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Report to Congressional Requesters

November 2006

NATIONAL TRANSPORTATION SAFETY BOARD

Progress Made, Yet Management Practices, Investigation Priorities, and Training Center Use Should Be Improved

GAO-07-118

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Highlights

Highlights of GAO-07-118, a report to congressional requesters

Why GAO Did This Study

The National Transportation Safety Board (NTSB) plays a vital role in advancing transportation safety by investigating accidents, determining their causes, and issuing safety recommendations. To support its mission, NTSB's training center, which opened in 2003, provides training to NTSB investigators and others. It is important that NTSB use its resources efficiently to carry out its mission. GAO was asked to examine the extent to which NTSB follows leading management practices, how NTSB carries out its transportation safety function, and the extent to which NTSB's training center is cost-effective, including potential options for improving the center's cost-effectiveness. GAO reviewed NTSB documents and data concerning management practices and accident investigations, interviewed relevant NTSB and other federal officials, and evaluated NTSB's management practices based on leading practices identified in prior work.

What GAO Recommends

GAO recommends that NTSB fully implement leading management practices, develop risk-based criteria for determining which accidents to investigate, increase its utilization of safety studies, determine whether to develop a business plan to increase the utilization of its training center or vacate it, and take steps to rectify its violation of the Anti-Deficiency Act. NTSB agreed with the recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-07-118.

To view the full product, including the scope and methodology, click on the link above. For more information, contact Gerald L. Dillingham at (202) 512-2834 or dillinghamg@gao.gov.

What GAO Found

While NTSB has recently made progress in following leading management practices, its overall use of leading management practices in the seven areas GAO examined was either minimal or partial. NTSB minimally follows leading practices in strategic planning, information technology, and knowledge management. NTSB partially follows leading practices in human capital management, communications, acquisition management, and financial accountability and control. For example, regarding human capital management, NTSB developed a detailed staffing plan. However, the agency lacks a strategic training plan and a diversity management strategy, which are important for ensuring that an organization has strategies for achieving the appropriate mix of skills to achieve its mission. In addition, while NTSB follows some leading practices for financial management, it is noncompliant with the Anti-Deficiency Act because it did not obtain budget authority for the net present value of the entire 20-year lease for its training center lease obligation at the time the lease agreement was signed in 2001.

NTSB carries out its transportation safety function by selecting which accidents to investigate, investigating accidents and issuing recommendations, and taking proactive steps outside of specific accidents. For some transportation modes, NTSB has risk-based criteria for selecting which accidents to investigate, while for others it does not. Such criteria are important to ensure NTSB is using its resources to achieve a maximum safety benefit, particularly because, by statute, NTSB must allocate a large proportion of its resources to investigating aviation accidents, which may reduce the number of staff that NTSB can use to investigate accidents in other modes that may have critical safety implications. To its credit, although accident investigations are sometimes lengthy, NTSB issues urgent recommendations during the course of an investigation. In addition, NTSB proactively carries out its mission by conducting safety studies to consider issues that may be relevant to more than one accident. Safety studies, which sometimes result in recommendations, may also reduce the likelihood of recurrence of transportation accidents. Over the last 6 years, NTSB has conducted four safety studies. Industry stakeholders stated they would like NTSB to conduct more safety studies.

NTSB's training center is not cost-effective, as the combination of the training center's revenues and external training costs avoided by NTSB staff's use of the facility do not cover the center's costs. In fiscal year 2005, costs exceeded revenues by $3.9 million. Furthermore, the training center has had a limited impact on avoiding external training costs, as the majority of NTSB staff training occurs externally. Potential strategies to increase revenues or decrease costs could increase the cost-effectiveness of the training center; however, vacating the space may be the least-cost strategy.

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Abbreviations

CFO	Chief Financial Officer
CIO	Chief Information Officer
CMMI	Capability Maturity Model® Integration
DOT	Department of Transportation
DOT IG	Department of Transportation's Inspector General
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GSA	General Services Administration
GPRA	Government Performance and Results Act of 1993
IDEAS	Interior Department Electronic Acquisition System
IT	information technology
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
OPM	Office of Personnel Management
PHMSA	Pipeline and Hazardous Materials Safety Administration
TSI	Transportation Safety Institute

GAO
Accountability * Integrity * Reliability

United States Government Accountability Office
Washington, DC 20548

November 22, 2006

The Honorable Ted Stevens
Chairman
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable Daniel Inouye
Co-Chairman
Committee on Commerce, Science, and Transportation
United States Senate

The Honorable James L. Oberstar
Ranking Democratic Member
Committee on Transportation and Infrastructure
House of Representatives

With a staff of 386 and a budget of $76.7 million in fiscal year 2006, the National Transportation Safety Board (NTSB) is a relatively small agency that plays a vital role in advancing transportation safety by investigating accidents, determining their causes, and issuing safety recommendations. From its creation in 1966 through 2006, NTSB has investigated more than 134,000 accidents in aviation and other modes of transportation and has issued over 12,500 safety recommendations across all modes. To support its mission, NTSB leases a training center that opened in 2003 and provides training to NTSB investigators and other transportation safety professionals. While new transportation technologies and NTSB's safety recommendations have made transportation safer than ever, the expected increase in the demand for all transportation modes will potentially place a strain on the ability of NTSB to continue playing its vital role in ensuring a safe transportation system in the United States. As the nation's large and growing long-term fiscal imbalance demands a growing share of federal resources, and a wide range of emerging needs and demands compete for a share of the budget, it is critical that NTSB use its resources in an efficient manner to carry out its safety mission and maintain its preeminent position.

In light of NTSB's expansive mission to investigate transportation accidents across all modes and its relatively limited resources to accomplish this mission, you asked us to assess the agency's management practices and accident investigation activities in order to provide

information to be considered during the reauthorization of NTSB. In doing so, we addressed the following questions: (1) To what extent does NTSB follow leading management practices? (2) How does NTSB carry out its accident investigation function? and (3) Is NTSB's training center a cost-effective investment, and how could it be more cost-effective?

To determine the extent to which NTSB follows leading practices, we compared NTSB's practices with criteria from our past work in functional areas that we consider important for an agency to perform well in—strategic planning, human capital management, communications, acquisition management, financial accountability and control, information technology (IT), and knowledge management. We did not evaluate NTSB's performance in the area of capital decision making because the agency does not have a large amount of either capital assets or capital acquisitions. With assistance from GAO specialists in the functional areas, we assessed whether NTSB was mostly following the practices (plans or policies for all or nearly all practices have been developed and implemented properly), partially following them (plans or policies are in place and implemented properly for some practices), or minimally following them (plans or policies are lacking for all or nearly all practices). We also reviewed NTSB's responses to recommendations in some of these functional management areas made by us and the Department of Transportation's Inspector General (DOT IG) in recent years. We interviewed current and former NTSB board members, senior officials, and division managers regarding their experience with those practices at NTSB and their perceptions of the effectiveness of those practices. We reviewed NTSB documents including orders, operations bulletins, investigative manuals, management plans, and applicable legislation. To determine how NTSB carries out its accident investigation function, we interviewed current and former board members, senior officials, division managers, and selected staff. We randomly selected 17 of the 203 investigators and 8 writer-editors, who assist in writing accident investigation reports, roughly evenly across NTSB's four modal offices.[1] The views represent the particular individuals and are not representative of all NTSB investigators and writer-editors. We also interviewed industry and government stakeholders, including federal agencies that receive NTSB recommendations; aviation, rail, marine, and highway associations; and transportation safety advocacy groups. In addition, we examined data

[1]The four offices are Aviation Safety; Highway Safety; Marine Safety; and Railroad, Pipeline, and Hazardous Materials Safety.

on the number and implementation status of safety recommendations from NTSB's recommendation database, and we determined the data were sufficiently reliable for this review. We reviewed legislation, policy guidance, and NTSB data on the investigative process. Additionally, we reviewed studies by RAND Corporation and Booz Allen Hamilton that examined NTSB's investigation process and determined the extent to which the agency had implemented their recommendations. To determine the extent to which NTSB's training center is a cost-effective investment and how it could be more cost-effective, we reviewed financial data on NTSB's training center, including the revenues and expenses for fiscal years 2004 and 2005, and we examined NTSB's lease to determine how NTSB may utilize the space. We conducted our review from December 2005 to November 2006 in accordance with generally accepted government auditing standards. For more information on our scope and methodology, see appendix I.

