, outside of DOT, rea-

soning 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." As DOT is responsible for both the regulation and promotion of transportation in the U.S., and accidents may suggest deficiencies in the transportation system, the Board's independence was deemed necessary for proper oversight.

The NTSB, which has no authority to regulate, fund or be directly involved in the operation of any mode of transportation, seeks to conduct investigations and to make recommendations from a totally objective viewpoint. Under current operating criteria, the Board's response to an accident primarily is determined by:

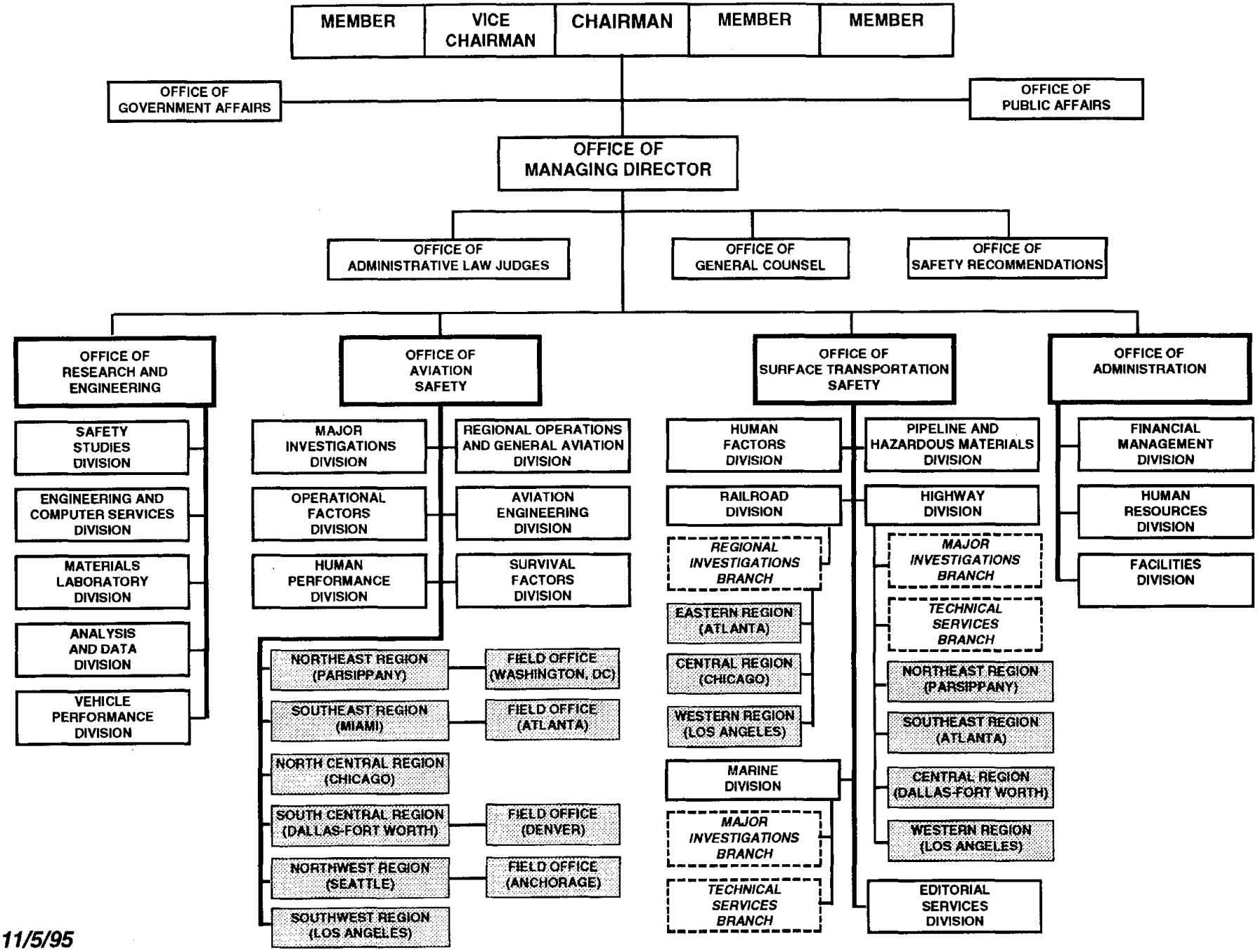
- the need for independent investigative oversight to ensure public confidence in the transportation system;
- the need to concentrate on the most significant and life-threatening safety issues; and
- the need to maintain a data base so that trends can be identified and projected.

Since its inception, the NTSB has investigated more than100,000 aviation accidents, and over 10,000 surface transportation accidents. On Call 24 hours a day, 365 days a year, NTSB investigators travel throughout the country and to every corner of the world to investigate significant accidents, developing a factual record and safety recommendations with one aim -- to ensure that such accidents never happen again.

To date, the NTSB has issued almost 10,000 safety recommendations pertaining to the various trans-

portation 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 the regulatory authorities and the transportation industry.

NATIONAL TRANSPORTATION SAFETY BOARD



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MEMBER PROFILES

James E. Hall of Tennessee became a member of the National Transportation Safety Board in October 1993. He was appointed Vice Chairman on May 2, 1994 and began serving as Acting Chairman on June 22, 1994. On October 3, 1994, he became the eighth chairman of the NTSB.

Chairman Hall received his law degree from the University of Tennessee College of Law and served for several years as counsel to the U.S. Senate Subcommittee on Intergovernmental Relations and on the staff of U.S. Senator Al Gore, Sr. He later maintained a private legal practice in Chattanooga, Tennessee.

Chairman Hall returned to Washington in early 1993 to serve as chief of staff for U.S. Senator Harlan Matthews. Before joining Senator Matthew's' staff, he was in the Cabinet of Tennessee Governor Ned McWherter and served for five years as Director of the Tennessee State Planning Office.

As a member of the Governor's Cabinet, Chairman Hall developed Tennessee's first comprehensive anti-drug effort. In that role, he successfully pushed for the enactment of the Drug Free Youth Act to address one of the major highway safety problems in Tennessee. That measure mandated the suspension of driving privileges for youths aged 13 to 17 who violated Tennessee's alcohol and drug laws. As a result of the law, referrals to juvenile court for alcohol/drug-related driving offenses declined from 530 in 1987 to 252 in 1991.

An army veteran, Chairman Hall received the Bronze Star for Meritorious Service in Vietnam.

Chairman Hall and his wife, the former Anne Stewart Impink, have two daughters. His current term on the NTSB expires on December 31, 1997; he is serving a two-year term as chairman.

Robert T. Francis II has been Vice Chairman of the Safety Board since January 1995, when he was appointed to the NTSB by President Clinton. In August 1995, he was confirmed by the U.S. Senate.

Prior to his appointment to the 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, governmental transportation authorities, aircraft manufacturers, and airports. Prior to his tour in France, he served four years as Manager of the FAA's Southern Region's Policy, Plans and International Office, and three years as Special Assistant to the FAA's European Director in Brussels.

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. Mr. Francis and his wife, Judy, have two daughters.

Mr. Francis' term as Vice Chairman expires on August 14, 1997, and his appointment as a Member of the NTSB expires on December 31, 1999.

John A. Hammerschmidt became a member of the NTSB in June 1991. Mr. Hammerschmidt had extensive senior-level experience, serving as a Special Assistant to the Board Chairman and Member from 1985 to 1991.

During his tenure at the Board, Mr. Hammerschmidt has participated on-scene in more than three dozen major accident investigations and public hearings. He is a private pilot.

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

In 1971, Mr. Hammerschmidt earned his Bachelor of Arts degree from Dartmouth College, graduating "with highest distinction" in a history honors program. At Dartmouth, he was named a Rufus Choate Scholar. Later, he attended Harvard University's Master of Business Administration program (1973-74). 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. His current term on the Board expires December 31, 1995.

John Goglia, an internationally recognized expert in aviation maintenance and aircraft operations, became a Member of the NTSB in August 1995.

Mr. Goglia is the first working A&P mechanic to serve on the Board, with over thirty years of aviation experience. Prior to Senate confirmation, he was based with USAir and was the recipient of the prestigious 1994 FAA/Industry Aviation Mechanic of the Year Award.

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

Mr. Goglia served as the Governor's appointee to the Massachusetts Workers Compensation Board and to the Boston Area Second Airport Site Selection Board. Mr. Goglia also served as Team Coordinator of the International Association of Machinists and Aerospace Workers' (IAM) Accident Investigation Team and, for over 21 years, he served as the IAM's Flight Safety Representative. He was the IAM's principal specialist on aviation issues, serving as liaison to the FAA, NTSB, DOT and other executive branch agencies as well as the U.S. Congress. He represented the IAM on the Aviation Rulemaking Advisory Committee, which evaluates and recommends changes regarding aviation safety and operational regulations.

Mr. Goglia was Chairman 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, an organization 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 symposiums and serving as contributing editor to several industry periodicals. In 1960, Mr. Goglia learned to fly in a Piper J2-J3 and, for over ten years, he was an owner/operator of an aircraft service company.

Mr. Goglia's current term on the Safety Board expires December 31, 1998.

POLICY & DIRECTION

Policy at the National Transportation Safety Board is established by the Chairman, Vice Chairman and Members of the Board, and is implemented by the Offices of the Managing Director, Government and Public Affairs, Safety Recommendations and the General Counsel.

To carry out the responsibilities of the NTSB as prescribed in the Independent Safety Board Act of 1974, Board members establish policy on transportation safety issues and problems and on Board goals, objectives and operations. Board Members review and approve major accident reports as well as all safety recommendations, and decide appeals of FAA and Coast Guard certificate actions. Individual members preside over hearings and testify before Congressional committees.

The Office of the Managing Director implements NTSB programs by coordinating the day-to-day operations of the staff. The office schedules and manages the Board's review of major reports, and provides executive secretariat services to the Board.

The Office of Government and Public Affairs keeps Congress and federal, state and local government agencies informed of the NTSB's efforts to improve transportation safety. This office responds to oral and written inquiries, and addresses problems and concerns raised by Congress and other government entities. It prepares testimony for Board participation in Congressional hearings, and provides information on legislation at the federal, state and local government levels.

The office's public affairs staff answers questions from the public, the news media, and the transportation industry. Public affairs staff members also work with the media at accident

sites, Board meetings and hearings, and disseminate safety information to increase public awareness of the NTSB's activities in transportation safety. Members of the Board conduct regular media briefings with the assistance of the public affairs staff.

The NTSB's state liaison unit serves as an advocate for Board recommendations to state and local governments, and provides information and insights to the Board on state policies and activities.

The Office of Safety Recommendations works to ensure that the Board issues appropriate and effective recommendations for enhancing safety in all transportation modes. The office develops programs to increase the acceptance of Board recommendations and also coordinates the "Most Wanted" Safety Recommendations Program, the development of alcohol and drug policy, and international accident prevention activities.

The General Counsel's office provides legal advice on policy, legislation, NTSB rules, and other matters. The office helps to ensure that the Board's review of airman and seaman certificate and license appeals is timely and objective, and assists the Department of Justice in representing the Board in court proceedings. The General Counsel's office also provides legal assistance and guidance to the Board's other offices regarding hearings, appearances as witnesses, and the taking of depositions.

ADMINISTRATION

The Office of Administration is responsible for providing timely, responsive support and services to the National Transportation Safety Board in the areas of human resources, and financial and facilities management.

The Financial Management Division maintains an accounting system to ensure that NTSB funds are properly expended and controlled. The office prepares annual budget requests to the Office of Management and Budget and the Congress, and also evaluates program operations and conducts reviews to ensure that appropriated funds are disbursed in accordance with approved programs.

The Human Resources Division manages the personnel system to maintain a highly skilled and efficient work force, improve productivity and morale, and ensure compliance with federal laws and regulations. The division recruits applicants for all vacant positions, processes personnel actions for all hiring, promotions and salary adjustments, and provides employees with employee services and benefits information. This division also develops personnel and training programs, and oversees the performance appraisal systems and incentive award program.

The Facilities Management Division manages the building facilities, telephones, printing, and mail/messenger services. To accomplish this, the division maintains the working environment and the NTSB's accountable property, and coordinates printing, graphics and photographic services. It provides the mail and messenger services, and also ensures adequate physical security.

TRANSPORTATION FATALITIES IN 1995

Transportation-related deaths rose in 1995 for the third year in a row. Fatalities totaled 44,347 persons, up two percent from 43,433 in 1994.

Highway-related deaths, which account for more than 90 percent of all fatalities, increased by about 1,000 to a total of 41,700 — 1.7 deaths per 100 million vehicle miles traveled in 1995.

The number of persons killed in aviation accidents decreased to 969 in 1995 from 1,071 the year before. While most of these fatalities resulted from general aviation accidents, there were 177 deaths in accidents involving scheduled carriers (major airlines and commuters). The two major airline accidents that accounted for the majority of these fatalities were the crash of an American Airlines B-757 in Colombia in December, with 162 deaths, and a U.S. cargo plane that went off a runway in Guatemala in April and hit a house, killing six persons. Nine people died in accidents involving commuter aircraft in 1995, eight of whom were aboard an Atlantic Southeast aircraft that crashed in Carrollton, Georgia in August. The remaining two fatalities resulted from an accident involving a nonscheduled cargo flight in the Dominican Republic in June.

The number of persons killed in recreational boating accidents increased to 836 in 1995 from 784 the year before. Personal watercraft fatalities have more than doubled since 1992 and in 1995 accounted for at least 79 fatalities. U.S. Coast Guard data indicate that there were 31 marine cargo transport deaths and 37 commercial fishing deaths in 1995.

Rail fatalities declined to 753 persons from 809 in 1994. The largest share of the deaths – 593 – continued to be as a result of persons

walking on or near railroad tracks. There were no passenger fatalities in 1995 on railroads that report to the Federal Railroad Administration. Motor vehicle occupants killed in grade crossing accidents totaled 575 persons, down from 615.

Pipeline-related deaths totaled 21, against 22 in 1994.