Results in Brief

While NTSB has recently made progress in following leading management practices in the seven areas we examined, overall, it either minimally or partially has plans or policies in place to implement those practices. NTSB minimally follows leading practices in strategic planning, IT, and knowledge management. NTSB partially follows leading practices in the areas of human capital management, communications, acquisition management, and financial accountability and control. For example, NTSB's strategic plan lacks results-oriented objectives and specific strategies for achieving them, which are important practices in helping an agency to define and support its mission, as well as a strategy for managing a diverse workforce as part of the strategic plan's discussion of human capital. In May 2006, we recommended that NTSB improve its strategic plan, and it is taking steps to do so.[2] Regarding IT, in previous work we identified key elements of an IT program—an IT strategy, enterprise architecture, IT investment management, and information security—that can help agencies maximize the value of their IT investments and improve agency performance. While NTSB has made recent progress in correcting some information security vulnerabilities identified by the DOT IG, the agency has not completed its information security efforts, developed an IT strategic plan, established an enterprise

[2]GAO, *National Transportation Safety Board: Preliminary Observations on the Value of Comprehensive Planning, and Greater Use of Leading Practices and the Training Academy*, GAO-06-801T (Washington, D.C.: May 24, 2006).

architecture, or initiated an IT investment management process. In addition, NTSB does not have a knowledge management initiative (i.e., a way for an organization to create, capture, and reuse knowledge to achieve its objectives) or a Chief Information Officer, which are essential to improving an organization's ability to create and share knowledge, including data and information. NTSB is partially following leading practices in human capital management. For example, NTSB developed a staffing plan that addresses the agency's skills, competency needs, and hiring strategies to strengthen the agency's ability to carry out its transportation safety mission. However, the agency lacks a strategic training plan, which is important for ensuring that an organization has strategies for developing and training staff with the appropriate mix of skills and capabilities to achieve its mission. With regard to communication practices, NTSB has recently taken positive steps to improve communications from senior management to the staff—such as periodically sending e-mails to all staff to share information on new developments and policies. However, the agency lacks upward communications mechanisms, which are central to forming effective partnerships within the organization. In May 2006, we made recommendations in this area, and NTSB is taking steps to follow them.[3] While NTSB is partially following leading acquisition practices, such as having a Chief Acquisition Officer and strategically assessing acquisition needs, the agency does not have an acquisition policy to guide IT activities, thereby increasing the risk that the agency will not be able to effectively manage new IT programs as they are acquired and come online. Finally, NTSB follows some leading practices for financial accountability and control and has received an unqualified or "clean" opinion from independent auditors on its financial statements in recent years. However, the agency lacks a full cost accounting system, which would inform managers of the resources spent on individual investigations and provide data to help assure balanced office workload. In addition, it has also violated the Anti-Deficiency Act because it did not obtain budget authority for the net present value of the entire 20-year lease for its training center lease obligation at the time the lease agreement was signed in 2001.

NTSB carries out its transportation safety function by selecting which accidents to investigate, sometimes using outside sources of expertise to help it determine the probable cause of those accidents, issuing suggestions and recommendations, and taking proactive steps outside of

[3]GAO-06-801T.

specific accidents. For some transportation modes, NTSB has detailed, risk-based criteria for selecting which accidents to investigate, while for others it does not. For example, in an effort to manage resources and ensure the maximum safety benefit, NTSB has a process to identify highway accidents for investigation based on the severity of the accident and amount of property damage. By comparison, NTSB lacks a documented policy with criteria for selecting rail, pipeline, and hazardous materials accidents to investigate. Instead, the decision to investigate an accident is made by the office Director based on his judgment. As a result, for these modes, the agency lacks assurance and transparency that it is managing resources in a manner that ensures a maximum safety benefit. Such criteria are also important because NTSB does not have enough resources to investigate all accidents. Moreover, NTSB must allocate a large proportion of its resources to investigating aviation accidents due to a statutory requirement that NTSB investigate all civil aviation accidents, including general aviation accidents. In fact, NTSB investigated nearly 2,000 aviation accidents in 2005 compared with 47 in all the other transportation modes combined. This requirement, therefore, reduces the number of staff that NTSB can use to investigate accidents in other modes that may have broader or more critical safety implications. To its credit, although accident investigations are sometimes lengthy, NTSB takes steps to ensure that recommendations for improving transportation safety are made available to the transportation industry before a report is issued by making "urgent" recommendations and suggestions for improvement during the course of an investigation. Since 2001, according to NTSB's records, 256 NTSB suggestions have been implemented. Another strength of NTSB's process is its use of external sources of technical expertise and occasionally public hearings. Finally, NTSB proactively accomplishes its transportation safety function by conducting public forums and safety studies to consider safety issues that may be relevant to more than one accident in order to provide improvements to transportation safety. Safety studies, which sometimes result in recommendations, are intended to improve transportation safety by affecting changes to policies, programs, and activities of federal agencies that regulate transportation safety. Over the last 6 years, NTSB has conducted four safety studies. Industry stakeholders stated they would like NTSB to conduct more safety studies because the studies address NTSB's mission in a proactive way, allowing for trend analysis and preventative actions. According to NTSB, the number of safety studies it conducts is resource driven.

While NTSB staff and other students at NTSB's training center have been positive about the quality of the courses, NTSB's training center is not cost-effective, as the combination of the training center's revenues and

external training costs avoided by NTSB staff's use of the facility do not cover the training center's costs. For the first 2 full years of operation, fiscal years 2004 and 2005, NTSB's training center did not generate sufficient revenues to cover the costs of providing training there. As a result, those portions of the training center's costs that were not covered by the revenues from tuition and other sources—approximately $6.3 million in fiscal year 2004 and $3.9 million in fiscal year 2005—were offset by general appropriations to the agency. Moreover, thus far the training center has had a limited impact in terms of avoiding external training costs, as the majority of NTSB staff training occurs externally. Revenues generated by the training center are affected by several factors, including low utilization of the facility and the availability of similar courses elsewhere that may reduce the number of students interested in NTSB classes. Potential strategies to increase revenues or decrease costs could increase the cost-effectiveness of the training center. For example, NTSB could attempt to increase training center revenues by attracting more external students, or decrease its external training costs by focusing on gearing more courses to NTSB staff, but it may be difficult to accomplish either of these strategies sufficiently to significantly affect the training center's overall deficit, since NTSB lacks a market niche for its course offerings, and NTSB's external training costs for its staff—approximately $1 million annually—are well below the $3.9 million deficit in fiscal year 2005. NTSB could also sublet space to other users, such as academic users, but subleasing may not help NTSB to recover training center costs. NTSB could also consider relocating some headquarters staff to the training center, although such a move would incur other costs. NTSB officials agreed with our analysis that vacating the space may be the least-cost strategy, even if NTSB had to buy out the remaining lease.

To improve overall agency operations, we recommend that NTSB fully implement leading management practices in several areas, develop risk-based criteria for determining which accidents to investigate in all modes, increase its utilization of safety studies, finalize a solution to its Anti-Deficiency Act violation that has continued since the signing of the lease in 2001, and develop a business plan to either increase the utilization of its training center or vacate it. NTSB agreed with these recommendations.

Background

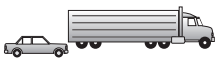
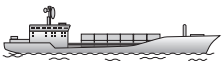
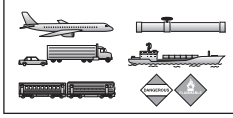
NTSB was established in 1966 as an independent government agency located within the newly formed Department of Transportation (DOT).[4] In

[4]Department of Transportation Act, Pub. L. No. 89-670, Oct. 15, 1966.

1974, Congress made NTSB completely separate from DOT.[5] NTSB's principal responsibility is to promote transportation safety by investigating transportation accidents, determining the probable cause, and issuing recommendations to address safety issues identified during accident investigations. As figure 1 indicates, NTSB has varying degrees of flexibility in its statutory mandate, as it pertains to initiating an investigation. By statute, NTSB has limited discretion in deciding which aviation accidents to investigate and the greatest amount of discretion in deciding whether to investigate highway accidents.

[5]Independent Safety Board Act, Pub. L. No. 93-633, Title III, 1974.

Figure 1: Key Laws, Regulations, and NTSB Policies for Investigations by Mode

Mode	Key laws, regulations, and policies	Investigation policy
Aviation 	49 U.S.C. 1131 (a)(1)(A) 49 C.F.R. part 800 International Civil Aviation Organization annex 13	Investigates or causes to be investigated all civil and certain public aircraft accidents in the United States and participates in the investigation of international accidents where the United States is the state of registry, operator, designer, or manufacturer.
Highway 	49 U.S.C. 1131 (a)(1)(B)	Investigates selected accidents including railroad grade crossing accidents, which NTSB selects in cooperation with a state.
Marine 	49 U.S.C. 1131(a)(1)(E); 1131(b) 49 C.F.R. part 850 U.S. Coast Guard/NTSB memorandum of understanding from 9/12/2002	Investigates selected major accidents and incidents, collisions involving public vessels with any nonpublic vessel, accidents involving significant safety issues related to Coast Guard safety functions, and international accidents within the territorial seas and where the United States is the state of registry. Major marine accidents are defined as a casualty that results in (1) the loss of six or more lives; (2) the loss of a mechanically propelled vessel of 100 or more gross tons; (3) property damage initially estimated as $500,000 or more; or (4) serious threat, as determined by the Commandant of the Coast Guard and concurred with by the Chairman of NTSB, to life, property, or the environment by hazardous materials.
Railroad 	49 U.S.C. 1131(a)(1)(C); 1116(b)(5) 49 C.F.R. part 840	Investigates railroad accidents involving a fatality, substantial property damage, or a passenger train.
Pipeline 	49 U.S.C. 1131 (a)(1)(D)	Investigates pipeline accidents in which there is a fatality, substantial property damage, or significant injury to the environment.
Hazardous materials 	49 U.S.C. 1116(b)(5)	Investigates releases of hazardous materials in any mode that involves a fatality, substantial property damage, or significant injury to the environment. For all modes, NTSB also evaluates the adequacy of safeguards and procedures for the transportation of hazardous materials and the performance of other departments, agencies, and instrumentalities of the government responsible for the safe transportation of that material.
All modes 		Investigates selected accidents that are catastrophic or of a recurring nature.

Source: GAO summary of law, regulations, and policies.

Unlike regulatory transportation agencies, such as the Federal Aviation Administration (FAA), NTSB does not have the authority to promulgate regulations to promote safety, but it makes recommendations in its accident investigation reports and safety studies to other agencies that have such regulatory authority. The federal agencies that receive NTSB

recommendations[6] include DOT's FAA, Federal Highway Administration (FHWA), Federal Motor Carrier Safety Administration (FMCSA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), National Highway Traffic Safety Administration (NHTSA), Pipeline and Hazardous Materials Safety Administration (PHMSA), and the U.S. Coast Guard within the Department of Homeland Security. Some of these federal agencies—including FAA, FRA, and the Coast Guard—also conduct transportation accident investigations. Table 1 shows NTSB's workload by transportation mode over 4 years.

Table 1: Number of Accident Investigations Completed by NTSB by Mode, Fiscal Years 2002-2005

Mode	2002	2003	2004	2005
Aviation[a]	1,949	1,997	1,870	1,937
Highway	52	45	45	33
Rail	11	9	12	8
Pipeline	1	2	2	1
Hazardous materials	2	1	2	1
Marine	6	6	7	4

Source: GAO analysis of NTSB data.

[a]Aviation accidents include limited investigations in which NTSB delegates the gathering of on-scene information to FAA inspectors.

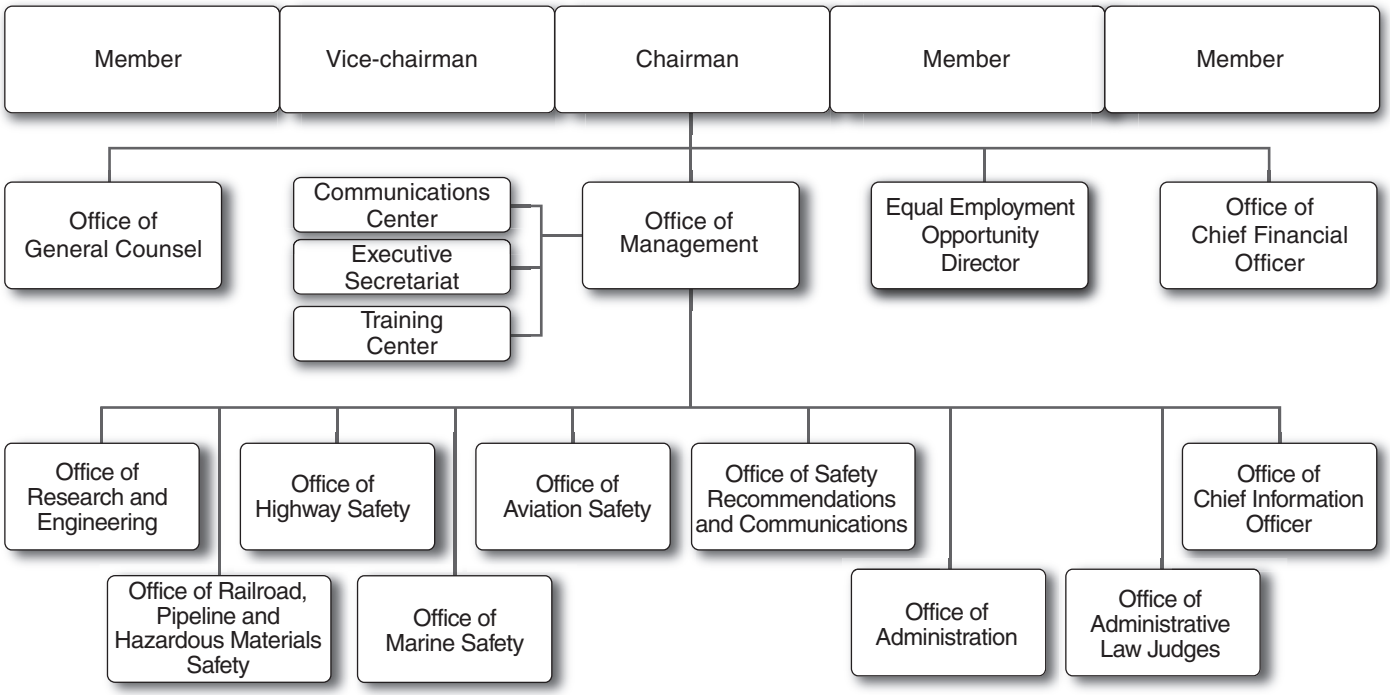
NTSB's Organization and Resources

NTSB's board is composed of five members nominated by the President and confirmed by the Senate.[7] The Chairman is NTSB's Chief Executive and Administrative Officer. As of September 2006, the board was supported by a staff of 386, which includes 203 investigators and technical staff assigned to four modal offices—aviation; highway; marine; and rail, pipeline, and hazardous materials—and the Office of Research and Engineering. Figure 2 shows NTSB's organization.

[6]NTSB also makes recommendations to others, such as state transportation authorities and industries.

[7]The Chairman is nominated by the President with the advice and consent of the Senate. The Vice Chairman is appointed by the President.

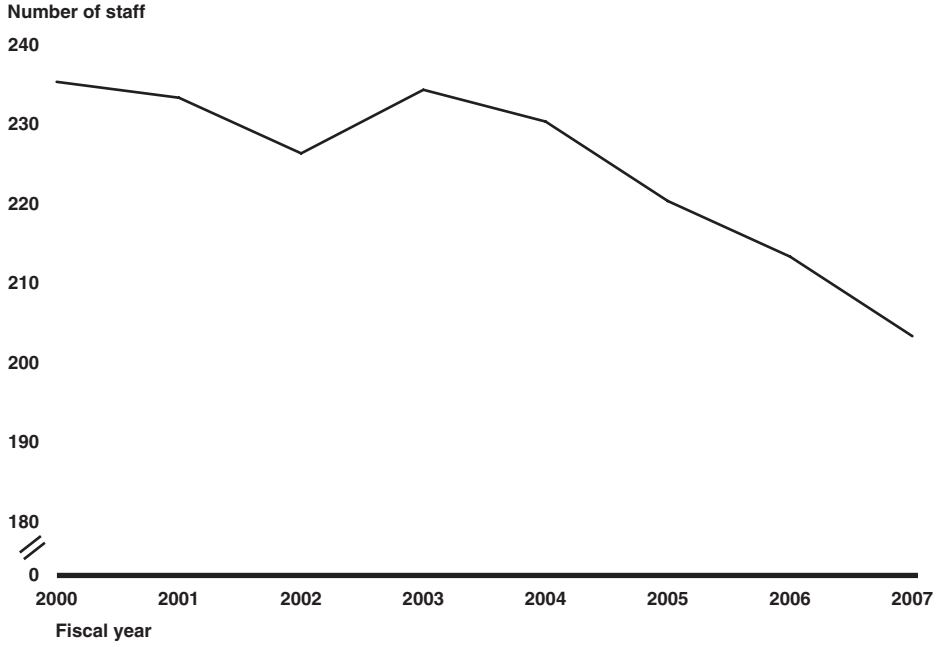
Figure 2: NTSB's Organization



Source: NTSB.

The agency is headquartered in Washington, D.C., and maintains 10 field offices nationwide and a training center in Ashburn, Virginia, in suburban Washington, D.C. In recent years, the agency has shrunk in size. In 2003, NTSB had 438 full-time employees compared with 386 in September 2006. During the same period, the number of full-time investigators and technical staff decreased from 234 to 203. (See fig. 3.) NTSB's modal offices vary in size in relation to the number of investigators; as of September 2006, the aviation office had 102 investigators and technical staff; the rail, pipeline, and hazardous materials office had 31; the highway office had 22; and the marine office had 12 employees. An additional 36 technical staff worked in the Office of Research and Engineering, which provides technical, laboratory, analytical, and engineering support for the modal investigation offices. For example, it is responsible for interpreting data recorders, creating accident computer simulations, and publishing general safety studies.