National Transportation Safety Board
1995 U.S. Transportation Fatalities

		1994	1995[1]
Highway:	Passenger cars	21,903	22,313
	Light trucks and vans	8,876	9,508
	Pedestrians	5,472	5,620
	Motorcycles	2,304	2,230
	Pedalcycles	802	780
	Medium and heavy trucks	663	632
	Buses	21	28
	All other	635	589
	Total	**40,676**	**41,700**
Grade Crossings: [2]		**(615)**	**(575)**
Rail:	Intercity		
	Trespassers and nontrespassers[3]	645	593
	Employees and contractors	34	41
	Passengers on trains	5	0
	Light and commuter rail	125	119
	Total	**809**	**753**
Marine:			
	Recreational boating	784	836
	Cargo transport	32	31
	Commercial fishing	39	37
	Total	**855**	**904**
Aviation:	General aviation	723	732
	Airlines	239	168
	Air taxi	63	52
	Commuter	25	9
	Foreign / unregistered [4]	21	8
	Total	**1,071**	**969**
Pipeline:	Gas	21	18
	Liquids	1	3
	Total	**22**	**21**
Grand Total:		**43,433**	**44,347**

1 All 1995 figures are preliminary estimates.

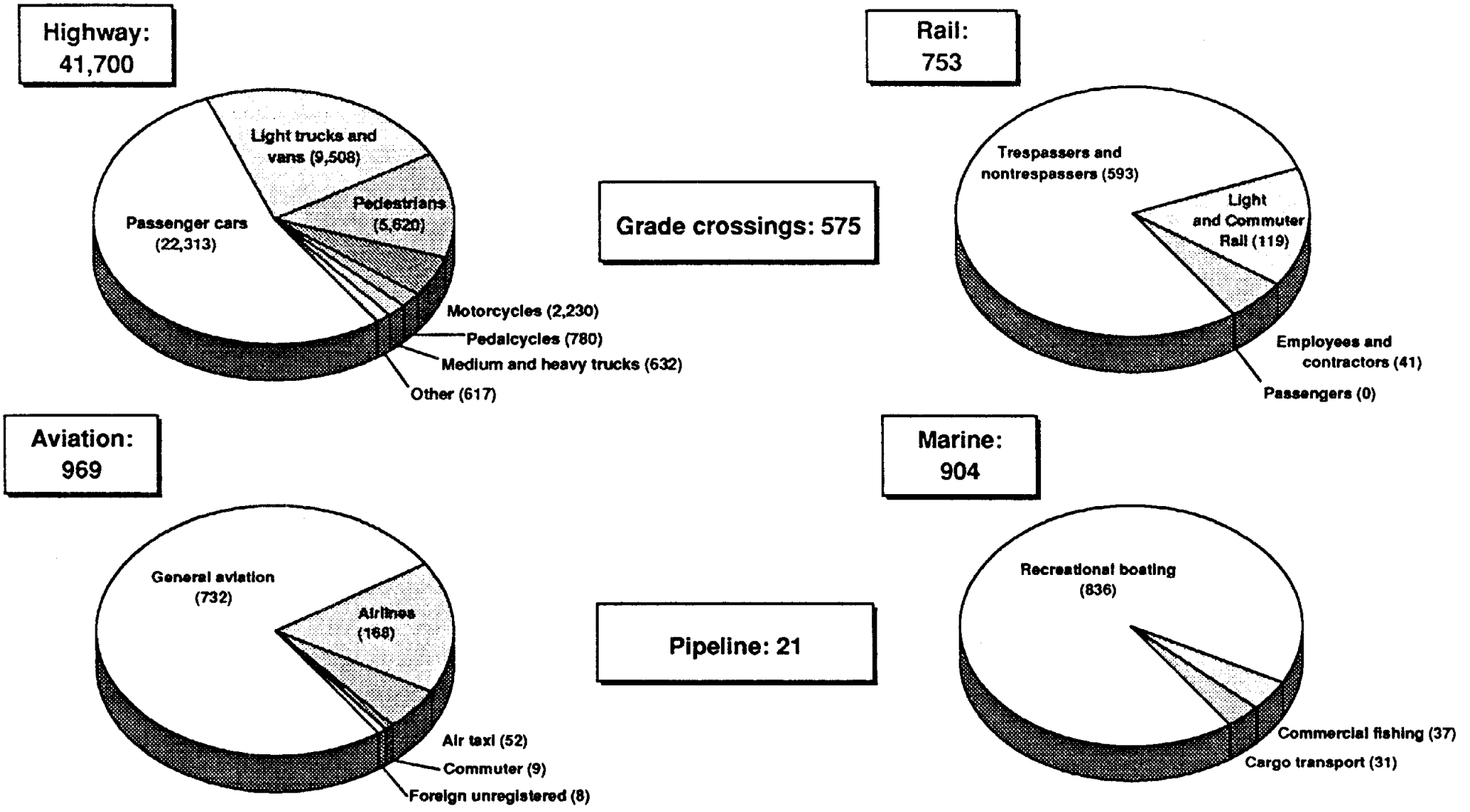
2 Grade crossing fatalities are not counted as a separate category for determining the grand totals because they are included in the highway and rail categories, as appropriate.

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

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

National Transportation Safety Board

44,347 Transportation Fatalities in 1995



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

THE NTSB & CONGRESS IN 1995

Members and staff of the National Transportation Safety Board testified eight times before Congressional committees in 1995.

On January 12, Chairman Hall appeared before the Senate Committee on Commerce, Science and Transportation to discuss aviation safety. The Chairman stated that, although the air transport system in the U.S. was among the safest in the world, we needed to continue to look hard to see what improvements may be needed. He noted that, during the past 27 years, NTSB safety recommendations have addressed almost every major facet of the aviation industry. While in nearly all of these areas there have been significant improvements, in some areas, as current accidents indicate, more needs to be done. Among the areas highlighted were commuter airline standards, ground proximity warning systems, windshear detection systems, enhanced flight data recorders, airport surface detection radar, crew training, and "corporate culture" and management issues that might contribute to an accident-prone environment.

The Chairman testified, February 8, before the House Appropriations Committee's Subcommittee on Transportation and Related Agencies on the NTSB's fiscal year 1996 budget request of $38 million. Chairman Hall noted that the 1996 request represented an increase of $1.4 million over the 1995 enacted level, and would provide funding only to maintain NTSB operations with the current staffing level of 350 positions. On March 9, the Chairman made a similar presentation to the Senate Appropriations Committee's Subcommittee on Transportation and Related Agencies.

On June 29, the Senate Commerce Committee held confirmation hearings for two new Board members – Robert T. Francis and John Goglia.

Dr. Bernard S. Loeb, Director of the Office of Aviation Safety, testified before the House Transportation and Infrastructure Committee's Subcommittee on Aviation, September 26, regarding air traffic control computer outages. Dr. Loeb stated that an NTSB special investigation had determined that, notwithstanding the relatively high reliability of ATC equipment and multiple levels of redundancy, there are unique failure modes that continue to occur, resulting in system degradation to a level that can have adverse safety implications. Dr. Loeb noted that the NTSB would be making recommendations for remedying the situation to the FAA.

On December 7, NTSB Chief Technical Advisor William G. Laynor testified before the House Science and Technology Committee's Subcommittee on Technology regarding FAA research and development programs. Mr. Laynor noted that almost all major aviation accidents resulted in NTSB safety recommendations to the FAA, and that many of these recommendations influence that agency's R&D program. He said that the NTSB supported improvement in the coordination of R&D, acquisition and implementation of new equipment to assure that requirements are compatible with users' needs, and that participants in the air transport system are adequately trained when new equipment becomes available. Mr. Laynor added that the requirement for coordination between the R&D community, flight standards, ATC, airway facilities and airports must be a top consideration in any future reorganization of the FAA.

Chairman Hall testified before the House Transportation and Infrastructure Committee's Subcommittee on Aviation, December 13, regarding pilot

record sharing. The Chairman stated that inadequate background checks and sharing between airlines of information regarding pilot proficiency was a continuing safety problem that needed a solution. He noted that the NTSB had been issuing recommendations to deal with this matter since 1988 but the response had not been satisfactory due to concerns about privacy, fairness and fears of civil litigation by former airline employees.

SAFETY RECOMMENDATIONS

The National Transportation Safety Board issued 350 recommendations in 1995 to improve safety in the five modes that make up the nation's transportation system: aviation, highway, marine, pipeline and rail. The recommendations are the important final product of approximately 2,400 accident investigations conducted annually by the Board. The overall acceptance rate for all recommendations issued through the end of 1995 was 82.1 percent.

Typically, it takes 1,080 days for an average recommendation to be implemented. For "urgent" recommendations, the time is much shorter - 272 days on average. For recommendations issued and implemented from January 1, 1990 through December 31, 1995, the average time to implementation was 505 days. For recommendations to the U.S. Department of Transportation agencies during that period, the average implementation time was 597 days. Historically, the recommendation acceptance rate at DOT has ranged from 87.8 percent at the Federal Highway Administration (FHWA) to 72.0 percent at the U.S. Coast Guard.

STATUS OF SAFETY RECOMMENDATIONS
DECEMBER 31, 1995

FAVORABLE ACTION	
Closed - Exceeds Recommended Action	**12**
Closed - Acceptable Action	**5487**
Closed - Acceptable Alternate Action	**878**
Open - Acceptable Response	**765**
Open - Acceptable Alternate Response	**36**
Total	**7178**
UNACCEPTABLE ACTION	
Closed - Unacceptable Action	**1407**
Open - Unacceptable Response	**158**
Total	**1565**
PENDING, SUPERSEDED ACTION	
Open - Awaiting Response or Response Received	**484**
Superseded, Reconsidered or No longer Applicable	**808**
Total	**1292**

"MOST WANTED" SAFETY RECOMMENDATIONS

Since the NTSB was established, it has issued almost 10,000 safety recommendations to prevent accidents, save lives, and reduce injuries. While all the recommendations made by the Board will, if implemented, improve safety and help prevent accidents, some of these recommendations have a greater potential to save lives. In order to identify and increase the public's awareness of those recommendations with the greatest impact on transportation safety, the NTSB adopted the "Most Wanted" Safety Recommendations Program in 1990. Recommendations selected as part of the program receive more intensive follow-up activity to persuade government agencies and industry to act on them as quickly as possible.

To be considered for the "Most Wanted" list, a recommendation must have a national impact on transportation safety, concern a safety issue of high visibility, or be of great interest to the public. Also considered are: the extent to which the safety problem the recommendation is aimed at solving exposes the public to risk; the loss of life and property incurred and the potential for future losses; and previous action taken by the recommendation recipient(s). Strong regard is given to recommendations that have not been acted upon for an inordinately long period of time.

In 1995, the Board, noting the forecasts for substantial increases in commuter air traffic over the next decade, emphasized the need for greater commuter airline safety by including it as an item in the "Most Wanted" list. Added to the list were recommendations that the FAA require that all commuter aircraft with 10 or more passenger seats come under the more stringent pilot training, maintenance and operating regulations that apply to large aircraft, commonly called Part 121 regulations.

The Board also raised its recommendations on aircraft wake turbulence to the "Most Wanted" category. The recommendations regarding wake vortices – funnel-shaped air disturbances generated behind aircraft – urged that the FAA review aircraft weight classifications and increase safe separation standards; change air traffic control procedures, especially relating to Boeing 757 aircraft; and require manufacturers of turbojet transport aircraft to determine wake vortex characteristics during certification.

Also moved to the top priority list were NTSB recommendations regarding improved flight data recorders. The Board had recommended early in 1995 that the FAA require expanded flight data recorder parameters on all Boeing 737 aircraft by the end of the year, as a result of the USAir flight 427 crash near Pittsburgh in September 1994. The Board also recommended the installation of expanded-capability recorders on new transport category aircraft and the retrofitting of aircraft currently in service.

To highlight concern about the fatigue factor in transportation accidents, the Board expanded the number of fatigue-related recommendations on the list. These urge the FAA to expeditiously review and revise flight-duty time limitations to ensure that the latest research on fatigue and sleep is incorporated. Another recommendation asks the FAA to include time spent ferrying aircraft, training and flight checks in computing the crew's overall duty time for cargo and commuter operations.

The "Most Wanted" list also includes recommendations to the Federal Highway Administration to require that truck drivers get at least eight hours of continuous sleep after driving 10 hours or being on duty 15 hours.

The Board also added to the list another recommendation in the area of small passenger vessel safety, urging the Coast Guard to require out-of-water survival craft for all passengers and crew.

Two aviation safety issues were dropped from the list in 1995 due to positive action by the FAA — brake wear limits and performance for transport category aircraft, and structural fatigue testing.

At year's end, the "Most Wanted" safety improvements being sought by the Board included recommendations in 17 areas regarding:

- Recreational Boating Safety
- Administrative Revocation of Driver's Licenses
- Airport Runway Incursions
- Positive Train Separation
- Requirements for Mode C Intruder Conflict Alerts in FAA Aviation Terminal Radar Control Areas
- Fishing Vessel Safety
- Youth Highway Crashes
- Flight Data Recorder Expanded Parameter Recording
- Installation of Pipeline Excess Flow Valves

- Railroad Hazardous Materials Tank Cars
- Human Fatigue in Transportation Operations
- School Bus Safety
- Commuter Airline Safety
- Small Passenger Vessel Safety
- Alcohol/Drug Detection
- Wake Turbulence
- Heavy Commercial Truck Safety

AVIATION SAFETY

The Federal Aviation Act of 1958 and the Independent Safety Board Act of 1974 placed the responsibility for investigating and determining the probable cause(s) of all civil aviation accidents with the NTSB. In practice, the Board sometimes delegates general aviation accidents to the FAA for investigation – primarily those involving agricultural, experimental or home-built aircraft. However, although it may delegate the actual investigation of an accident to another agency, the Board is the only entity that may make an official determination of probable cause.

The Board is also charged with carrying out studies, special investigations, and assessments on issues that are aviation-related. In 1995, these included a study of aviation safety in Alaska and a special investigation of safety in the air tour industry.

Because of the international nature of the aviation industry and America's leading role in aviation technologies, the Board's investigation of domestic accidents and participation in foreign investigations is essential to the enhancement of aviation safety on a worldwide basis. The Board fulfills U.S. obligations with regard to foreign accident investigations, established by an International Civil Aviation Organization (ICAO) treaty, by sending an accredited representative to participate in investigations in cases where U.S. interests are involved.

Foreign governments often request the assistance of NTSB experts in their investigations. The Board's major aviation accident reports, safety recommendations, and accident statistics are disseminated worldwide and have a direct influence on the safety policies of foreign aviation authorities and airlines.

Another important aspect of the Board's mandate is to investigate the more than 2,000 general aviation accidents that occur annually. On a selective basis, the NTSB will investigate accidents involving only property damage in which data is collected in a relatively limited but highly focused investigation. In addition, certain incidents not meeting the definition of an accident may be investigated as they often provide information that may be helpful in preventing accidents.