Figure 3: Number of NTSB Investigators and Technical Staff, Fiscal Years 2000-2007



Source: GAO analysis of NTSB data.

Note: Fiscal years 2000 and 2001 data are presented as of the second month of the fiscal year. Fiscal years 2002-2006 are presented as of the first pay period for each fiscal year. Fiscal year 2007 is presented as of the last pay period of fiscal year 2006.

NTSB has approximately $28 million in capital assets. The vast majority of these assets—88 percent of the value—are made up of the capital lease on the training center and equipment, furniture, and desktop computers to furnish the training center. (See table 2.)

Table 2: NTSB Training Center and Headquarters Capital Assets, as of September 2006

Training center	Acquisition value
Lease value	$23,731,941
Equipment value	211,485
Furniture value	347,641
Desktop computers value	307,353
Training center total value	**$24,598,420**
Headquarters	
Materials lab	$1,590,797
All other headquarters value	1,862,188
Headquarters total value	**$3,452,985**
Training center and headquarters total value	**$28,051,405**

Source: GAO analysis of NTSB data.

Note: NTSB leases the training center under an operating lease.

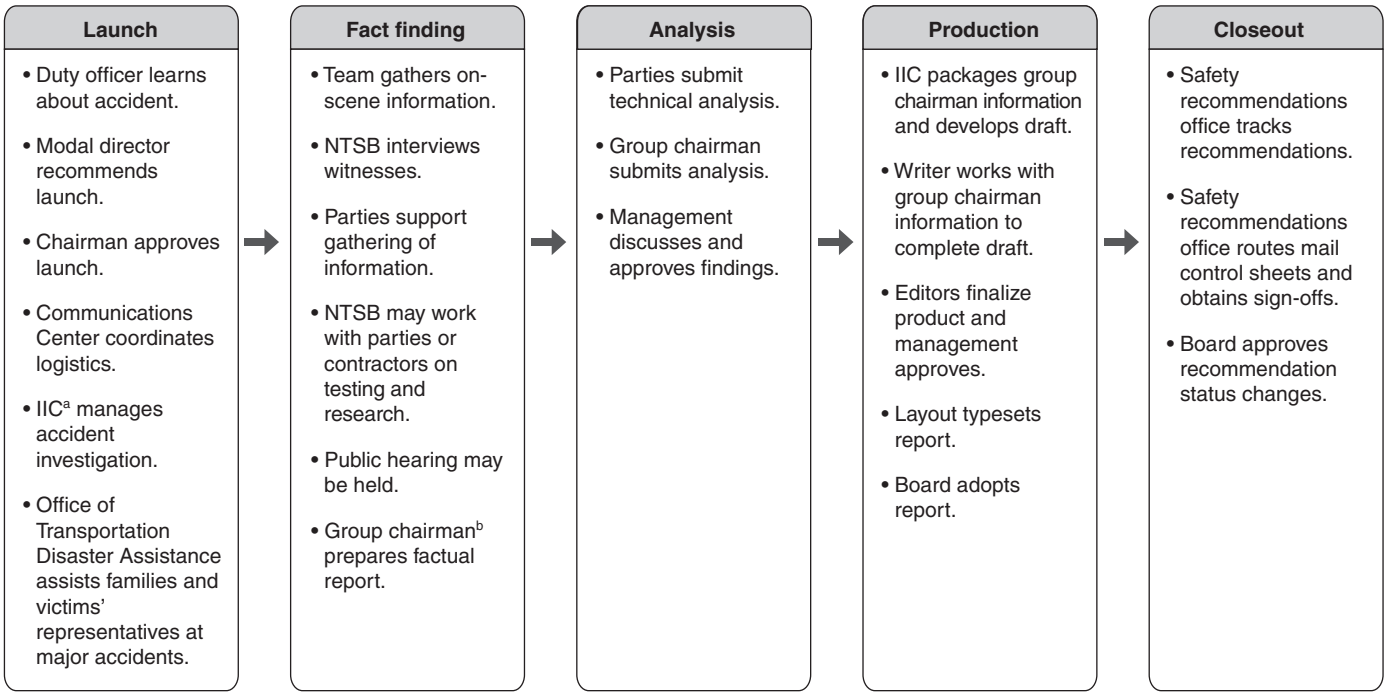
NTSB's budget increased from $62.9 million in fiscal year 2001 to $76.7 million in fiscal year 2006, or about 22 percent. After adjusting for inflation, this represents an increase of about 9 percent. The President requested $79.6 million for NTSB in fiscal year 2007.[8]

Investigative Process

Investigations have four phases—the "launch," fact finding, analysis, and report production. After a report is issued and recommendations made, NTSB tracks the progress of implementing the recommendations during a fifth closeout phase. Figure 4 describes these phases.

[8]As of November 3, 2006, the House had approved NTSB's fiscal year 2007 budget at $81,594,000, and the Senate Appropriations Committee approved a level of $79,594,000.

Figure 4: Components of an NTSB Investigation and Recommendation Closeout



Source: GAO analysis of NTSB information.

[a]IIC is the "investigator-in-charge."

[b]The group chairman is a technical specialist who is responsible for developing the facts and analysis for a particular area of an investigation.

When a major accident[9] occurs, a team of investigators is dispatched usually within hours of notification of the accident. All marine, rail, pipeline, hazardous material, and highway accidents[10] that NTSB investigates are designated as major accidents. For aviation accidents, NTSB conducts on-scene investigations of major accidents and more limited investigations of accidents not designated as major. In some cases,

[9]NTSB defines a major accident as one that involves an issue related to a current safety study or special investigation, impacts public confidence or transportation safety in a significant way, or is catastrophic.

[10]NTSB investigates accidents involving all types of highway vehicles, including automobiles, buses, and trucks.

for on-scene investigations, the team members must set aside the investigations they have been working on to begin fact-finding on the new accident. The team begins the on-scene investigation as quickly as possible and assembles the technical expertise that is needed to solve sometimes complex transportation safety problems associated with the accident. The team's leader is a senior investigator called the "investigator-in-charge;" other investigators contribute as specialists responsible for a clearly defined portion of the accident investigation.[11] Under the direction of the investigator-in-charge, each NTSB investigator heads a working group in one area of expertise, which is staffed by representatives of the "parties" to the investigation. Parties are typically entities that can provide the necessary technical assistance to the investigation.[12] For example, parties to an aviation accident may be the aircraft manufacturer and the pilots' union; by statute, FAA is always a party to aviation investigations. At major accidents, NTSB's Office of Transportation Disaster Assistance[13] ensures that families and victims' representatives have access to information concerning an accident throughout each phase of the investigation. This office coordinates briefings and provides support to families at the accident site by answering questions and guiding the families through the investigation process.[14]

Upon analyzing information obtained from parties and other sources, NTSB analysts prepare the accident investigation report, which is then reviewed throughout the agency. A report is typically reviewed by the

[11]For example, in aviation, these specialists and their responsibilities are operations, structures, power plants, systems, air traffic control, weather, human performance, and survival factors. Locomotive engineers, signal system specialists, and track engineers head working groups at railroad accidents. The specialists at a highway accident include a truck or bus mechanical expert and a highway engineer. The agency's weather, human performance and survival factors specialists respond to accidents of all kinds.

[12]Only those persons who can provide NTSB with needed technical or specialized expertise are permitted to serve on the investigation; persons in legal or litigation positions are not allowed to be assigned to the investigation.

[13]The Office of Transportation Disaster Assistance is located in NTSB's Office of Safety Recommendations and Communications. Family affairs specialists accompany the team to fulfill NTSB's responsibilities under the Aviation Disaster Family Assistance Act of 1996, Pub. L. No. 104-264, Title VII–Family Assistance, October 9, 1996.

[14]After the on-scene investigation has been concluded, the Office of Transportation Disaster Assistance continues its assistance through a dedicated telephone answer line that families and victims' representative can call and receive information with a guaranteed response time of 2 hours. Family members are also notified of other events relating to the accident such as public hearings and receive the final investigative report.

modal office, the Office of Research and Engineering, the Executive Secretariat, the Office of Safety Recommendations and Communications, the Office of General Counsel, and the Managing Director's Office. A final report is then submitted to each board member and the Chairman perhaps 12 to 18 months from the date of the accident. Final reports typically include recommendations.

Leading Management Practices

Through our work governmentwide, we have identified a number of leading practices in areas that are important for managing an agency. Although NTSB is a relatively small agency, such practices are relevant for any agency. We evaluated NTSB's practices based on leading practices identified in prior GAO work. (Related GAO products are listed at the end of this report.) In May 2006, we reported preliminary information concerning how NTSB's practices compare with leading practices in the areas of strategic planning, human capital management, communications, and financial accountability and control.[15] This report focuses on NTSB's performance in those areas, as well as acquisition management, IT, and knowledge management.

NTSB Has Made Recent Progress in Following Leading Management Practices, but Overall Record Remains Mixed

While NTSB has recently made progress in following leading management practices, its overall record in following such practices is mixed. As illustrated in figure 5, NTSB minimally follows leading practices in strategic planning, IT, and knowledge management. In the areas of human capital management, communications, acquisition management, and financial accountability and control, it partially follows leading practices. Much of NTSB's progress toward following leading practices is due to recent management initiatives. However, NTSB lacks a human capital plan that includes strategies on staffing, training, diversity management, and recruitment and retention; a comprehensive strategic plan; a knowledge management plan; and an IT management process. In May 2006, based on our preliminary work, we made recommendations to NTSB to address some of these areas. (App. II lists our previous recommendations.)

[15] GAO-06-801T.

Figure 5: Extent to Which NTSB Follows Leading Practices in Selected Management Areas

Management area	Extent to which leading practices followed
Strategic planning	○
Human capital management	◐
Communications	◐
Acquisition management	◐
Financial accountability and control	◐
IT	○
Knowledge management	○

○ Leading practices are minimally followed
◐ Leading practices are partially followed
● Leading practices are mostly followed

Source: GAO analysis of NTSB information.

NTSB's Strategic Plan Lacks Certain Performance-Based Elements

NTSB's strategic plan minimally follows leading performance-based practices. Without effective short- and long-term planning, federal agencies risk delivering programs and services that may not meet the nation's most critical needs. The Government Performance and Results Act of 1993 (GPRA)[16] and guidance contained in the *Office of Management and Budget Circular A-11*, provide performance-based strategic planning guidelines. GPRA requires federal agencies, including NTSB, to develop strategic plans in which they define their missions, establish results-oriented goals, and identify the strategies that will be needed to achieve those goals. Such a plan can help to directly link efforts such as training to the organization's strategic goals and help to ensure that the skills and competencies of its workforce enable the organization to perform its mission effectively. To its credit, in December 2005, NTSB issued a strategic plan for fiscal years 2006 through 2010, which was the first time

[16]Pub. L. No. 103-62.

the agency had a strategic plan in 6 years. We compared NTSB's strategic plan with selected elements required by GPRA. (See fig. 6.)

Figure 6: Extent to Which NTSB's Strategic Plan Follows GPRA Elements

GPRA elements	Follows GPRA elements
Mission statement	✓
General goals and objectives	
Approaches or strategies to achieve goals and objectives	
Relationship between general goals and annual goals	
External factors	✓
Program evaluations	
5-year time frame	✓
Stakeholder involvement	

Source: GAO analysis of NTSB information.

While NTSB's 5-year strategic plan has a mission statement, four general goals and related objectives, and mentions key factors, such as declining resources, that could affect the agency's ability to achieve those goals, the plan lacks a number of key elements—including information about the operational processes; skills and technology; and the human, capital, and information resources—required to meet the goals and objectives. In addition, the goals and objectives lack sufficient specificity to know whether they have been achieved, and the plan lacks specific strategies for achieving those goals. According to GPRA, the strategies should include a description of the operational processes, skills and technology, and the resources required to meet the goals and objectives. Since NTSB's strategic plan lacks such a description, it does not align staffing, training, or other human resource management to strategic goals. In May 2006, we recommended that NTSB revise its strategic plan.[17] In response to our recommendation, NTSB hired a contractor to assist in revising the strategic plan. The statement of work for the contract called for a more comprehensive and results-oriented plan that included the GPRA elements that are missing or incomplete in the current plan. As of October 2006, the

[17]GAO-06-801T.

first draft of the revised plan had been prepared. NTSB expects to issue the new plan in January 2007.

NTSB Is Partially Following Leading Human Capital Practices

Federal agencies are experiencing pervasive human capital challenges in acquiring and developing staffs to meet current and emerging agency needs. Human capital management consists of several key management elements, including workforce planning; performance management; training; recruiting, hiring, and retention; and diversity management. As illustrated in figure 7, NTSB is partially following leading practices in workforce planning; performance management; and recruiting, hiring, and retention and is minimally following leading practices in training and diversity management.

Figure 7: Extent to Which NTSB Follows Leading Practices in Selected Human Capital Management Areas

Human capital area	Extent to which leading practices followed
Workforce planning	◐
Performance management	◐
Training	○
Recruiting, hiring, and retention	◐
Diversity management	○

○ Leading practices are minimally followed
◐ Leading practices are partially followed
● Leading practices are mostly followed

Source: GAO analysis of NTSB information.

NTSB's Staffing Plan Is a Step in the Right Direction for Workforce Planning, but the Organizational Structure Has Not Been Reviewed

NTSB is partially following leading practices in workforce planning. NTSB developed a draft agencywide staffing plan in December 2005 that follows several leading practices but lacks other leading practices such as a workforce deployment strategy that considers the organizational structure and its balance of supervisory and nonsupervisory positions. Existing strategic workforce planning tools and models suggest that certain principles should be followed in strategic workforce planning, such as

determining the agency's skills and competencies needs, involving stakeholders (e.g., management and employees) in the planning process, and developing succession plans to anticipate upcoming employee retirement and workforce shifts. Further, in workforce deployment, it is important to have human capital strategies to avoid excessive organizational layers and to properly balance supervisory and nonsupervisory positions. NTSB's draft staffing plan addresses the agency's skills and competencies needs and includes strategies to deal with workforce shifts. For example, the draft staffing plan proposes to increase the number of investigative staff by 21, which will help with the agency's resource needs. In addition, while some stakeholders (i.e., managers) were involved in the planning process, employees were not included. Employee input provides greater assurance that new policies are accepted and implemented because employees have a stake in their development.

Performance Management Plans Closely Follow Leading Practices but Are Not Fully Functional

NTSB is partially following leading practices in performance management. In prior work, we reported that performance management systems are crucial for agencies because, if developed properly, they allow employees to make meaningful contributions that directly contribute to agency goals.[18] NTSB has begun to develop a performance management system that should eventually link each individual's performance throughout the agency to the agency's strategic goals and objectives. NTSB has a comprehensive performance management plan for Senior Executive Service employees that links individual performance to strategic goals. This plan states that NTSB will link performance management with the agency's results-oriented goals and set and communicate individual and organizational goals and expectations. Because NTSB recognizes in this plan the importance of aligning organizational performance with individual performance and contributions to the agency's mission, the performance management plan is a step in the right direction. Furthermore, NTSB issued, in August 2005, a performance plan for its overall workforce, which includes some elements of linking individual performance to organizational goals. However, without having results-oriented goals in the strategic plan itself, neither of the two performance management plans is fully functional. That is, until NTSB's goals are more fully articulated in the strategic plan, it may be difficult for staff to know whether their performance contributes to meeting those goals. As with the

[18]GAO, *Results Oriented Cultures: Creating a Clear Linkage between Individual Performance and Organizational Success*, GAO-03-488 (Washington, D.C.: Mar. 14, 2003).

2005 strategic plan, NTSB staff were not involved in the development of the performance plan, and there was no mechanism for employee feedback after the plan was initially developed.

NTSB Lacks a Strategic Approach to Training Staff

NTSB is minimally following leading practices in training, which is another key area of human capital management. It is important for agencies to develop a strategic approach to training their workforce, which involves establishing training priorities and leveraging investments in training to achieve agency results, identifying specific training initiatives that improve individual and agency performance, ensuring effective and efficient delivery of training opportunities in an environment that supports learning and change, and demonstrating how training efforts contribute to improved performance and results.[19] NTSB has neither developed a strategic training plan, nor has it identified the core competencies needed to support its mission and a curriculum to develop those competencies. Although NTSB staff annually identify training to improve individual performance, as a result of not having a core curriculum that is linked to core competencies and the agency's mission, NTSB lacks assurance that the courses that staff take provide the technical knowledge and skills necessary for them to be competent for the type of work they perform. We recommended that NTSB develop a strategic training plan.[20] In response, NTSB plans to hire a training officer and begin addressing this recommendation.

NTSB Uses Flexibilities to Recruit and Retain Staff, but Strategic Recruiting and Succession Planning Is Lacking

NTSB is partially following leading management practices for recruitment and retention. People are an agency's most important organizational asset. With the increasing numbers of employees retiring and the numbers of employees who will be eligible to retire in the near future, along with competition from private companies, federal agencies are in a struggle to recruit and retain highly skilled employees. To deal with the challenges in acquiring and developing staffs to meet current and emerging agency needs, we have reported that agencies need effective human capital flexibilities to assist them.[21] In broad terms, human capital flexibilities represent the policies and practices that an agency has the authority to implement in managing its workforce to accomplish its mission and

[19]GAO, *Human Capital: A Guide for Assessing Strategic Training and Development Efforts in the Federal Government*, GAO-04-546G (Washington, D.C.: Mar. 1, 2004).

[20]GAO-06-801T.