The NTSB serves as the nation's primary repository of aviation accident statistics and other related data, but its approach goes beyond the collection of data and a narrow determination of probable cause. Typically, NTSB investigators examine all factors surrounding an accident or series of accidents, thereby ensuring that the regulatory agencies are provided with a thorough and objective analysis of actual as well as potential deficiencies in the transportation system. Only then can solutions be proposed to correct deficiencies that may have caused the accident.

OFFICE OF AVIATION SAFETY

The Office of Aviation Safety has the primary responsibility for investigating aviation accidents and incidents, and proposing probable causes for Board approval. Working with other NTSB units, the office also formulates aviation safety recommendations.

The staff is located in Washington, D.C. and in 10 regional and field offices in major metropolitan areas throughout the United States. The office is composed of six divisions: Major Investigations, Field Operations and General Aviation, Operational Factors, Human Performance, Aviation Engineering, and Survival Factors.

When the Board is notified of a major accident, it launches a "Go Team," which varies in size depending on the severity of the accident and the complexity of the issues involved. The team may consist of experts in as many as 14 different specialties. Each NTSB expert manages a group of other specialists from industry and government agencies in the collection of the facts, and determining the conditions and circumstances surrounding the accident.

The participation of these other (non-NTSB) parties multiplies the Board's resources and fosters a greater likelihood of general agreement over the findings of the investigation. It also allows first-hand access to information so that timely corrective actions may be taken by the appropriate parties.

A public hearing may be convened, or depositions taken, to collect additional factual information. After an investigation is completed, a detailed narrative report is prepared that analyzes the investigative record and identifies the probable cause(s) of the accident.

A major investigation usually takes from six months to more than a year to complete. Safety recommendations resulting from major investigations generally are included in the final accident report although, in the interest of safety, they may be issued at any time during the course of an investigation if deemed necessary by the Board.

The Major Investigations Division provides the Investigator-In-Charge (IIC) for an accident and coordinates the preparation of the Board's aviation accident reports. The group chairmen, under the direction of the IIC, coordinate the efforts of the other expert participants in accident

investigations provided by industry and other government agencies. Each group conducts an objective, and thorough technical investigation of the accident, and produces factual reports that are incorporated into the final Board report on the accident. This division also provides the accredited representatives for the investigation of civil aviation accidents occurring in other countries in which U.S. citizens and/or U.S.-manufactured equipment are involved.

Operational factors experts in three disciplines (air traffic control, operations, and weather) support major investigations with intensive work in their specialties. Air traffic control (ATC) specialists examine ATC facilities, procedures, and flight handling, including ground-to-air voice transmissions, and develop flight histories from Air Route Traffic Control Center and terminal facility radar records. Other specialists examine the flight operations conducted by the carrier and the airport, and the flight training and experience of the crew. Weather specialists study the meteorological and environmental conditions prevailing at the time of an accident.

Human performance specialists review the background and performance of persons associated with an accident, focusing on each individual's professional knowledge, experience, training, decisions, actions, work patterns and physical abilities. Also examined are company policies and procedures, management relationships, equipment design, and the general work environment.

Aviation engineering experts in four areas provide strong technical skills. Power plant specialists examine the aircraft engines, while structures experts study the integrity of aircraft structures and flight controls as well as the adequacy of aircraft design and certification procedures. Systems special-

ists investigate the aircraft's flight controls, and electrical, hydraulic, and avionic systems. Maintenance specialists study the service history and maintenance of aircraft systems, structures, and power plants.

Survival factors experts investigate circumstances that affect the survival of persons involved in accidents, including the causes of injuries and fatalities. These investigators also examine cabin safety and emergency procedures, crashworthiness, equipment design, emergency response effectiveness, and airport certification.

"Public Use" Aircraft

Under a 1994 law, which took effect in April 1995, the NTSB was granted new authority to investigate accidents and incidents involving "public use" aircraft, i.e., those that are owned, operated or leased by government entities (excluding military and intelligence agency aircraft). Previously, the Board did investigate some "public use" aircraft accidents under agreements with several government agencies. In investigating "public use" aircraft accidents, the NTSB's role will be the same as in civil aircraft cases – determining the facts and probable cause, and making recommendations for safety improvements.

MAJOR AVIATION INVESTIGATIONS IN 1995

Among the major domestic and foreign aviation accidents investigated by the NTSB in 1995 were the following significant cases:

Tusayan, AZ - Grand Canyon Charter Flight

On February 13, a Piper PA-31 aircraft operated by Las Vegas Airlines as an on-demand charter flight crashed about three miles from the Grand Canyon airport. Initial information indicated that the pilot reported losing power in one engine and was attempting to return to the departure airport when the accident occurred. There were eight fatalities among the 10 passengers and crew; the two survivors sustained serious injuries.

Atlanta, GA. - ValuJet Engine Failure

On June 8, ValuJet flight 597 to Miami, was on takeoff from Hartsfield Atlanta International Airport when an engine failed. Shrapnel from the engine penetrated the fuselage and cut a fuel line. A cabin fire erupted, destroying the DC-9 aircraft, which was carrying 55 passengers and crew. One flight attendant was seriously injured; six others on board received minor injuries. The Board's investigation focused on a cracked compressor disk on the engine, which ValuJet had purchased from a Turkish aviation maintenance and overhaul company in 1994.

Carrollton, GA - Atlantic Southeast Embraer Crash

On August 21, an Embraer EMB-120, registered to Atlantic Southeast Airlines and operating as Delta Airlines flight 7529, made an off-airport, forced landing near Carrollton, GA. The flight, enroute from

Atlanta to Gulfport, MS, as a scheduled commuter flight, had 29 passengers and crew aboard. The crew advised air traffic controllers of an emergency involving the left engine while climbing through 18,000 feet. After initially requesting to return to Atlanta, the crew asked to be directed to the nearest airport. The flight was vectored by controllers to the West Georgia Regional Airport but hit trees and crashed about five miles short of the runway. The captain and four passengers were fatally injured; the other occupants sustained impact and burn injuries. Three other passengers died within 30 days as a result of their injuries. The investigators found that a propeller blade had separated in flight.

East Granby, CT - MD-83/Hard Landing

On November 12, an MD-83 operated by American Airlines struck trees and terrain about a mile from the airport while making an instrument approach to Bradley International Airport at East Granby, Connecticut. Witnesses indicated the airplane touched down in the overrun of runway 15 and then bounced to a stop in the normal runway area. An emergency evacuation was ordered and the 72 passengers and five crew deplaned with no reported injuries. The aircraft sustained substantial damage. Light rain was reported at the time of the accident. Air traffic control personnel had evacuated the airport tower before the accident due to water leaks and wind damage to the control cab; maintenance personnel and a supervisor were in the cab at the time of the accident.

Buga, Colombia - American Airlines B-757 Crash

On December 20, American Airlines flight 965, a regularly scheduled passenger flight from Miami to Cali, Colombia, crashed into mountainous terrain during a descent under instrument flight rules 38 miles north of Cali. There were 158 passengers and 8 crew on board; four passengers survived.

Investigation of the accident was undertaken by Colombian officials in accordance with the provisions of Annex 13 of the Convention on International Civil Aviation. Under those provisions, a U.S. team led by NTSB investigators assisted with the investigation as full participants. The U.S. team included advisors from American Airlines, the Allied Pilots Association, the Boeing Company and the FAA.

Jamaica, NY - B-747 Runway Departure

A Boeing 747, operated by Tower Air, veered off the runway while attempting a takeoff from JFK International Airport on December 20. The regularly scheduled passenger flight had 468 persons aboard. Weather reports at the time of the accident indicated light snow and fog conditions. Twenty-four passengers sustained minor injuries; the aircraft was substantially damaged.

AVIATION PUBLIC HEARINGS IN 1995

American Eagle Flight 4184

On February 27, the NTSB began several days of testimony in Indianapolis on the October 1994 crash of American Eagle flight 4184 near Roselawn, Indiana. All 64 passengers, the captain, first officer

Significant Aviation Investigations In 1995

Accident Date	Location	Carrier/ Aircraft Type	Fatalities
2/13/95	Tusayan, AZ	Las Vegas Airlines/ Piper PA-31	8
6/8/95	Atlanta, GA	ValuJet/DC-9	0
8/21/95	Carrollton, GA	Atlantic Southeast/ Embraer-120	8
11/12/95	East Granby, CT	American Airlines/ MD-83	0
12/20/95	Buga, Colombia	American Airlines/ B-757	162
12/20/95	Jamaica, NY	Tower Air/B-747	0

and two flight attendants were killed when the ATR-72 aircraft struck the ground and was destroyed on impact.

Government and aviation industry officials, from both the U.S. and France, participated in the hearing, focusing on air traffic control, weather, aircraft performance and design, icing certification, aircraft systems and airline company operational issues.

St. Louis Runway Collision

The November 1994 collision of a TWA MD-82 and a Superior Aviation Cessna 441 at Lambert-St. Louis International Airport was the impetus for an NTSB hearing on runway incursions, held in Arlington, VA on April 19-20. The Cessna had mistakenly taxied onto an active runway where a TWA flight was taking off . The TWA aircraft swerved at the last second but the right wing sheared off the roof of the Cessna, fatally injuring both people on board the smaller aircraft. None of the 140 passengers and crew aboard the TWA flight reported serious injuries.

Issues discussed at the hearing included the scope of the runway incursion problem in the U.S., FAA runway incursion solutions, airport operations, delays in installation of Airport Surface Detection Equipment (ASDE-3) and the Airport Movement Area Safety System (AMASS)

USAir Flight 427

As part of the ongoing investigation into the 1994 crash of USAir flight 427, the NTSB convened public hearings in January and November 1995 in Pittsburgh, PA and Arlington, VA, respectively. On September 8, 1994, flight 427, a Boeing 737 aircraft, crashed in clear weather on approach to Greater Pittsburgh International Airport. All 132 persons aboard perished as the aircraft was totally destroyed by impact and post-crash fire.

Parties to the hearings, whose representatives participated in the investigation under NTSB supervision, included the FAA, USAir, Boeing, Airline Pilots Association, International Association of Machinists and Aerospace Workers, Parker Hannifin, Inc., and the Monsanto Company.

Issues discussed included the B-737's rudder control system, the FAA's Critical Design Review Report of May 3 on the B-737's flight control system, wake vortex flight tests, simulation studies of cockpit human performance, recent flight path disturbances involving 737 aircraft, and simulations of flight 427's flight path.

MAJOR AVIATION REPORTS ADOPTED IN 1995

Major aviation reports adopted by the NTSB in 1995 included the following significant cases:

New York, NY - Continental MD-82 Accident

On February 14, the NTSB called for the FAA to require that all cockpit voice recorders (CVR) manufactured after December 31, 1995 have a recording duration of at least two hours and that the FAA prohibit new installations of CVRs that do not have at least a two-hour recording capability.

Aircraft manufacturers, the Board said, have already introduced two-hour CVRs that can replace existing 30-minute CVRs with no aircraft modification. The new CVRs use solid state memory and have demonstrated improved reliability and crash/fire survivability when compared to 30-minute magnetic tape CVRs.

These recommendations were among those stemming from the Board's review of an accident involving a Continental Airlines aircraft, in which important information was lost due to the 30 minute limitation on the CVR. The accident occurred on March 2, 1994 when the captain of Continental flight 795 aborted a takeoff from

LaGuardia airport. The aircraft ran beyond the runway, coming to rest on a tidal mud flat of Flushing Bay. There were some minor injuries but no fatalities or serious injuries among the 116 passengers and crew aboard. Damage to the aircraft was substantial, estimated at $5.6 million.

The Board determined that the probable cause of the accident was the flight crew's failure to comply with checklist procedures and turn on an operable pitot/static heat system, resulting in ice/snow blockage of the pitot tubes that produced erroneous airspeed indications, and the flight crew's untimely response to those abnormal airspeed readings, with the consequent rejection of takeoff at an actual speed of five knots above V1 (the takeoff go/no-go decision speed).

In addition to the CVR recommendations, the Board also recommended that the FAA:

- Require the modification of transport category aircraft to incorporate the automatic activation of air data sensor heating systems without flight crew action.

- Require that for newly certificated aircraft, anti-ice protection for the air data sensor heating systems be provided automatically (without flight crew action) following engine start.

- Require that air carrier rejected takeoff training include elapsed time to target speed takeoff performance data.

The Board also reiterated recommendations that the FAA:

- Require an evacuation and/or wet ditching drill group exercise during recurrent training.

- Require that flight attendants receive crew resource management training that includes group exercises in order to improve crew member coordination and communication.

Chantilly, VA - Dulles Learjet Crash

On March 7, the Board, expressing concern over the lack of ground proximity warning systems (GPWS) on smaller turbojets, reported that deficient pilot operating practices led to the crash, June 18, 1994, of a Learjet 25D on approach to Dulles International Airport. All 12 persons aboard the aircraft were killed.

The flight from Mexico City, a commercial charter operated by the Mexican airline TAESA, carrying ten passengers, two more than could be safely seated, crashed a mile short of the runway on a second instrument landing attempt in fog conditions.

The Board determined that the probable causes of the accident were the poor decision-making and airmanship of the relatively inexperienced pilot in initiating and continuing an unstabilized instrument approach that led to a descent below authorized altitude without visual contact with the runway environment. The lack of a GPWS on the aircraft was cited as a contributing factor.

The NTSB concluded that the weather conditions were less than authorized for the crew to initiate the approaches, and that the pilot should have held in the air for an improvement in the weather, tried another runway, or proceeded to an alternate airport.

The Board also determined that the impact of the Learjet was not survivable. Destruction from the crash prevented establishing exact occupant seating location but the aircraft was designed to seat only eight passengers with safety belts and, therefore, at least two passengers were not properly restrained as required by international aviation rules.

The Board said that management oversight of the aircraft by TAESA and the Mexican authorities was inadequate with regard to ensuring adherence to requirements for flights operating in the U.S. There are indications that other foreign operators also may be flying in the U.S. with inappropriate operations specifications, the NTSB said.

In repeating its recommendation on GPWS, the Board said these devices should be required by FAA within two years on all turbojet-powered aircraft with six or more passenger seats. After many years' urging by the NTSB, the FAA required such devices in turbine-powered aircraft with ten or more seats used in commuter operations. However, in October 1992, the FAA rejected the NTSB's further recommendation for GPWS on turbojet aircraft used in corporate and general aviation operations.

In its recommendation on oversight of foreign carriers flying into the U.S., the Board called on FAA to review operations specifications to ensure that they are current and include proper criteria for instrument

approaches. The Board said that the absence of the definitive statement that runway visual range (RVR), when available, is controlling, represented an oversight in approving the operations specifications for TAESA. RVR represents the horizontal distance a pilot will see along the runway.

The Board also asked the FAA to formally notify the Mexican authorities about the circumstances of the accident and the failure to observe aviation rules that was involved.

Charlotte, NC - USAir DC-9 Accident

Mistakes by the flight crew and a lack of real-time weather information were cited by the NTSB, on April 4, as major factors in a fatal USAir accident in Charlotte, NC last year.

The accident occurred on July 2, 1994 when USAir flight 1016 crashed after the flightcrew missed an approach to Charlotte/Douglas International Airport. Thirty-seven passengers were killed. The first officer, two flight attendants, and 14 passengers sustained serious injuries; the aircraft was destroyed by impact forces and a post-crash fire. The crash brought to an end a 27-month period in which the major U.S. scheduled airlines did not suffer a passenger fatality.

The NTSB determined that the probable causes of the accident were the crew's decision to continue an approach into severe windshear conditions, the failure to quickly recognize windshear, establish proper aircraft attitude and thrust setting to escape it, and the lack of real-time adverse weather hazard information from FAA controllers.

Contributing to the accident were the lack of air traffic procedures requiring controllers to issue airport surveillance radar weather information to the pilots, and the Charlotte tower supervisor's failure to properly advise and ensure that all controllers were aware of and reporting reduced visibility information, and low- level windshear alerts.

Also contributing, the Board said, were inadequate remedial actions by USAir to ensure adherence to standard operating procedures, and software logic in the aircraft's windshear warning system that did not provide an alert upon entry into the windshear. This combination led to an encounter with a microburst-induced windshear that was produced by a rapidly developing thunderstorm located at the approach end of the runway.

The Board stated that had the FAA's Terminal Doppler Weather Radar (TDWR) been installed at the airport as scheduled, the radar would have given controllers definitive information about the severity of the weather, and they would have been required to issue that information to the flight crew.

As a result of the investigation, the NTSB recommended to the FAA that it:

- Require weather advisories to be amended promptly to provide information about current windshear, thunderstorm or microburst development in terminal areas.

- Require the tower supervisor to notify tower and radar approach control facility personnel, the National Weather Service observer and pilots of the deterioration of prevailing visibility to less than three miles.

- Require radar and tower controllers to display the highest levels of precipitation and issue the information to flight crews.

- Review all low- level windshear alert system (LLWAS) installations to identify possible deficiencies and correct them.

- Develop standards for forward-facing, integrated child safety seats for transport category aircraft and require that all occupants, including small children, be restrained during takeoff, landing and turbulent conditions.

- Re-evaluate flight crew windshear training to incorporate additional simulator training cues and procedures for using the windshear escape maneuver.

The Board also recommended that the FAA and the National Weather Service re-evaluate their weather programs and develop procedures to immediately disseminate information about rapidly developing hazardous weather conditions to FAA airport towers and radar approach facilities.

In addition, the Board recommended that USAir:

- Conduct periodic check airman training and flight check reviews to ensure standardization and compliance with USAir's operating procedures.

- Re-emphasize in pilot training and flight checking the cues available for identifying convective activity and recognizing associated microburst windshears.

Fresno, CA - Learjet Crash

On August 1, the NTSB reported that incorrectly installed electrical wiring led to a fatal crash the previous December of a Learjet in Fresno, CA. Two civilian pilots were killed; 21 people on the ground were injured, and two apartment buildings and a number of vehicles were damaged by fire.

The Learjet 35A was operated by the Phoenix Air Group, Inc., of Cartersville, GA, under contract to the U.S. Air Force and the California Air National Guard. It was returning to base after exercises with Air National Guard F-16s when the pilot declared an emergency because of engine fire indications. The aircraft crashed, with landing gear down, on a Fresno street.

At a public meeting, the Board determined that the probable causes of the accident were:

- Improperly installed electrical wiring for special mission operations that led to an in-flight fire. The fire caused aircraft systems and structural damage and control difficulties.

- Improper maintenance and inspection procedures by the operator.

- Inadequate oversight and approval of maintenance and inspection practices by the operators in the

installation of special mission systems.

Investigators concluded that the in-flight fire most likely originated with an electrical short in the special mission power supply wires in an area unprotected by current limiters. The fire resulted in false engine fire warning indications that led the pilots to shutdown the left engine. At the time of impact, the left engine was not producing power while the right engine was producing at least flight-idle power.

Investigators also found that the mechanics who installed and inspected the modifications in the Learjet that crashed, and 14 other aircraft, did not notice that their installation did not conform with the illustrated instructions.

The investigation prompted the Board to:

- Urge the FAA to publish a Special Airworthiness Information Bulletin describing the circumstances of the accident and stressing the consequences of improper installation of special mission wiring.

- Urge Phoenix Air Group, Inc., to conduct an in-depth audit of its maintenance program to insure that all work is being done in accordance with applicable Federal Aviation Regulations, and particularly to ensure that mechanics and others involved in aircraft maintenance are consulting proper technical data when performing maintenance and inspection work.

St. Louis, MO - Runway Incursion/Collision

On August 30, the NTSB adopted a report on the runway collision (described above) in St. Louis, MO, involving a TWA MD-82 and a Cessna 441. The Board determined that the accident occurred when the pilot of the Cessna mistakenly taxied onto the wrong runway, making an undetected entry onto an active runway at night.

The Board found that contributing to the accident was the lack of Automated Terminal Information Service (ATIS) and other air traffic control information. The installation and utilization of Airport Surface Detection Equipment (ASDE-3), and particularly ASDE-3 enhanced with Airport Movement Area Safety System (AMASS) could have prevented the accident.

As a result of the investigation, the Board made the following recommendations to the FAA:

- Revise Federal Aviation Regulations to require pilots to illuminate all taxi, landing and logo lights, or otherwise enhance the prominence of their aircraft when operating on an active runway (including runway crossing and position-and-hold operations).

- Examine the feasibility of requiring pilots to use aircraft anti-collision/strobe lights when holding in position on active runways.

- Require air traffic control personnel to make every possible effort to use as few frequencies as possible when positions are combined, and to provide notice of such on the ATIS where applicable.

- Require flight instructors to stress airport surface operations, including airport markings, signs and lighting; situational awareness; clearance readbacks; and proper phraseology during initial training and biennial flight reviews.

- Require that initial and recurrent air carrier pilot training programs include training in airport surface movement operations, and familiarization with airport markings, signs and lighting.

- Continue research and development efforts to provide airports that are not scheduled to receive ASDE equipment with an alternate, cost-effective system, such as ground induction loop, to bring controller and pilot attention to pending runway incursions in time to prevent ground collisions.

- Facilitate and encourage industry and airports to develop, publish and implement procedures such as automated flight clearances and standard taxi routes to reduce radio frequency congestion during ground operations.

Kansas City, MO - Cargo Aircraft Crash

On August 30, the NTSB reported that the pilot's loss of control while attempting to take-off with one inoperative engine, and inadequate flight crew training, led to the fatal crash of a DC-8 cargo plane on February 16, 1995.

All three crew members were killed when the empty cargo jet, scheduled to fly to Massachusetts to repair one of its four engines, crashed during a second takeoff attempt from Kansas City International Airport. The crew was attempting a "three-engine ferry flight" with the left outboard engine inoperative.

The NTSB report noted the pilot's loss of directional control during the take off roll and his decision to continue the takeoff and lift the nose before the aircraft had reached correct takeoff speed. This resulted in a premature takeoff, a loss of aerodynamic control and a collision with the ground.

Also cited were: the flightcrew's lack of understanding of three-engine takeoff procedures and their decision to modify the procedures; the failure of the operating company, Air Transport International (ATI), to ensure that the crew had adequate experience, training and rest; and inadequate FAA flight and duty time regulations.

As a result of the investigation, the Board urged the FAA to:

- Review the air carrier oversight programs of its local flight standards district offices and improve communications between principal operations inspectors and FAA inspectors in other geographic areas who assist in air carrier oversight.

- Evaluate FAA's surveillance programs to ensure that budget and personnel resources are sufficient and used effectively to maintain adequate oversight of the operation and maintenance of both passenger and cargo carriers, regardless of size.

- Require aircraft manufacturers to revise one-engine inoperative takeoff procedures to provide adequate rudder availability for correcting directional deviations during takeoff roll. Also require them to provide performance figures and runway requirements compatible with achieving maximum asymmetrical thrust at an appropriate speed greater than ground minimum control speed.

The NTSB also recommended that ATI:

- Review its DC-8 operating manuals to make sure three-engine procedures are understandable to all pilots and emphasize proper throttle application techniques.

- Discontinue the company policy of routinely assigning line flight crews for three-engine ferry operations, and allow only specifically designated, highly experienced crew members to perform these operations.

Morrisville, NC - Commuter Airline Crash

The NTSB determined, on October 24, that the probable causes of the crash of a Jetstream 3201 commuter aircraft on December 13, 1994 were the captain's incorrect assumption that an engine had failed and his subsequent failure to follow approved procedures for engine failure, single-engine approach and go-around,

and stall recovery. The Flagship Airlines/American Eagle flight, with 20 persons on board, went down while making an instrument landing approach to Raleigh-Durham International Airport. There were 15 fatalities; the aircraft was destroyed by impact and fire.

Cited as a contributing factor by the Board was the failure of the airline's management to identify, document, monitor, and remedy deficiencies in pilot performance and training.

As a result of the investigation, the Board made a series of recommendations to the FAA to improve training in engine failure identification and response, and the assessment and monitoring of pilot performance.

Significant Aviation Reports Adopted In 1995

Date Adopted	Location	Carrier/ Aircraft Type	Fatalities
2/14/95	New York, NY	Continental/ MD-82	0
3/7/95	Chantilly, VA	TAESA/ Learjet 25D	12
4/4/95	Charlotte, NC	USAir/DC-9	37
8/1/95	Fresno, CA	Phoenix Air/ Learjet 35A	2
8/30/95	St. Louis, MO	TWA/MD-82 Superior Aviation/ Cessna 441	2
8/30/95	Kansas City, MO	Air Transport Intl/DC-8	3
10/24/95	Morrisville, NC	Flagship Airlines/ Jetstream 3201	15

SPECIAL INVESTIGATION- AIR TOUR INDUSTRY

On June 1, the NTSB called on the FAA to take steps to improve the safety of the air tour industry. The Board said that a national standard should be created by the end of the year for all air tour operators, who should be required to comply with the same or equivalent level of safety regulations now applicable to commuter airlines.

The Board issued the recommendations after collecting evidence from a special investigation initiated in July 1994 after two sight-seeing accidents occurred on the same day in Hawaii. In each, helicopters made forced landings into the surf in remote areas, killing three people and seriously injuring one.

The Board maintained that helicopter air tour companies providing sightseeing operations over water in Hawaii should be required to provide life preservers for all occupants aboard. It also found that there were problems with the activation of flotation equipment in some helicopter models.

Long concerned about air tour accidents, the Board investigated 139 accidents or incidents that occurred between October 1, 1988 and April 1, 1995, involving 117 fatalities, 86 serious injuries and 135 lesser injuries.

The Board recommended that a national standard for air tour operations should contain definitions and requirements specific to the industry. The NTSB also noted that the lack of a national data base for air tour operations precluded effective evaluation of the accident rate of air tour operators on the traditional bases of flight hours, cycles, and passengers carried.

GENERAL AVIATION INVESTIGATIONS IN 1995

In 1995, the NTSB's regional and field offices initiated 2,084 general aviation accident investigations. Although these investigations generally do not have the high visibility of those involving major air carriers, they are an important source of transportation safety information. In addition, the NTSB regional offices investigated 55 aviation incidents in 1995. Incidents are occurrences not serious enough to be considered accidents but incident investigations often can lead to significant safety improvements.

Analysts located in the Board's Washington headquarters are responsible for reviewing the standardized accident reports prepared by the regional investigators for the public record. Computer "brief" reports containing relevant facts, findings, and probable cause(s) are prepared on all field and limited investigations, and summary narrative reports are prepared on selected cases. The data from all investigations is maintained to identify trends, assess program effectiveness, provide statistical support for NTSB studies, safety recommendations, and other related purposes.

Table 1. Accidents, Fatalities, and Rates, 1995 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	33	2	166	160	12,648,000	8,220,000	0.261	0.016	0.401	0.024
Nonscheduled	6	2	38	8	861,000	447,000	0.232	0.116	0.447	0.224
U.S. Air Carriers Operating Under 14 CFR 135										
Scheduled	12	2	9	9	2,580,000	3,506,000	0.465	0.078	0.342	0.057
Nonscheduled	76	24	52	52	2,000,000	n/a	3.80	1.20	n/a	n/a
U.S. General Aviation	2,066	408	732	725	20,000,000	n/a	10.33	2.04	n/a	n/a
U.S. Civil Aviation	2,188	437	961	948						
Other Accidents In The U.S.										
Foreign Registerd Aircraft	10	1	1	1						
Unregistered Aircraft	8	5	7	7						
U.S. Registered Aircraft Operated Abroad By Foreign Air Carriers	5	3	71	71						

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.

Table 2. Accidents and Accident Rates by NTSB Classification, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121

	Accidents				Aircraft Hours Flown	Accidents per Million Hours Flown			
Year	Major	Serious	Injury	Damage	(millions)	Major	Serious	Injury	Damage
1982	3	4	6	5	7.040	0.426	0.568	0.852	0.710
1983	4	2	9	8	7.299	0.548	0.274	1.233	1.096
1984	2	2	7	5	8.165	0.245	0.245	0.857	0.612
1985	8	2	5	6	8.710	0.918	0.230	0.574	0.689
1986	4	0	14	6	9.976	0.401	0.000	1.403	0.601
1987	5	1	12	16	10.645	0.470	0.094	1.127	1.503
1988	4	2	13	10	11.141	0.359	0.180	1.167	0.898
1989	8	4	6	10	11.275	0.710	0.355	0.532	0.887
1990	4	3	10	7	12.150	0.329	0.247	0.823	0.576
1991	5	2	10	9	11.781	0.424	0.170	0.849	0.764
1992	3	3	10	2	12.360	0.243	0.243	0.809	0.162
1993	1	2	12	8	12.706	0.079	0.157	0.944	0.630
1994	4	0	12	7	13.122	0.305	0.000	0.914	0.533
1995	3	2	14	17	13.513	0.222	0.148	1.036	1.258

Definitions of NTSB Classifications

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

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

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

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

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

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

Table 3. Passenger Injuries and Injury Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121

Year	Passenger Fatalities	Passenger Serious Injuries	Total Passenger Enplanements (millions)	Million Passenger Enplanements per Passenger Fatality
1982	210	17	299	1.4
1983	8	8	325	40.6
1984	1	6	352	352.0
1985	486	20	390	0.8
1986	4	23	426	106.5
1987	213	39	456	2.1
1988	255	44	464	1.8
1989	259	55	464	1.8
1990	8	23	475	59.4
1991	40	19	461	11.5
1992	26	14	485	18.7
1993	0	7	500	No Fatalities
1994	228	16	541	2.4
1995	152	15	560	3.7

Note Injuries exclude flight crew and cabin crew.