[21]GAO, *Human Capital: Effective Use of Flexibilities Can Assist Agencies in Managing Their Workforces*, GAO-03-2 (Washington, D.C.: Dec. 6, 2002).

achieve its goals. The tailored use of such flexibilities for acquiring, developing, and retaining talent is an important cornerstone of our model of strategic human capital management, which we issued to assist in transforming agencies so they become more results-oriented, integrated, and externally focused.[22] We have reported that agencies find work-life policies and programs, such as alternative and flexible work schedules, transit subsidies, child care assistance, and employee assistance programs, to be the most effective human capital flexibilities available in federal agencies for managing the workforce to achieve agency missions and accomplish agency goals. Other effective flexibilities include monetary recruitment and retention incentives, student employment and outstanding scholar programs, and performance incentives or time-off awards.

NTSB has implemented several flexibilities—such as alternative work arrangements, recruiting and relocating bonuses, and performance incentives and awards—to assist with recruiting and retention. Furthermore, NTSB employees are eligible to participate in federal transit fare subsidies and flexible spending account programs. NTSB also offers employees health and wellness services and health club fee reimbursements. We recognize that agencies need to be able to identify and select the recruitment and retention incentives that are most appropriate and effective. For instance, we have reported that student loan repayment programs show promise as effective tools for attracting and retaining the talent needed to sustain the federal workforce.[23] Although NTSB does not have such a program, NTSB employees can be reimbursed—based on funds availability—for completed university courses related to their current position. NTSB has also established student and internship programs for investigative, technical, administrative, and professional functions where participants are often converted to permanent appointments. These kinds of programs and opportunities help attract and retain talent in an agency.

As mentioned earlier in this report, NTSB's staffing plan is a step in the right direction for workforce planning purposes, but strategic workforce

[22]GAO, *A Model of Strategic Human Capital Management*, GAO-02-373SP (Washington, D.C.: Mar. 15, 2002).

[23]GAO, *Federal Student Loan Repayment Program: OPM Could Build on Its Efforts to Help Agencies Administer the Program and Measure Results*, GAO-05-762 (Washington, D.C.: July 22, 2005).

planning is also needed to attract and retain employees with the skill sets the agency needs to achieve its mission. NTSB does not have a strategic recruiting and retention policy. NTSB does have a recruitment and relocation bonus policy and a newly established policy for candidate selection, but these policies are limited in scope and do not align key skill sets with agency's strategic goals. Furthermore, NTSB does not have any succession plans. The Federal Workforce Flexibility Act of 2004 requires the head of each agency to establish, in consultation with the Office of Personnel Management (OPM), a comprehensive management succession program to provide training for employees and develop future managers for the agency.[24] We have reported that leading organizations use succession planning as a strategic planning tool that focuses on current and future needs and develops pools of high-potential staff in order to meet the organization's mission over the long term.[25] Succession planning is used to help the organization become what it needs to be, rather than simply to recreate the existing organization. Also, given the retirement projections for the federal government that could create vacancies, agencies can use succession planning as a critical tool in their efforts to enhance diversity in their leadership positions.

Retention is important for an agency, such as NTSB, where employees have unique skill sets that cannot be easily replaced. When employees leave an agency, a formal exit interview process allows agency officials to obtain detailed, firsthand information on employees' reasons for separation that would allow management to analyze and address issues that could affect retention and take appropriate follow-up actions, such as improving training, career development opportunities, and communication. NTSB does not conduct exit interviews with departing employees.

NTSB Is Not Following Most Diversity Management Leading Practices

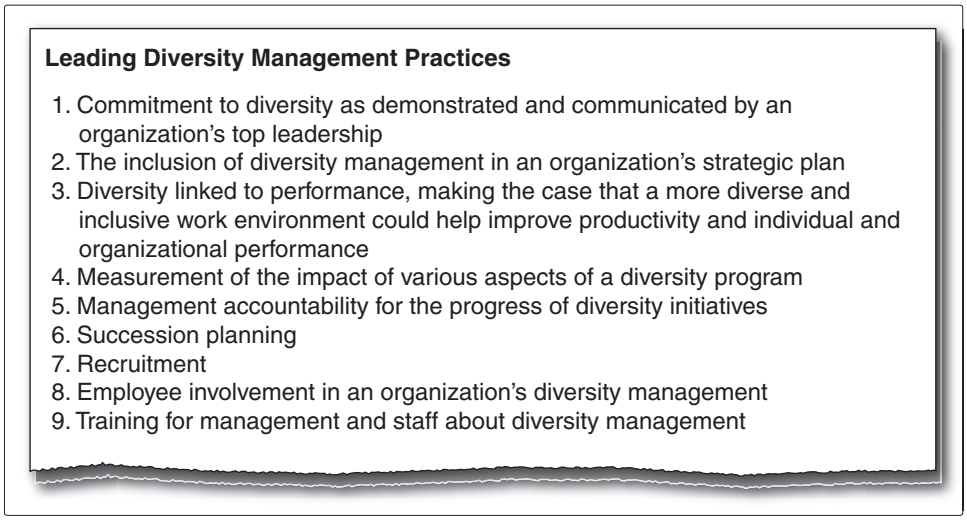
NTSB is minimally following leading practices in diversity management. We have reported that a high-performing organization relies on a dynamic workforce with the requisite talents, multidisciplinary knowledge, and up-to-date skills to ensure that it is equipped to accomplish its mission and

[24]NTSB is required, under the Federal Workforce Flexibility Act (5 U.S.C. § 4121), to establish a comprehensive management succession program. NTSB's board members, as presidential appointees, are exempt from this requirement. OPM has not yet promulgated required regulations under this act, and NTSB has yet to develop its program.

[25]GAO, *Human Capital: Selected Agencies Have Opportunities to Enhance Existing Succession Planning and Management Efforts*, GAO-05-585 (Washington, D.C.: June 30, 2005).

achieve its goals.[26] Such organizations provide both accountability and fairness for all employees and draw on the strengths of employees at all levels and of all backgrounds. Diversity management is a process intended to create and maintain a positive work environment where the similarities and differences of individuals are valued, so that all can reach their potential and maximize their contributions to an organization's strategic goals and objectives. We identified nine leading practices for diversity management. (See fig. 8.)

Figure 8: Leading Practices in Diversity Management



Source: GAO.

NTSB minimally follows identified leading diversity management practices. For example, NTSB has not integrated diversity management into its strategic plan. As required, NTSB submitted its annual status reports to the U.S. Equal Employment Opportunity Commission in fiscal years 2004 and 2005 including some recruiting objectives.[27] NTSB also

[26]GAO, *Diversity Management: Expert-Identified Leading Practices and Agency Examples*, GAO-05-90 (Washington, D.C.: Jan. 14, 2005).

[27]Federal agencies are to report annually to the Equal Employment Opportunity Commission on their progress in establishing and maintaining continuous programs of equal employment opportunity, including workforce data collected and analyzed by race, gender, national origin, and disability; a description of identified barriers to equal employment opportunity; and a plan for eliminating or moderating such barriers.

submitted a Federal Equal Opportunity Recruitment Program Report to OPM for fiscal year 2006 that highlights some proposed actions for future hiring.[28] For instance, the NTSB report proposes to target recruiting to disabled veterans, women, and minority professional organizations such as the Organization of Black Airline Pilots, the National Society for Black Engineers, and the Society for Hispanic Engineers. NTSB's report also calls for distribution of information to managers regarding recruitment sources such as internship and scholarship programs. The report states that NTSB will determine the feasibility of cooperative agreements with universities with large percentages of minority students. However, there are no deadlines tied to these proposed actions, and accountability for activities is not assigned. As mentioned above, NTSB does not have any succession plans and is, therefore, not using that process to assist with diversity management. NTSB also lacks a formal mentoring program and does not have advisory groups to foster employee involvement in diversity management.

Communications from Senior Management to Staff Have Increased, but Upward Communications Mechanisms Are Lacking

NTSB is partially following leading practices related to managing employees that include seeking and monitoring employee attitudes, encouraging two-way communication between employees and management, and incorporating employee feedback into new policies and procedures.[29] In response to issues raised by NTSB employees in a governmentwide survey conducted by OPM in 2004, NTSB's senior management made changes to improve the way they communicate information to staff. For example, the Managing Director periodically sends "management advisory" e-mails to all staff that share information such as policy changes or new developments at the agency. However, we found no formal processes that encouraged two-way communication, such as town hall meetings, regular staff meetings, or confidential employee surveys; or incorporated employee feedback into policy making. Communication and collaboration across offices at all levels can improve an agency's ability to carry out its mission by providing opportunities to share best practices and helping to ensure that any needed input is provided in a timely manner. In May 2006, we recommended that NTSB

[28]Agencies are required to report annually to OPM concerning their Federal Equal Opportunity Recruitment Program, which is a program established by Congress and overseen by OPM to ensure equal employment opportunity in recruitment.