Table 4. Number and Rate of Destroyed Aircraft, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121

Year	Hull Losses	Aircraft Hours Flown (millions)	Hull Losses per Million Aircraft Hours Flown
1982	3	7.040	0.426
1983	2	7.299	0.274
1984	2	8.165	0.245
1985	8	8.710	0.918
1986	2	9.976	0.200
1987	5	10.645	0.470
1988	3	11.141	0.269
1989	7	11.275	0.621
1990	3	12.150	0.247
1991	5	11.781	0.424
1992	3	12.360	0.243
1993	1	12.706	0.079
1994	3	13.122	0.229
1995	3	13.513	0.222

Table 5. Accidents, Fatalities, and Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121, Scheduled and Nonscheduled Service (Airlines)

	Accidents		Fatalities					Accidents per 100,000 Flight Hours		Accidents per 1,000,000 Miles Flown		Accidents per 100,000 Departures	
Year	All	Fatal	Total	Aboard	Flight Hours	Miles Flown	Departures	All	Fatal	All	Fatal	All	Fatal
1982	18	5	235	223	7,040,325	2,938,513,000	5,351,133	0.241	0.057	0.0058	0.0014	0.318	0.075
1983	23	4	15	14	7,298,799	3,069,318,000	5,444,374	0.315	0.055	0.0075	0.0013	0.422	0.073
1984	16	1	4	4	8,165,124	3,428,063,000	5,898,852	0.196	0.012	0.0047	0.0003	0.271	0.017
1985	21	7	526	525	8,709,894	3,631,017,000	6,306,759	0.241	0.080	0.0058	0.0019	0.333	0.111
1986	24	3	8	7	9,976,104	4,017,626,000	7,202,027	0.231	0.020	0.0057	0.0005	0.319	0.028
1987	34	5	232	230	10,645,192	4,360,521,000	7,601,373	0.310	0.038	0.0076	0.0009	0.434	0.053
1988	29	3	285	274	11,140,548	4,503,426,000	7,716,061	0.251	0.018	0.0062	0.0004	0.363	0.026
1989	28	11	278	276	11,274,543	4,605,083,000	7,645,494	0.248	0.098	0.0061	0.0024	0.366	0.144
1990	24	6	39	12	12,150,116	4,947,832,000	8,092,306	0.198	0.049	0.0049	0.0012	0.297	0.074
1991	26	4	62	49	11,780,610	4,824,824,000	7,814,875	0.221	0.034	0.0054	0.0008	0.333	0.051
1992	18	4	33	31	12,359,715	5,054,916,000	7,880,707	0.146	0.032	0.0036	0.0008	0.228	0.051
1993	23	1	1	0	12,706,206	5,249,469,000	8,074,393	0.181	0.008	0.0044	0.0002	0.285	0.012
1994	23	4	239	237	13,122,221	5,478,118,000	8,242,903	0.168	0.030	0.0040	0.0007	0.267	0.049
1995	36	3	168	162	13,513,219	5,648,512,000	8,451,606	0.266	0.022	0.0064	0.0005	0.426	0.035

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

The 62 total fatalities in 1991 includes the 12 persons killed aboard a Skywest commuter aircraft and the 22 persons killed aboard the USAir airliner when the two aircraft collided.

The following suicide/sabotage cases are included in "Accidents" and "Fatalities" but are excluded from accident rates in this table.

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

Table 6. Accidents, Fatalities, and Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121, Scheduled Service (Airlines)

	Accidents		Fatalities					Accidents per 100,000 Flight Hours		Accidents per 1,000,000 Miles Flown		Accidents per 100,000 Departures	
Year	All	Fatal	Total	Aboard	Flight Hours	Miles Flown	Departures	All	Fatal	All	Fatal	All	Fatal
1982	16	4	234	222	6,697,770	2,806,885,000	5,162,346	0.224	0.045	0.0053	0.0011	0.291	0.058
1983	22	4	15	14	6,914,969	2,920,909,000	5,235,262	0.318	0.058	0.0075	0.0014	0.420	0.076
1984	13	1	4	4	7,736,037	3,258,910,000	5,666,076	0.168	0.013	0.0040	0.0003	0.229	0.018
1985	17	4	197	196	8,265,332	3,452,753,000	6,068,893	0.206	0.048	0.0049	0.0012	0.280	0.066
1986	21	2	5	4	9,495,158	3,829,129,000	6,928,103	0.211	0.011	0.0052	0.0003	0.289	0.014
1987	32	4	231	229	10,115,407	4,125,874,000	7,293,025	0.306	0.030	0.0075	0.0007	0.425	0.041
1988	28	3	285	274	10,521,052	4,260,785,000	7,347,575	0.257	0.019	0.0063	0.0005	0.367	0.027
1989	24	8	131	130	10,597,922	4,337,234,000	7,267,341	0.226	0.075	0.0055	0.0018	0.330	0.110
1990	22	6	39	12	11,524,726	4,689,287,000	7,795,761	0.191	0.052	0.0047	0.0013	0.282	0.077
1991	25	4	62	49	11,139,166	4,558,537,000	7,503,873	0.224	0.036	0.0055	0.0009	0.333	0.053
1992	16	4	33	31	11,732,026	4,782,825,000	7,515,373	0.136	0.034	0.0033	0.0008	0.213	0.053
1993	22	1	1	0	11,981,347	4,936,067,000	7,721,975	0.184	0.008	0.0045	0.0002	0.285	0.013
1994	19	4	239	237	12,292,356	5,112,633,000	7,824,802	0.146	0.033	0.0035	0.0008	0.230	0.051
1995	34	2	166	160	12,770,405	5,326,266,000	8,102,491	0.266	0.016	0.0064	0.0004	0.420	0.025

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

The 62 total fatalities in 1991 includes the 12 persons killed aboard a Skywest commuter aircraft and the 22 persons killed aboard the USAir airliner when the two aircraft collided.

The following suicide/sabotage cases are included in "Accidents" and "Fatalities" but are excluded from accident rates in this table.

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

Table 7. Accidents, Fatalities, and Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 121, Nonscheduled Service (Airlines)

	Accidents		Fatalities					Accidents per 100,000 Flight Hours		Accidents per 1,000,000 Miles Flown		Accidents per 100,000 Departures	
Year	All	Fatal	Total	Aboard	Flight Hours	Miles Flown	Departures	All	Fatal	All	Fatal	All	Fatal
1982	2	1	1	1	342,555	131,628,000	188,787	0.584	0.292	0.0152	0.0076	1.059	0.530
1983	1	0	0	0	383,830	148,409,000	209,112	0.261	-	0.0067	-	0.478	-
1984	3	0	0	0	429,087	169,153,000	232,776	0.699	-	0.0177	-	1.289	-
1985	4	3	329	329	444,562	178,264,000	237,866	0.900	0.675	0.0224	0.0168	1.682	1.261
1986	3	1	3	3	480,946	188,497,000	273,924	0.624	0.208	0.0159	0.0053	1.095	0.365
1987	2	1	1	1	529,785	234,647,000	308,348	0.378	0.189	0.0085	0.0043	0.649	0.324
1988	1	0	0	0	619,496	242,641,000	368,486	0.161	-	0.0041	-	0.271	-
1989	4	3	147	146	676,621	267,849,000	378,153	0.591	0.443	0.0149	0.0112	1.058	0.793
1990	2	0	0	0	625,390	258,545,000	296,545	0.320	-	0.0077	-	0.674	-
1991	1	0	0	0	641,444	266,287,000	311,002	0.156	-	0.0038	-	0.322	-
1992	2	0	0	0	627,689	272,091,000	365,334	0.319	-	0.0074	-	0.547	-
1993	1	0	0	0	724,859	313,402,000	352,418	0.138	-	0.0032	-	0.284	-
1994	4	0	0	0	829,865	365,485,000	418,101	0.482	-	0.0109	-	0.957	-
1995	2	1	2	2	742,814	322,246,000	349,115	0.269	0.135	0.0062	0.0031	0.573	0.286

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

Table 8. Accidents, Fatalities, and Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 135, Scheduled Service (Commuter Air Carriers)

	Accidents		Fatalities					Accidents per 100,000 Flight Hours		Accidents per 1,000,000 Miles Flown		Accidents per 100,000 Departures	
Year	All	Fatal	Total	Aboard	Flight Hours	Miles Flown	Departures	All	Fatal	All	Fatal	All	Fatal
1982	26	5	14	14	1,299,748	222,355,000	2,026,691	2.000	0.385	0.1169	0.0225	1.283	0.247
1983	17	2	11	10	1,510,908	253,572,000	2,328,430	1.125	0.132	0.0670	0.0079	0.730	0.086
1984	22	7	48	46	1,745,762	291,460,000	2,676,590	1.260	0.401	0.0755	0.0240	0.822	0.262
1985	21	7	37	36	1,737,106	300,817,000	2,561,463	1.209	0.403	0.0698	0.0233	0.820	0.273
1986	15	2	4	4	1,724,586	307,393,000	2,798,811	0.870	0.116	0.0488	0.0065	0.536	0.071
1987	33	10	59	57	1,946,349	350,879,000	2,809,918	1.695	0.514	0.0940	0.0285	1.174	0.356
1988	19	2	21	21	2,092,689	380,237,000	2,909,005	0.908	0.096	0.0500	0.0053	0.653	0.069
1989	19	5	31	31	2,240,555	393,619,000	2,818,520	0.848	0.223	0.0483	0.0127	0.674	0.177
1990	16	4	7	5	2,341,760	450,133,000	3,160,089	0.683	0.171	0.0355	0.0089	0.506	0.127
1991	22	8	99	77	2,291,693	433,900,000	2,820,440	0.960	0.349	0.0507	0.0184	0.780	0.284
1992	23	7	21	21	2,363,745	508,242,000	3,114,932	0.931	0.296	0.0433	0.0138	0.706	0.225
1993	16	4	24	23	2,641,268	554,963,000	3,601,902	0.606	0.151	0.0288	0.0072	0.444	0.111
1994	10	3	25	25	2,787,904	594,716,000	3,850,372	0.359	0.108	0.0168	0.0050	0.260	0.078
1995	11	2	9	9	2,478,872	565,577,000	3,216,900	0.444	0.081	0.0194	0.0035	0.342	0.062

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

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

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

Table 9. Accidents, Fatalities, and Rates, 1982 through 1995, for U.S. Air Carriers Operating Under 14 CFR 135, Nonscheduled Service (On-demand Air Taxis)

	Accidents		Fatalities			Accidents per 100,000 Flight Hours	
Year	All	Fatal	Total	Aboard	Flight Hours	All	Fatal
1982	132	31	72	72	3,008,000	4.39	1.03
1983	141	27	62	57	2,378,000	5.93	1.14
1984	146	23	52	52	2,843,000	5.14	0.81
1985	154	35	76	75	2,570,000	5.99	1.36
1986	117	31	65	61	2,690,000	4.35	1.15
1987	96	30	65	63	2,657,000	3.61	1.13
1988	101	28	59	55	2,632,000	3.84	1.06
1989	110	25	83	81	3,020,000	3.64	0.83
1990	106	28	50	48	2,249,000	4.71	1.24
1991	87	27	70	66	2,241,000	3.88	1.20
1992	76	24	68	65	2,009,000	3.78	1.19
1993	69	19	42	42	1,809,000	3.81	1.05
1994	85	26	63	62	1,993,000	4.26	1.30
1995	75	24	52	52	1,910,000	3.93	1.26

Hours are estimated by the Federal Aviation Administration (FAA).

Table 10. Accidents, Fatalities, and Rates, 1982 through 1995, U.S. General Aviation

	Accidents		Fatalities			Accidents per 100,000 Flight Hours	
Year	All	Fatal	Total	Aboard	Flight Hours	All	Fatal
1982	3,233	591	1,187	1,170	29,640,000	10.90	1.99
1983	3,078	556	1,069	1,062	28,673,000	10.73	1.94
1984	3,017	545	1,042	1,021	29,099,000	10.36	1.87
1985	2,739	498	955	944	28,322,000	9.66	1.75
1986	2,582	474	967	878	27,073,000	9.54	1.75
1987	2,495	447	838	823	26,972,000	9.25	1.65
1988	2,385	460	800	792	27,446,000	8.69	1.68
1989	2,232	431	768	765	27,920,000	7.98	1.53
1990	2,215	442	766	761	28,510,000	7.77	1.55
1991	2,175	432	786	772	27,226,000	7.98	1.58
1992	2,073	446	857	855	23,792,000	8.71	1.87
1993	2,039	398	736	732	22,531,000	9.05	1.76
1994	1,994	404	730	723	21,873,000	9.11	1.84
1995	2,054	411	733	726	23,538,000	8.72	1.74

Hours are estimated by the Federal Aviation Administration.

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

Effective in April, 1995 the NTSB is required by law to investigate all public use accidents. The effect upon the number of general aviation accidents is an increase of approximately 1 1/2 percent.

SURFACE TRANSPORTATION SAFETY

OFFICE OF SURFACE TRANSPORATION SAFETY

The NTSB investigates selected surface transportation accidents and incidents. The Board's Office of Surface Transportation Safety manages these investigations when multi-disciplinary "Go Teams" are sent to an accident site, while smaller-scale accidents are usually investigated by one person or a partial team from one of the Board's seven regional surface transportation offices.

The Surface Transportation office contains five investigative divisions: Highway, Railroad, Marine, Pipeline and Hazardous Materials, and Human Factors. These divisions provide the Investigators-In-Charge for the teams that conduct the investigations and also coordinate the preparation of the Board's comprehensive surface transportation accident reports.

When the Board is notified of an accident, the team that is launched varies in size depending on the severity and complexity of the accident. As with aviation accidents investigated by the NTSB, the teams consist of experts in various technical specialties, including vehicle factors, hazardous materials analysis, operational and environmental factors, systems design and support, human performance, and survival factors. Each expert manages a team of specialists from industry and other government entities in collecting of the facts and determining the circumstances surrounding the accident.

A hearing may be conducted (or depositions taken) to gather additional information in connection with an investigation. After the investigation is concluded, a detailed narrative report that analyzes the investigation record and identifies the probable cause(s) of the accident is prepared. A major surface

accident investigation often takes from six months to a year to complete.

Safety recommendations resulting from the investigations are generally included in the final report. However, safety recommendations may be issued at any time during the course of an investigation if warranted by events. The Surface Transportation office also is responsible for follow-up with safety recommendation recipients, once an agency or organization has responded to particular recommendations.

HIGHWAY DIVISION

The NTSB investigates highway accidents, including railroad grade crossing accidents, that it selects in cooperation with the state authorities. The Board seeks to concentrate it's limited highway investigation resources on accidents that have a significant impact on the public's confidence in highway safety, that generate high public interest, or that concern technical safety issues that cause or contribute to accidents or injuries on a national scale. In-depth investigations, therefore, tend to focus on accidents involving multiple fatalities or substantial property damage. The Board also undertakes investigations related to specific highway emphasis areas such as school buses or highway bridges; others are designed to focus on a pre-determined subject selected in support of a safety study or special investigation.

HIGHWAY INVESTIGATIONS IN 1995

The NTSB investigated 100 highway accidents in 1995, including two major investigations, and completed one safety study with the Office of Research and Engineering. Issues involved in the investigations ranged from driver fatigue to collision warning technologies. Among the investigations initiated in 1995 were the following significant cases:

Sycamore, SC - Passive Grade Crossing Accident

On May 2, an AMTRAK passenger train derailed near Sycamore, SC after colliding at a grade crossing with a tractor-semitrailer. The Silver Star, carrying 279 passengers from New York to Tampa, struck a "lowbed" tractor- semitrailer that had been lodged for about 30 minutes on the high-vertical-profile (hump) passive grade crossing. The two locomotive units and 14 cars of the 16-car train derailed. Thirty-three persons sustained minor injuries. The combined damage to the train and truck exceeded $1 million.

Fox River Grove, IL - School Bus/Commuter Train Collision

On October 25, a school bus transporting 35 high school students was struck by a METRA express commuter train in Fox River Grove, IL. The train, consisting of a locomotive and 7 bi-level passenger cars, was traveling toward Chicago at approximately 70 mph, the authorized track speed. The bus was stopped at an intersection, with the rear of the vehicle extending onto the railroad track as the driver waited for a green signal to proceed. The school bus at 38 feet 4 inches was longer than the space available between the railroad track and the highway stop line. Seven students were fatally injured; the others on the bus received minor to critical injuries.

HIGHWAY REPORTS ADOPTED IN 1995

Intercession City, FL - Passenger Train/Special Vehicle Collision.

On May 16, the NTSB reported that a failure to coordinate fully the roadway routing of a special vehicle carrying an 82-ton turbine generator resulted in a rail crossing collision with a passenger train, injuring 59 persons and causing damage exceeding $14 million.

The accident occurred on November 30, 1993 when the special vehicle transporting the generator stopped on the railroad tracks to make a needed road clearance adjustment. Preparations for raising the vehicle's cargo deck had been completed when the train arrived traveling at 79 mph. Despite emergency braking, the train collided broadside with the vehicle and turbine, derailed, and came to rest close to high-pressure petroleum product pipelines buried parallel to the tracks.

The trucking firm originated the load in the Port of Tampa and had notified the railroad of intended rail crossing locations in the Tampa area. However, the company failed to include the accident location because the crossing was on a private approach road to the Kissimmee Utility Authority's Cane Island Project, a new electric plant.

As a result of its investigation, the Board issued recommendations to the trucking industry and governmental authorities for review and improvement of the procedures for issuing permits

for oversized loads, and for routing and escorting low clearance vehicles across rail lines.

The Board also found that there was little or no communication when the accident occurred and during the cleanup afterwards between the railroad and the Central Florida Pipeline Corporation, operator of the pipeline alongside the tracks. Further, the Osceola County personnel responding to the emergency failed to determine and assess the risks posed by potentially hazardous pipelines at the accident site. The Board called for the development of new or improved joint plans for responding to emergencies.

White Plains, NY - Propane Tank Truck Crash

The NTSB reported on November 14 that driver fatigue and inadequate supervision by the company management led to the fiery crash of a propane tank truck on Interstate 287 in White Plains, NY.

The accident, which occurred in July 1994, involved a cargo-tank semitrailer loaded with 9,200 gallons of propane, owned by the Paraco Gas Corporation of Purchase, NY. The vehicle crashed into a bridge column, propelling the tanker into a house across the road and releasing propane, which then ignited. The driver of the truck was killed; 23 others were injured and several houses were damaged.

The Board determined that the probable cause of the accident was the reduction in alertness of the driver caused by his failure to properly schedule and obtain rest, and the failure of the Paraco's management to exercise adequate oversight over the driver's hours of service.

The Board concluded that the company's policy of paying by the load instead of by the hour appeared to encourage drivers to violate hours-of-service regulations. It said the driver might have rested before trying to complete his last run had he been trained in understanding the effects on job performance of insufficient sleep and irregular rest schedules. The Board called on the company to ensure that its drivers followed hours-of-service rules. It urged the trucking industry to improve training on the problems of working while fatigued.

The Board noted that a contributing factor to the accident was the design of the highway and guard rails, and called for modernized, higher barriers to improve truck safety. The Board also recommended the construction of stronger tank trucks to standards similar to the strengthened crashworthiness requirements for rail tankers.

Menifee, AR - Chain Collision in Fog Conditions

On December 4, the NTSB, expressing concern about recurring highway collisions in fog and other limited-visibility conditions, called for the use of modern collision warning technology as a means of preventing such vehicle accidents and the resulting loss of lives.

The Board issued the recommendation after investigation of a collision involving eight tractor-trailers and a light duty cargo van, on Interstate 40 near Menifee, AR, which killed five persons. The accident was caused by drivers entering an area of fog conditions at speeds too high to avoid hitting slower or stopped vehicles.

The Board's report noted that collision warning systems have the potential for avoiding or reducing the severity of low-awareness condition collisions due to fog, snow, rain or darkness, and accidents caused by fatigued or distracted drivers. The Board said that government and industry should jointly undertake fleet testing of collision warning technology through partnership programs and incorporate the results in training and educational efforts.

The Board also recommended establishing uniformity in the use of four-way hazard flashers, including the high-mounted brake light. Also suggested was equipping citizen band radios with an emergency channel override to enhance their contribution to highway safety.

Significant Highway Investigations In 1995

Accident Date	Location	Accident Type	Fatalities
5/2/95	Sycamore, SC	Grade Crossing Collision	0
10/25/95	Fox River Grove, IL	School Bus/ Train Collision	7

Major Highway Reports Adopted In 1995

Date Adopted	Location	Accident Type	Fatalities
5/16/95	Intercession City, FL	Special Vehicle/ Train Collision	0
11/14/95	White Plains, NY	Propane Tanker Accident	1
12/4/95	Menifee, AR	Chain Collision/ Fog Conditions	5

Enforcing Seat Belt Laws

On July 12, the NTSB recommended that state governments adopt stricter methods of enforcing seat belt laws and to consider tougher penalties for drivers and passengers who do not wear them.

In a recommendation sent to 41 states and the District of Columbia, the Board stressed the need for "primary enforcement" of seat belt laws. Primary enforcement means that a vehicle can be stopped solely for a safety belt violation. Of the 48 states that have seat belt laws, nine have provisions for primary enforcement. In 39 states, the law is a "secondary" enforcement measure i.e., a motorist can be cited for a seat belt violation only if already stopped for another infraction.

The NTSB also recommended that states consider increasing fines and imposing penalty points to increase the number of people who use seat belts. The Board stated that seat belt laws, stiffer penalties for non-users and vigorous enforcement save lives and reduce health care costs, and noted that states with primary enforcement laws average 13 percent higher seat belt use than states that practice only secondary enforcement.

Improving State Traffic Laws

On December 12, NTSB Chairman Hall, joined by NHTSA Administrator Ricardo Martinez, issued an urgent call for improved state traffic laws. In light of recent legislation removing state mandates on speed limits and motorcycle helmet laws, and in the high-risk season for alcohol and other drug-impaired driving, the two agency heads stressed the need for action at the state level to enact laws that have proven life-saving ability. These include, and

the NTSB has recommended adoption of:

- Administrative license revocation laws allowing police officers to confiscate the licenses of drivers who fail or refuse to take an alcohol test.

- Zero tolerance laws, usually 0.00 or 0.02 blood alcohol content (BAC) for drivers under age 21 (for whom alcohol consumption is illegal).

- Graduated drivers license laws to better train young drivers and require them to "earn" full licensure by being accident and violation free.

Currently, 38 states and the District of Columbia have administrative license revocation laws; 28 states and the District of Columbia have some form of zero tolerance law for young drivers; 14 states have a 0.08 percent BAC law; and 12 states have some components of graduated drivers license laws.

MARINE DIVISION

The NTSB has the authority to investigate marine accidents that meet specified criteria. These accidents may involve foreign vessels in U.S. waters or U.S. vessels anywhere in the world. In past years, the Board has conducted marine accident investigations as far away as the Persian Gulf and the South China Sea.

The marine accident investigation function is performed entirely from NTSB headquarters;

there are no marine field offices or marine personnel assigned to any of the Board's modal field offices. To carry out its marine investigation program, the Board maintains a small staff of professional investigators with marine industry and/or U.S. Navy or U.S. Coast Guard experience. These investigators include licensed master mariners, marine engineers and naval architects who possess a wealth of hands-on maritime experience.

During an average year, about 4,000 marine accidents involving commercial vessels and more than 6,500 accidents involving recreational boats occur in the United States. Those accidents that appear to meet specified criteria are reported by the Coast Guard to the NTSB. The Board then makes a decision as to whether the severity of the accident, the level of public interest, and the safety issues involved require an NTSB investigation. Given the small size of the NTSB marine staff, the Board tries to target only those accidents that appear to involve the most significant safety issues. The Board does have the option of requesting that the Coast Guard investigate an accident without NTSB participation. In such cases, the Coast Guard will send the accident file to the Board when the investigation is completed.

If the Board decides to investigate a marine accident, then it must coordinate with the Coast Guard on whether the investigation will be conducted jointly under Coast Guard rules, or independently under NTSB rules. Procedures for conducting the investigation are outlined in the joint regulations contained in the Code of Federal Regulations.

During an average year, the NTSB will investigate about 10 marine accidents. Of these, approximately half will be conducted jointly with the Coast Guard and the remainder independently. In 1995, the Board investigated 13 marine accidents, one of which

was handled in collaboration with the Coast Guard.

As in the other transportation modes, the Board also undertakes safety studies involving specific marine safety issues. These studies may be based on previous NTSB investigations, or analytical reviews of accident trends, marine regulations, practices, procedures and standards. Typically, marine safety studies result in the issuance of safety recommendations to federal and state agencies, and the maritime industry and associations.

MARINE INVESTIGATIONS AND REPORTS IN 1995

Major marine investigations and reports adopted in 1995 included the following significant cases:

Seward, AK - Fishing Vessel Fire

On May 27, the NTSB initiated an investigation of a fire aboard the U.S. fish processing vessel ALASKA SPIRIT, which burned while moored alongside a dock in Seward, AK. The ship's master died in the accident; damage to the vessel was estimated at $3 million. The ship, which usually had a crew of 48, was undergoing repairs when the fire occurred. Only eight crew members were aboard at the time.

The Board's investigation focused on the adequacy of fire safety conditions and practices on the vessel and, more broadly, fire safety standards for commercial fishing vessels.

Southwest Pass, LA - Ship Collision

On July 5, the NTSB reported that the probable cause of the collision between the passenger vessel NOORDAM and the bulk carrier MOUNT YMITOS was the failure of the NOORDAM's crew to maintain a proper lookout, either by sight or by radar. Contributing to the accident was the MOUNT YMITOS master's failure to communicate with the NOORDAM until a collision was unavoidable.

The two vessels collided on November 6, 1993 in international waters 3.9 miles south of the entrance to the Mississippi River near Southwest Pass, LA. The NOORDAM, carrying 1,730 passengers and crew was preparing to embark a bar pilot and proceed upriver to the Port of New Orleans. The MOUNT YMITOS was outbound from the Mississippi River and was heading for open sea. Nine crew members from the NOORDAM sustained minor injuries. No one on the MOUNT YMITOS was injured, and no deaths resulted from this accident. Damage to both vessels, however, was substantial.

As a result of the investigation, the Board made remedial recommendations to the U.S. Coast Guard, the International Chamber of Shipping, the International Council of Cruise Lines, and Holland America Line Westours Inc.

Bering Sea - Fish Processing Vessel Fire

On July 11, the NTSB cited highly flammable insulating material and poor crew training as factors that led to a fatal fire that destroyed a fish processing vessel in the Bering Sea.

The fire occurred on July 24, 1994 while the U.S. fish processing vessel ALL ALASKAN was operating near Unimak Island in the Aleutian chain. The fire burned out of control for several days. One crewman died and two others were injured. There were 133 persons aboard the vessel; damages were estimated at over $25 million.

At a public meeting in Washington, D.C., the Board determined that the probable cause of the fire was the failure to isolate electrically-energized heat tape, used to keep pipes from freezing, from highly combustible polyurethane insulation, and the lack of heat tape standards for fish processing vessels.

The Board issued a series of recommendations regarding fire protection and construction standards for fish processing vessels, heat tape installation, and firefighting training and fire watch procedures for crewmembers.

San Francisco - Dinner Cruise Vessel Fire

On November 14, The NTSB determined that the probable cause of a fire aboard the small passenger vessel ARGO COMMODORE was a short circuit in the electrical starting system for the starboard propulsion engine. The fire occurred on December 3, 1994 while the vessel was on a dinner cruise in San Francisco Bay. There were no deaths or injuries among the crew of four and 41 passengers, who were rescued by a Coast Guard vessel and a passing yacht. The blaze was extinguished after about three hours; damages was estimated at $150,000.