[29]GAO, *Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations*, GAO-03-669 (Washington, D.C.: July 2, 2003).

develop mechanisms that will facilitate communications from staff-level employees to senior management.[30] In response to this recommendation, NTSB has begun developing a communications plan. The agency has also begun activities to enhance communication from staff to management, such as outreach visits to regional offices and brown bag lunches with senior managers and board members. In addition, the agency conducted a survey in September 2006 to obtain employee input on its revised strategic plan. According to agency officials, although they have no set schedule for regional office visits and employee surveys, their goal is to continue the visits on an ad hoc basis and the survey on an as needed basis for specific purposes, such as to obtain more detailed, actionable information to followup on OPM's biennial employee survey.

Acquisition Management Has Made Significant Progress in Recent Years

NTSB is partially following leading acquisition practices that promote an efficient and accountable acquisition environment and process. We found that leading organizations transform the acquisition function from one focused on supporting various business units to one that is strategically important to the bottom line of the whole organization. For example, NTSB has a Chief Acquisition Officer and is, for the most part, strategically assessing acquisition needs. After NTSB identified weakness in its small purchases program, audits by both GAO and DOT IG in the early 2000's identified weaknesses in the agency's financial internal controls.[31] As a result of these audits, NTSB undertook a number of initiatives to improve its acquisition activities. For example, NTSB established an Acquisition Division in October 2003 and hired an individual to manage the agency's acquisition program and to implement the GAO and DOT IG recommendations. In addition, NTSB's purchase card program was transferred to the Acquisition Division in fiscal year 2005. Upon assuming responsibility for this program, the division developed and implemented new purchase card policies and procedures. As part of these new procedures, the approving administrative officers at headquarters are responsible for purchasing office supplies and services for the agency, as needed, while investigators who hold purchase cards are limited to using

[30]GAO-06-801T.

[31]DOT IG, *National Transportation Safety Board: Rapiddraft Payment System*, Statement of Kenneth M. Mead Before the Budget Committee Task Force on Housing and Infrastructure, U.S. House of Representatives, April 13, 2000; GAO, *National Transportation Safety Board: Weak Internal Control Impaired Financial Accountability*, GAO-01-1032 (Washington, D.C.: Sept. 28, 2001).

them only on the scene of an accident during an investigation. NTSB also instituted a purchase limit for all staff. The single purchase limit is $2,500, and the monthly cycle-limit for purchases cannot exceed $25,000. NTSB also required that all purchase card holders and approving officials take an online General Services Administration (GSA) training course and additional NTSB training. Other controls to protect against fraud, waste, and abuse include certifying funds and obtaining approval from the cardholder's supervisor prior to making a purchase.[32] In addition, the cardholder's approving official reviews and approves cardholders' monthly statements. NTSB also performs random audits of cardholders' purchase card files to ensure that procedures are being adhered to. However, due to lack of staff in the 10 regional offices, the Acquisition Division has not randomly audited these purchase card holders. According to NTSB officials, they mitigate the risk associated with the lack of these audits by having the Chief Financial Officer (CFO) and the responsible approving official review all purchase card activity via the monthly Citibank transaction reports. However, unlike an audit, such a review does not assure that acquisition procedures are being followed.

Throughout the acquisition process, leading management practices have shown financial information should be tracked and communicated in a way that enables effective evaluation and assessment of acquisition activities. When financial data are not useful, relevant, timely, or reliable, the acquisition function—as well as other functions across an organization—are at risk of inefficient or wasteful business practices. NTSB is partially following this practice. For example, NTSB's purchase card program requires administrative and other key purchase card users to obtain quarterly lump sum funds approvals called credit authorizations. Once these cardholders have an approved credit authorization, they must prepare and submit to their supervisor a "credit buy" for every purchase. According to NTSB's purchase card procedures, a purchase cannot be made until funds have been certified, and a supervisor has approved the purchase. NTSB tracks and monitors both credit authorizations and credit buys using the Interior Department Electronic Acquisition System (IDEAS) Procurement Desktop, a Windows-based acquisition software application intended to facilitate the purchasing of goods and services. The program

[32]Other positive steps taken by the Acquisition Division include providing monthly obligations reports to all office directors and focusing on customer outreach and education. The Acquisition Division has also hosted training classes for senior staff, administrative staff, and its Contracting Officer's Technical Representative to educate them on their responsibilities in the acquisition process.

automates the entire purchasing process from creation of the purchase request to contract closeout. However, IDEAS cannot alert managers to identify when quarterly credit authorizations are running low and, therefore, there is a potential that more money can be spent than allotted. NTSB mitigates this risk by reviewing all purchases monthly.

Effective acquisition planning for IT includes having a written organizational policy guiding acquisitions and an acquisition strategy that includes objectives, projected costs and schedules, and risks and addresses the entire project life cycle. NTSB is not using some key processes and capabilities needed to successfully handle IT acquisitions. Sound business practices call for agencies to establish acquisition policies for IT to institutionalize and guide activities, such as project planning, to include budgeting and scheduling, requirements management, and risk management.[33] NTSB does not have an agencywide policy specific to IT acquisitions, which increases the risk that NTSB will not be able to effectively manage new IT programs as they are acquired and come online.

Other leading management practices in acquisition include strategically assessing the agency's needs and developing acquisition approaches to help the agency meet those needs, as well as leveraging the purchasing volume by identifying agencywide acquisitions of goods and services. In August 2004, Booz Allen Hamilton recommended that NTSB consolidate the purchasing of office supplies, uniforms, and other equipment in order to gain efficiencies such as acquiring quantity discounts, allowing spending to be easily tracked, tracking supply usage and forecasting needs with ease, and accounting for office purchases. In response to this recommendation, NTSB now centrally purchases computers, copiers, protective equipment, and uniforms.[34] NTSB has also assessed and incorporated changes to enable its acquisition process to better respond to

[33]Carnegie Mellon University's Software Engineering Institute, recognized for its expertise in software and system processes, has developed the Capability Maturity Model® Integration (CMMI[sm]) and a CMMI appraisal methodology to evaluate, improve, and manage system and software development processes. The CMMI model and appraisal methodology provide a logical framework for measuring and improving key processes needed for achieving quality software and systems.

[34]NTSB's Acquisition Division processes approximately $10-12 million per year on contracts that include approximately 600 small acquisition actions that total under $100,000 per year. The division also processes contracts for NTSB's training center that usually amount to under $100,000 per year.

unforeseen external events and emergencies.[35] For example, NTSB was granted "special contracting authority" in the NTSB Reauthorization Act of 2003 to help it award contacts without competition in order to expedite accident investigations. Since the authority was granted, NTSB has used it 11 times for a total acquisition value of $98,744. This is compared with $8,110,165 in total contract award dollars in fiscal year 2004 and $10,482,001 in total contract award dollars in fiscal year 2005. NTSB also has an appropriated emergency fund of $2 million, which is used for acquisitions.[36] The emergency fund provides additional resources if NTSB requires additional funding during the course of an investigation to purchase products or services. NTSB has used this authority selectively. For example, in the last 8 years, NTSB has accessed the fund once in fiscal year 2002 for costs related to the crash of American Airlines flight 587 at Belle Harbor, New York, and, at that time, the disbursement was about a quarter of the fund or $491,687.

NTSB Follows Certain Leading Practices in Financial Management but Lacks a Full Cost Accounting System and Is Not Compliant with the Anti-Deficiency Act

NTSB is partially following leading practices in financial accountability and control. A key to financial accountability is obtaining accurate and useful information on a timely and ongoing basis to support day-to-day managerial decisions and oversight. Other financial leading management practices include clear, strong financial management leadership by establishing the CFO position with specific authority and functional responsibilities for improving financial management, conducting related long-range planning, preparing agencywide financial statements that are subject to independent audit and preparing an agencywide public accountability report. NTSB's CFO has emphasized the importance of sound financial management based on best practices and has taken an active role in managing internal controls and improving financial management. For example, the CFO oversees the monitoring and financial execution of the agency budget in relation to actual expenditures and reports this information via weekly reports and regular senior management meetings. The CFO also provides information and regular communication to program office administrative officers and attends program office meetings. NTSB also has an arrangement with the

[35]For example, NTSB has prepared annual procurement forecasts since fiscal year 2004 to assist the agency with planning and gaining efficiencies.

[36]Based on information from the Managing Director, CFO, and the respective modal director, the Chairman makes the decision to make the emergency fund available for extraordinary accident investigation costs.

Department of Interior for personnel, payroll, accounting, and contracts and procurement systems. This arrangement allows the CFO to provide relevant financial and performance information to agency decision makers. Similar to private sector companies, government agencies are required to report their financial condition in publicly available financial statements. NTSB received an unqualified or "clean" opinion from independent auditors on its financial statements for the fiscal years ending September 30, 2003 through 2006. The audit reports concluded that NTSB's financial statements presented fairly, in all material respects, the financial position, net cost, changes in net position, budgetary resources, and financing in conformity with generally accepted accounting principles for those 4 fiscal years.