The Board further reported that a contributing factor was the failure of the cruise line to

diagnose and correct recurring problems in the starboard engine starting system. Contributing to the severity of the fire was the master's failure to follow proper firefighting procedures.

NTSB safety recommendations focused on management oversight of vessel repairs, the design and installation of firefighting systems on small passenger vessels, and fire emergency procedures.

St. Croix, V.I. - Tankship Engineroom Fire

On October 8, 1994, the Liberian tankship SEAL ISLAND was moored at the Hess Oil refinery in St. Croix, U.S. Virgin Islands when a fire erupted in the engineroom while engineering personnel were servicing the ship's service turbo generator. The fire, which started when lubricating oil sprayed onto the hot turbine casing, burned for six hours before it was extinguished. Three crewmembers were killed and six others seriously injured. The vessel was declared "no longer a useful carrier" and was sold as scrap material.

The Board's investigation report, adopted December 12, cited the chief engineer's failure to recognize the risks introduced by the temporary repair to the engine room oil strainer. Contributing to the loss of life were the suddenness and severity of the fire, the inability of the crew to use the control room emergency escape hatch, and the lack of fire and escape drills conducted in the vessel engineroom.

Safety recommendations in this case were made to the U.S. Coast Guard, the Governor of the U.S. Virgin Islands, Hess Oil Virgin Islands Corporation, and the National Petroleum Industries Association.

Major Marine Reports Adopted In 1995

Date Adopted	Location	Vessel	Accident Type	Fatalities
7/5/95	Southwest Pass, LA	Noordam/ Mt. Ymitos	Ship Collision	0
7/11/95	Bering Sea	All Alaskan	Fish Processing Vessel Fire	1
11/14/95	San Francisco, CA	Argo Commodore	Cruise Vessel Fire	0
12/12/95	St. Croix, VI	Seal Island	Tankship Fire	3

PIPELINE/HAZARDOUS MATERIALS DIVISION

More than 1.6 million miles of natural gas pipelines provide service to more than 50 million customers in the U.S. In addition, there are more than 240,000 miles of gathering and petroleum product pipelines traversing the country to provide essential fuels to major cities and industries and feedstocks to manufacturing plants. The regulation and inspection of most of these pipelines, and the investigation of accidents for enforcement purposes, are shared by DOT's Research and Special Programs Administration (RSPA), Office of Pipeline Safety (OPS), and various state agencies. While pipeline safety on interstate facilities is the sole responsibility of the OPS, because of the

enormous size of the pipeline system the OPS inspectors share this responsibility with state agencies.

In 1995, according to OPS, there were 341 pipeline accidents and incidents reported that met the agency's investigation criteria. These accidents generally involved a death or serious injury, property damage of more that $50,000, or the release of the transported material into the environment. Three of these accidents – each involving significant safety issues – were investigated by the NTSB. The remainder were investigated by OPS or state authorities.

About 500,000 shipments of hazardous materials enter into the U.S. transportation system daily. Responsibility for the regulation, inspection and enforcement of regulations regarding the transportation of these hazardous materials shipments is shared among the DOT's RSPA and modal administrations, as well as the states. The responsibility for investigating hazardous materials transportation accidents is similarly diversified. RSPA is responsible for issuing hazardous materials regulations, and for inspecting shippers and manufacturers of shipping containers that are of a multimodal nature.

The NTSB investigates hazardous materials accidents that result in deaths, serious injuries, or major disruptions within communities caused by the release of the transported material into the environment. In addition, the Board will investigate cases that provide further evidence of the need for safety improvements previously recommended by the NTSB but not yet implemented by the regulatory authorities or the carriers.

The Board's work in this area includes identifying and documenting the hazardous characteristics of materials transported, the threats posed to

public safety when those materials are released into the environment, and the consequences of unintentional releases of those materials during transportation. It also includes evaluating the level of packaging protection required during transportation relative to the seriousness of the hazards posed. Further, there is the evaluation of the construction, inspection, testing, and maintenance of hazardous materials packaging and its performance in the transportation environment. Five major hazardous materials investigations were initiated by the Board in 1995.

MAJOR PIPELINE/HAZARDOUS MATERIALS REPORTS ADOPTED IN 1995

Edison, NJ - Gas Pipeline Explosion

On January 18, the NTSB reported that the probable cause of the rupture of a Texas Eastern Transmission Corporation (TETCO) gas pipeline in Edison, NJ, was mechanical damage to the exterior surface of the pipe. Excavation equipment had gouged the pipe wall, creating a crack that, most likely through metal fatigue, eventually grew to critical size.

The accident happened on March 23, 1994 when the 36-inch diameter natural gas pipeline ruptured on the site of an asphalt plant. The force of the rupture and escaping gas blew soil, rocks and debris hundreds of feet into the air. The escaping gas ignited, sending flames 500 feet into the air and igniting several roofs in a garden apartment complex nearby. Several buildings in

the complex were destroyed. Although there were no fatalities, 103 persons were injured and 1,500 residents had to be evacuated.

The Board found that the pipeline had been damaged by excavation equipment, such as a backhoe, sometime after the company had done an internal inspection in 1986. Contributing to the pipe rupture were the brittle properties of the pipe material at the operating temperature. Affecting the severity of the accident was the inability of TETCO to stop the flow of natural gas to the rupture point.

The Board issued 17 recommendations as a result of the investigation, including:

To the Research and Special Programs Administration -

- Expedite requirements for the installation of automatic and/or remotely operated mainline valves on high pressure pipelines in urban and environmentally sensitive areas to provide for promptly shutting down failed pipeline segments.

- Develop toughness standards for new pipe installed in gas and hazardous liquid pipelines, especially in urban areas.

- Expedite completion of the study on methods to reduce public safety risks with respect to the siting and proximity of pipelines, modify the study to include consideration of building standards and,

when completed, make the study widely available to state and local governments.

To TETCO -

- Install on mainline valves in urban areas equipment that can be operated remotely or automatically to rapidly shutdown failed pipeline segments.

To the Interstate Natural Gas Association of America, the Association of Oil Pipe Lines, the American Petroleum Institute and the American Gas Association -

- Develop programs, including modification of existing valves for remote or automatic operation, to reduce to a minimum the time required to stop the flow of natural gas or hazardous liquids to failed pipeline segments, especially those segments in urban or environmentally sensitive locations.

Chattanooga, TN - Toxic Chemical Spill

A toxic chemical spill that threatened the water supply of Chattanooga prompted the NTSB, on February 22, to urge improvements in inspection, maintenance and repair of railroad tank cars across the country.

The accident occurred on June 6, 1994 when a tank car in the Norfolk Southern Railway

yard in Chattanooga began leaking arsenic acid, which is classified as a poisonous material and a marine pollutant. More than 3,000 gallons of the acid were released from the tank car, entered the yard's storm drain, discharged into Citico Creek and then into the Tennessee River near the intake pipes for the city's municipal water supply. Although injuries and evacuations were averted, the containment, clean-up and disposal costs were estimated at more than $8 million.

After an in-depth investigation, the Board determined that the probable cause of the accident was the failure of the Union Tank Car Co., the car's manufacturer, to detect and correct misalignment of an eduction pipe system installed, and later modified, in the tank car. This resulted in damage to the tank's protective coating at the sump, with subsequent corrosion and tank failure.

Another cause cited was the failure of the Hickson Corporation, the shipper, to detect and correct corrosion damage in the sump area. Contributing to the seriousness of the environmental impact was the lack of a toxic release containment area in the railyard, and the delay in calling an environmental and emergency response contractor. The Board said that railroad and fire department officials failed to recognize the severity of the release and its potential environmental consequences.

As a result of its investigation, the Board issued recommendations that:

- Urge the Federal Railroad Administration (FRA) and industry associations to evaluate the failure rate of sumps and eduction pipe bracing systems in tank cars transporting hazardous materials

and, based on the evaluation, require appropriate modifications and repairs.

- Urge the FRA and the Research and Special Programs Administration to require shippers of corrosive materials to determine periodic inspection intervals and testing techniques for linings and coatings.

- Urge the car manufacturer to inspect similarly built and equipped cars and appropriately modify all tank cars to ensure that eduction pipes cannot contact the sump. Also, require the company to evaluate and modify its quality assurance program to ensure that tank cars are constructed, modified or repaired in accordance with approved designs.

- Urge the shipper to develop and implement procedures to evaluate, select and monitor coatings and linings used in tank cars in arsenic acid service to make sure they provide suitable protection.

- Urge the railroad company to designate areas where tank cars can be placed to contain leaking cargo and to provide access for off loading operations within the company's yards that handle hazardous materials.

- Urge the railroad company to revise its definition of a major leak to include the location of the leak on the tank car, its accessibility, whether the leak can be readily stopped, and potential threats to the environment or to long-term public health.

- Urge the railroad to initiate and participate in emergency response drills with local emergency response agencies. Urge city and county officials to plan and conduct emergency response exercises with local transporters of hazardous materials.

- Urge the American Association of Railroads to advise its members of the Chattanooga accident and encourage them to evaluate their emergency response plans.

Pipeline/Hazardous Materials Reports Adopted In 1995

Date Adopted	Location	Accident Type	Fatalities
1/18/95	Edison, NJ	Gas Pipeline Rupture	0
2/22/95	Chattanooga, TN	Toxic Chemical Spill	0

RAILROAD DIVISION

Since 1967, the primary responsibility for railroad accident investigation has been assigned by Congress to the NTSB. The Board performs in-depth analyses of selected rail accidents involving a fatality, substantial property damage, the transport of hazardous materials, or a passenger train. The Board determines the probable cause(s) and issues recommendations to effect changes to prevent similar accidents.

The Board also conducts studies of significant railroad safety issues, often based on a set of accident investigations specifically undertaken as the basis for the study. In other cases, safety studies may be based on an analysis of regulations, railroad safety programs and procedures, audit reviews of management and operational practices, or other research. In addition, the Board investigates selected accidents concerning specific life-saving issues.

Because of its limited resources, the Board is able to investigate only about 100 of the approximately 2,000 accidents and incidents that are reported each year to the Federal Railroad Administration.

MAJOR RAILROAD INVESTIGATIONS IN 1995

Among the railroad investigations initiated by the NTSB in 1995 were the following significant cases:

New York, NY - Subway Crash

On February 9, a subway train in Brooklyn crashed into the rear of a standing 10-car train. The accident, which occurred on an elevated track about 1,000 feet short of the Ninth Avenue station, resulted in 15 injuries and damage estimated at more than $1.5 million. The train, traveling north, had managed to slip by an automatic stopping arm, designed to trip the train's emergency brake to ensure compliance with a red signal, and then went on to accelerate around a curve and failed to stop in time to avoid a the collision.

New York, NY - Crash on the Williamsburg Bridge

On June 5, a southbound "J" subway train went through a red signal and failed to stop before crashing into the rear of a stopped "M" train on the Williamsburg Bridge between Brooklyn and Manhattan. The motorman of the "J" train was killed and 64 passengers were injured. As part of the NTSB's investigation of the accident, a public hearing was arranged in November that focused on the oversight of rapid transit operations, standards for rapid transit equipment and subway signal standards and installations.

MAJOR RAILROAD REPORTS ADOPTED IN 1995

Lakeland, FL - Circus Train Derailment

On February 14 , the NTSB reported that a damaged wheel caused the January 1994 derailment of a Ringling Bros. and Barnum & Bailey Circus train in Lakeland, FL. The accident killed two circus employees and injured 15 others.

The 53-car train was enroute from Tampa to Orlando when a wheel broke apart. The train traveled almost three miles before 16 cars derailed, with five landing on their sides. The Board found that the wheel had been thermally damaged before the train left Tampa.

The wheel that failed was stamped with a serial number on its outer rim. It also had a straight-plate design that is more susceptible to thermal damage than a curved-plate wheel, which is much more widely used on freight cars. The combination of a thermally damaged straight-plate wheel and a fatigue crack stemming from the “rim-stamp” led to the failure of the wheel and the consequent derailment of the train.

In its report, the Board called on the Federal Railroad Administration (FRA) and the industry to prevent future use of rim-stamped wheels like the one that failed on the circus train. The Board also recommended that railroads refuse to haul any cars with such wheels until proper inspection procedures can be implemented.

Noting that many of the circus train cars had been adapted for use as living quarters for employ-

ees, the Board found that one of the fatalities might have been prevented if large appliances and equipment in these cars had been better secured. The Board urged the circus company to implement plans for improving safety aboard its rail cars.

Selma, NC - AMTRAK Derailment

The NTSB reported on March 21, that a train derailment in Selma, NC, in May 1994, was caused by a collision with an improperly secured "piggyback" trailer aboard a CSX Transportation freight train traveling in the opposite direction. The pre-dawn accident killed one engineer and seriously injured another.

The Board noted that there were no federal or industry standards at the time of the accident on loading and securing trailers on freight trains, despite past accidents and a huge growth in this segment of rail traffic. The Board further noted that corrective measures were now in process by the industry, and asked the major railroads to inform the NTSB about their progress to date.

The Board determined that the probable causes of the accident were the CSX Transportation loading crew's failure to properly secure the trailer to the flat car, and the company's failure to have in place a comprehensive inspection program. The trailer either had fallen or was falling from the flat car when it was struck by the passing AMTRAK train. All but one of the 18 cars in the AMTRAK passenger train derailed resulting in injuries to 120 people on board. Total damage was estimated at almost $4 million.

The Board noted that the Federal Railroad Administration (FRA), after the accident, had undertaken a study and found 108 loading-related accidents or incidents during 1983-93, with 60 percent due to improperly secured loads. The FRA found seven areas in need of improvement and said it planned to rely on voluntary corrective measures by industry and not resort to government regulatory actions unless these steps were unsuccessful.

The Board said the Selma accident also prompted a recommendation to the Association of American Railroads (AAR) to develop informational materials and recommended practices for loading, securing and inspecting trailer and containers.

The Board issued recommendations to the FRA and the AAR, asking to be advised, within 90 days, of both organizations' progress in solving the loading problem. The recommendations also called for implementation of a solution by the end of 1995. Within those time-frames, the Board, through another recommendation, called on the AAR to develop a data base on incidents involving unsecured trailers and containers aboard freight trains.

Thedford, NE - Fatigue Cited in Three-Train Accident

On September 7, the NTSB reported that the failure of a Burlington Northern (BN) engineer to obey a restrictive signal because he anticipated that the signal would change, and the inattentiveness of the conductor to train operations, due to fatigue, caused the collision and derailment of three BN freight trains near Thedford, Nebraska.

Contributing factors, the Board determined, were the fatigue of the engineer, which affected his judgment and the manner in which he operated his train; the use of the "restricted proceed" signal indication; and the lack of a positive train separation control system.

The accident occurred on June 8, 1994 when an eastbound BN train, which had stopped behind another eastbound train, was struck in the rear by a third eastbound BN train. The engineer and conductor of the third train were killed; two others were injured. Damages to track, equipment and lading were estimated at $2.5 million.

The Board concluded that the use of the "restricted proceed" signal indication may be a less safe operating practice than the use of a "stop and proceed" signal indication, and should not be used in general applications to control train movement. Further, the Board noted that a fully implemented positive train separation control system would have prevented the accident.

As a result of the investigation, the Board made recommendations to the railroad industry regarding the use of "restricted proceed" signals, and reiterated to the Federal Railroad Administration earlier recommendations on requirements for a positive train separation control system.

Cajon Pass, CA - Freight Train Collision

The NTSB determined on November 21 that the probable cause of a collision between an Atchison, Topeka and Santa Fe train and a Union Pacific (UP) train, near Cajon, CA, was insufficient available train braking force due to a restriction or

blockage in the trainline between the third and fourth articulated cars. The accident happened on December 14, 1994 when the westbound Santa Fe intermodal train collided with the rear end of a standing westbound UP coal train. Two crewmembers from the Santa Fe train were injured; damage to the two trains totaled over $4 million.

The Board issued a series of recommendations in this case, most notably:

To the Federal Railroad Administration -

- Separate the two-way end-of-train requirements from the power brake law notice of proposed rulemaking, and immediately conclude the end-of-train device rulemaking so as to require the use of two-way end-of-train telemetry devices on all trains without cabooses.

To All Class I Railroads -

- Pending the adoption of a formal rule by the FRA, implement the use of two-way end-of-train telemetry devices on all trains without cabooses by March 31, 1996.

Significant Railroad Investigations In 1995

Date Adopted	Location	Carrier	Accident Type	Fatalities
2/9/95	New York, NY	NYC Transit	Subway Collision	0
6/5/95	New York, NY	NYC Transit	Subway Collision on Bridge	1

Major Railroad Reports Adopted In 1995

Date Adopted	Location	Carrier	Accident Type	Fatalities
2/14/95	Lakeland, FL	Ringling Bros.	Derailment	2
3/21/95	Selma, NC	Amtrak/CSX	Collision/ Derailment	1
9/7/95	Thedford, NB	Burlington Northern	Three-Train Collision	2
11/21/95	Cajon Pass, CA	ATSF/Union Pacific	Freight Train Collision	0

RESEARCH AND ENGINGEERING

The Office of Research and Engineering provides technical support to accident investigations and conducts studies that examine safety issues in all modes of transportation. The office is also responsible for maintaining the NTSB's aviation accident data base, providing periodic statistical reviews of aviation accidents, and responding to public inquiries regarding Board investigations and duties.

SAFETY STUDIES

The Safety Studies Division, in collaboration with the Aviation and Surface Transportation 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 performance. 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 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 government agencies and to attaining implementation of previous Board recommendations. The adequacy of program resources committed by other government agencies, the 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.

FATIGUE IN COMMERCIAL TRUCK OPERATIONS

On January 18, the NTSB released the results of a safety study examining the role of driver fatigue in heavy truck accidents. The study was initiated in response to a large number of fatal accidents involving heavy trucks (4,615 in 1994), and the significant role of fatigue in such accidents, that were fatal to the driver (31 percent as determined in an earlier study conducted by the Board). The Board investigated 113 single-vehicle, heavy truck accidents in which the driver survived and was able to be interviewed to determine sleep patterns for the 96 hours preceding the accident. Sufficient information was available from truck drivers in 107 of the accidents investigated. Based on the determination of probable cause, 58 percent (62 of 107) of the accidents were fatigue related. Nineteen drivers stated that they fell asleep while driving.

The Board found that the most important measures in predicting a fatigue-related accident in this sample were the duration of the last sleep period, the total hours of sleep obtained during the 24 hours prior to the accident, and fragmented sleep patterns. Also noteworthy:

- Truck drivers in the fatigue-related accidents had an average of 5.5 hours of sleep in the last sleep period prior to the accident. This was 2.5 hours less than the drivers involved in nonfatigue-related accidents.

- Truck drivers in the fatigue-related accidents had 6.9 hours of sleep in the 24 hours prior to the accident. This was 2.4 hours less than the drivers involved in nonfatigue-related accidents.

- The current hours-of-service regulations do not provide an opportunity for adequate sleep (at least 8 hours) because they do not consider the time needed for travel, eating, personal hygiene, recreation, or the inability to fall asleep immediately at the beginning of the 8-hour off-duty period.

- Truck drivers with split sleep patterns obtained about 8 hours sleep in a 24-hour time period; however, they obtained it in small segments, on average about 4 hours at a time, thereby impeding the recovery of performance abilities. Further, the exemption in the current hours- of - service regulations regarding use of sleeper berths for rest actually promotes split rest periods.

- About 67 percent of the drivers with irregular schedules were involved in fatigue-related accidents as compared to about 38 percent of the drivers with regular schedules. Seventeen of the 107 drivers had inverted their duty/sleep periods on the accident trip; that is, the accident occurred at a time when the driver had been sleeping during the day. All but one of these drivers had a fatigue-related accident.

- There is a possible link between the method of driver compensation and fatigue-related accidents.

- Providing education to transportation employees about the factors affecting fatigue is a vitally important component of overall efforts to combat fatigue in transportation.

Based on these findings, the Board made recommendations to the DOT's Federal Highway Administration (FHWA) to complete rulemaking within two years to address the regulatory issues identified in the study and to examine truck driver pay compensation to determine if there is an effect on hours-of-service violations, accidents or fatigue.

An additional recommendation was made to both the FHWA and various components of the trucking industry to develop and disseminate a training education module to inform truck drivers of the hazards of driving while fatigued, including the behavioral and physiological consequences of sleepiness and strategies for avoiding sleep loss.

AIR SAFETY IN ALASKA

After a year-long study, the Board, on November 28, issued a report calling for measures to improve air safety in Alaska. The 150-page report, containing 22 specific recommendations, updates an NTSB special Alaskan aviation study published in 1980.

The Board found air travel in Alaska to be safe. It noted, however, that operators continue to

conduct flights there with higher than normal risks in response to demands for reliable air service in an environment and aviation structure that are often inconsistent with these demands.

The Board called for more commercial flying under instrument rules rather than by visual means. It also recommended improvements in weather and airport condition reports, pilot duty-time regulations, and the handling of certain postal service flights.

The study indicated that flying under visual flight rules into instrument meteorological conditions was the leading safety problem for Alaskan commuter airlines from 1989 through 1993, accounting for six of nine fatal accidents during the period, and for Alaskan air taxis, seven of 15 fatal accidents.

The study concluded that the continued occurrence of such accidents highlighted the need to provide flight crews, during initial and recurrent training programs, aeronautical decision-making training tailored to commercial operations and Alaska's aviation environment.

The Board said that the FAA should develop appropriate flight and duty times for air crews consistent with limitations for crews in the rest of the U.S. It urged FAA and the National Weather Service to ensure that all automated surface weather observation systems, where personnel are sited, have significant weather information added manually to the automated readings and disseminated in a single report. The Board also called for improved weather graphics and adequate personnel levels for weather observations and communications with aircraft in flight.

The Board also called on the U.S. Postal Service to develop broader and more flexible performance standards for the handling of fourth class mail to relieve pressures on flight crews to operate in adverse weather conditions.

Safety Studies Completed in 1995

Topic	Name of Report	Date Adopted	NTIS ID
Fatigue	**Factors That Affect Fatigue In Heavy Truck Accidents**	**1/18/95**	**PB95-917001 PB95-917002**
Alaska	**Aviation Safety In Alaska**	**11/28/95**	**PB95-917006**

SYMPOSIUM ON FATIGUE IN TRANSPORTATION

The symposium, “Managing Human Fatigue in Transportation: Promoting Safety and Productivity,” focused on the latest research and studies on issues such as the scope of fatigue in transportation, the physiological aspects of fatigue, the effect of fatigue on performance, fatigue and public policy, and fatigue countermeasures.

Experts making presentations on the opening day of the symposium included Dr. Mark Rosekind, NASA Ames Fatigue Countermeasures Program; Dr. David Dinges, University of Pennsylvania Medical School; Dr. William Dement, Stanford University Medical School; Dr. Charles Czeisler, Harvard University Medical School; and Dr. Alan Pack, University of Pennsylvania Medical Center.

On the second day, the symposium participants spilt into separate workshops for each transportation mode to discuss current needs and develop ideas and recommendations for implementing measures to lessen the impact of fatigue on transportation safety. A complete record of the conference was published and circulated widely to industry and government organizations.

VEHICLE PERFORMANCE, ENGINEERING SERVICES & MATERIALS LABORATORIES

The NTSB operates several laboratories at its Washington, D.C. headquarters. Here commercial airliner flight data and cockpit voice recorders, railroad event recorders and marine course recorders are read out and analyzed as a part of the investigative process. The laboratories are world-renowned and the technical staff is considered to be among the most experienced in accident investigation techniques.

The Vehicle Performance and Engineering Services laboratories examine electronic information in radio, video, and recorded communications and their supporting systems from aircraft, ships, and trains. The laboratories also extract, format, and analyze data from digital and mechanical aircraft flight recorders and recorders installed in locomotives and large ships.

Aircraft performance is analyzed through advanced computer technology that examines the characteristics of vehicles in accidents, including three-dimensional performance animations and complex analytical studies in vehicle dynamics and operation.

The Materials laboratory provides engineering analysis for all modes of transportation. The laboratory performs fracture, deformation and failure analysis, in addition to determining the chemical composition and strength of materials.

ANALYSIS AND DATA

The Analysis and Data Division is responsible for the management of the aviation accident data base and provides statistical analyses in regularly published reports and special safety studies. Accurate and accessible data are essential to pinpointing areas of safety need, developing insight into solutions, monitoring the effectiveness of safety counter-measures, and reviewing the progress of safety efforts. The division is also responsible for handling public inquiries and requests for the Board's reports and other information.

COMPUTER SERVICES

The Engineering and Computer Services Division is responsible for the management and maintenance of the Board's mainframe and micro computer systems and for management of the computer network that serves NTSB headquarters and regional offices. The division also provides applications programming support to other Board units.

ADMINISTRATIVE LAW JUDGES

Since 1967, the NTSB has served as the "court of appeal" for airmen, mechanics or mariners whenever a certificate action is taken by the FAA or the Coast Guard.

Under 49 U.S.C. section 1133 and 49 C.F.R. Part 821, the Board's administrative law judges hear, consider and issue initial decisions on appeals of FAA certificate actions taken under 49 U.S.C. sections 44106, 44709 and 44710. Also covered are petitions for certification that have been denied by the FAA pursuant to 49 U.S.C. section 44703. The judges' decisions in these cases may be appealed to the five-member Board by either the airman or the FAA.

The FAA Civil Penalty Administrative Assessment Act of 1992 transferred all civil penalty appeals for enforcement cases involving pilots, engineers, mechanics and repairmen from the FAA to the NTSB. (The civil penalty act is now codified at 49 U.S.C. sections 46301, *et. seq*. That law also gave the FAA the right to appeal certain decisions of the five-member Board (in both certificate action and civil penalty cases) to the U.S. Court of Appeals. 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 judges also review and decide applications for attorneys fees and expenses from airmen against the FAA in cases brought pursuant to 49 U.S.C. sections 44709. EAJA applications filed in connection with actions brought by the FAA under 49 U.S.C. section 46301(d) (civil penalty cases) are also decided by the Board's judges and, on appeal from the judges' decision, by the full Board.

The Board's review on appeal of its administrative law judges' decisions is based on the record of the proceeding, which includes hearing testimony (transcript), exhibits and the judge's decision, as well as appeal briefs submitted by the parties.

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 a writ of *certiorari*.

Marine certificate actions are heard first by Coast Guard's administrative law judges, and may be appealed to the Commandant of the Coast Guard. The ruling of the Commandant may 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 1995, four marine appeals were filed with the NTSB, and the Board closed four marine cases.

There were 463 aviation certificate appeals filed with the Board's Office of Administrative Law Judges in 1995; 146 of these cases were from emergency orders. The Board's judges held 148 hearings and closed 492 cases in 1995.

During 1995, 80 of the judges' decisions were appealed to the full five-member Board for review. The Board decided 78 appeals, reversing the judges' decisions in 9 cases. Twenty-eight of the Board's decisions were appealed to the U.S. Courts of Appeals, which rendered 45 decisions in aviation certificate cases in 1995, affirming the Board in 43 of these. (The two remaining cases were dismissed.)

There were 14 EAJA applications filed with the Board's administrative law judges in 1995, and 20 cases were decided by the judges. In 1995, 10 of the judges' EAJA decisions were appealed to the full Board, which issued rulings in 11 EAJA cases.

INVESTIGATIONS, REPORTS & RECOMMENDATIONS AT A GLANCE

	1995	1994	1993	1992
Total Accident Investigations	2394	2341	2434	2443
Aviation	2188	2106	2158	2194
Hazardous Materials	5	12	8	5
Highway	100	98	165	72
Marine	13	10	11	6
Pipeline	3	6	5	11
Railroad	85	56	63	95
Foreign Aviation Investigations	58	53	59	60
Hearings	4	3	2	5
Major Accident Reports Adopted	20	21	26	22
Aviation	7	10	13	7
Hazardous Materials	1	1	0	2
Highway	3	4	2	2
Marine	4	4	3	6
Pipeline	1	0	2	1
Railroad	4	2	5	4
Recommendations Issued	349	324	310	353
Aviation	151	226	171	136
Highway	50	17	34	103
Marine	62	52	49	64
Pipeline	36	3	23	22
Railroad	48	18	29	24
Intermodal	2	8	4	4
Safety Studies/ Special Investigative Reports	2	2	3	9
Aviation Certificate Appeal Cases Closed	492	497	669	1091
Seamen Certificate Appeal Cases Closed	4	4	8	6
Aviation Equal Access to Justice Cases Closed	20	32	45	41