While cost accounting systems[37] provide financial information that can be used to monitor ongoing operations, they also aid in planning for the future. We have reported that sound financial management is crucial for responsible stewardship of federal resources.[38] In 2000, RAND recommended that NTSB develop systems that would allow the agency to better manage its resources by permitting full-cost accounting of all agency activities and recommended this be completed within a year.[39] To accomplish this, RAND recommended putting in place a timekeeping system, in which individual project numbers were assigned to each investigation and support activity such as training. With this information, project managers could better understand how staff resources were utilized, and project workload could be actively monitored by the Managing Director. NTSB began to implement this recommendation by upgrading a software system in November 2005 that tracks employee annual leave and sick leave. However, the system is not being fully utilized to track the number of hours staff spend on each investigation. Also, this system is not used to track time staff spend in training or at conferences. As a result, RAND's previous conclusion that "NTSB managers have little information they can use to plan the utilization of staff resources or

[37]Cost accounting involves the accumulation and analysis of financial and nonfinancial data, resulting in the allocation of costs to organizational pursuits such as performance goals, programs, activities, and outputs. Nonfinancial data measure the occurrences of activities and can include, for example, the number of hours worked.

[38]GAO, *Executive Guide: Creating Value through World-class Financial Management*, GAO/AIMD-00-134 (Washington, D.C.: April 2000).

[39]RAND Institute for Civil Justice, *Safety in the Skies: Personnel and Parties in NTSB Aviation Accident Investigations* (Santa Monica, CA.: 2000).

manage staff workloads properly" remains current. An NTSB official stated that a major challenge will be the cultural change to use the cost accounting system once installed because of the size of NTSB; some divisions only have 10-20 investigators, and the official stated that the division managers know the workload of each investigator. In May 2006, we recommended that NTSB develop a full cost-accounting system. NTSB agreed with the recommendation and told us that it will attempt to allocate funds in fiscal year 2007 to address this capability.

Finally, NTSB has been noncompliant with the Anti-Deficiency Act because it did not obtain budget authority for the net present value of the entire 20-year training center lease obligation at the time the lease agreement was signed in 2001. This occurred as a result of NTSB classifying the lease as an operating lease rather than a capital lease. NTSB realized the error in 2003 and reported its noncompliance to Congress and the President. NTSB has proposed in the President's fiscal year 2007 budget to remedy this Anti-Deficiency Act violation by inserting an amendment in its fiscal year 2007 appropriation that would allow NTSB to fund this obligation from its salaries and expense account through fiscal year 2020. However, this proposal was removed once the budget went to the House and Senate Appropriations Committees and, at this time, leaves the Anti-Deficiency Act violation uncorrected. If this provision is not passed, NTSB will need to take action to correct the Anti-Deficiency Act violation. This could include obtaining a deficiency appropriation for the full amount of the lease, renegotiating, or terminating the lease so that it complies with the Anti-Deficiency Act, or obtaining authority to obligate lease payments using annual funds.

NTSB Is Making Progress in IT Management but Still Lacks Key Components

NTSB has made improvements in its IT program, but weaknesses persist. Federal agencies are increasingly relying on IT to facilitate mission support. Our previous work has identified key elements of an IT program, which include an IT strategic plan, enterprise architecture, IT investment management, and information security. At present, NTSB is minimally following leading IT management practices. Currently, NTSB does not have a strategic management plan for IT, and it has not developed an enterprise architecture plan for modernizing its IT systems. Similarly, NTSB also lacks an IT investment management process to control and evaluate the agency's IT investment portfolio. Additionally, in 2005, the DOT IG found significant weaknesses in NTSB's information security

program and reported that NTSB computers were vulnerable to unauthorized access from both inside and outside the agency and that the agency had no system to identify security breaches on its network.[40]

NTSB has made some improvement to IT security in response to DOT IG recommendations. To manage information security risks, NTSB has instituted a program of intrusion detection and computer vulnerability scanning. NTSB has also invested in advanced training for IT staff on information security and has trained all users of the agency's computer system in computer security awareness. Furthermore, NTSB has created a Chief Information Officer (CIO) position, which will be responsible for IT. Although NTSB is actively recruiting for the position, it is still vacant.[41] However, NTSB has recently hired a deputy CIO who has expertise in enterprise architecture and IT investment management. Nonetheless, in October 2006, the DOT IG found that while NTSB has made a concerted effort to improve its information security program, its program still has significant deficiencies.[42]

NTSB Lacks a Knowledge Management Program

NTSB is minimally following leading practices in knowledge management. Knowledge management includes four fundamental principles: leadership that articulates management's vision and goals (e.g., in written policies and guidance), processes (including performance measurements) to turn vision into reality, technology that allows implementation of goals and supports the processes, and a culture of knowledge sharing and reuse. Knowledge management is essential to an organization because it is a means by which people create and share knowledge, including data and information. Some key elements of knowledge management are having an agencywide knowledge management initiative and having a senior official who coordinates this initiative and integrates it with other areas of the organization. Although the 2004 OPM's Federal Human Capital Survey reported that over 90 percent of NTSB employees were satisfied with the use of IT to gather and share knowledge, NTSB does not have a knowledge

[40]DOT IG, *Information Security Program: National Transportation Safety Board*, FI-2006-001 (Washington, D.C.: Oct. 7, 2005).

[41]When the position becomes filled, NTSB expects that the CIO will focus upon maintaining the NTSB desktop computer program, refreshing and consolidating some computer servers, and improving technical resources for continuity of operations.

[42]DOT IG, *Information Security Program: National Transportation Safety Board*, FI-2007-001 (Washington, D.C.: Oct. 13, 2006).

management initiative or program and lacks a CIO to implement policies and procedures on information sharing.

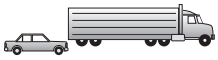
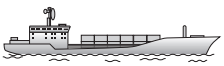
NTSB Carries Out Its Transportation Safety Function by Investigating Accidents, Issuing Recommendations, and Taking Proactive Steps Outside of Specific Accidents

NTSB has an accident investigation process in which some transportation modes have detailed criteria for determining which accidents to investigate, while others do not. Although accident investigations are sometimes lengthy, NTSB takes steps to ensure that recommendations for improving transportation safety are made available to the transportation industry before a report is issued. To assist in accident investigations, NTSB employs the use of outside sources that provide technical expertise. Also, public hearings are used to assist in the investigation process, although they are time and resource intensive. Finally, NTSB proactively accomplishes its mission by conducting public forums and safety studies.

NTSB's Use of Risk-Based Criteria to Select Accidents to Investigate is Uneven

NTSB accomplishes its transportation safety function by conducting on-scene investigations of selected accidents in all transportation modes. Since its inception in 1966, NTSB has investigated over 134,000 transportation accidents, over 90 percent of which were aviation. NTSB's statutory mandate gives it broad discretion in determining which accidents in the nonaviation modes to investigate. Since NTSB lacks the staff resources to conduct on-scene investigations of all aviation accidents or a large number of nonaviation accidents, certain modal offices have adopted additional risk-based guidance for selecting accidents for investigation. Figure 9 describes the legislative and other criteria that NTSB uses to identify accidents to investigate.

Figure 9: Legislative, Regulatory, and Other Criteria for Identifying Accidents to Investigate, by Mode

Mode	Legislative and regulatory criteria	Additional guidance
Aviation 	Investigates or causes to be investigated all civil and certain public aircraft accidents in the United States and participates in the investigation of international accidents where the United States is the state of registry, operator, designer, or manufacturer.	Investigates international or domestic accidents where there is the likelihood of significant public interest or involvement of individuals of national prominence.
Highway 	Investigates selected accidents including railroad grade crossing accidents, which NTSB selects in cooperation with a state.	Identifies candidate accidents for investigation using a 4-tier system: Tier 1: general accidents that have five or more fatalities and mostly involve passenger vehicles. Tier 2: accidents that have two or more fatalities or one or more of varying circumstances. Tier 3: accidents that have one fatality and one or more of varying circumstances. Tier 4: any accident not in tiers 1, 2, or 3 that might have significant safety issues; any accident in any other mode, when the accident is reported to that mode's duty officer.
Marine 	Investigates selected major accidents and incidents, collisions involving public vessels with any nonpublic vessel, accidents involving significant safety issues related to Coast Guard safety functions, and international accidents within the territorial seas and where the United States is the state of registry. Major marine accidents are defined as a casualty that results in (1) the loss of six or more lives; (2) the loss of a mechanically propelled vessel of 100 or more gross tons; (3) property damage initially estimated as $500,000 or more; or (4) serious threat, as determined by the Commandant of the Coast Guard and concurred with by the Chairman of NTSB, to life, property, or the environment by hazardous materials.	Investigates accidents involving the risk to the safety of third parties, such as passengers or port facilities; serious threats to life, property, or the environment; and a vessel collision with one or more fatalities or $75,000 or more in property damage.
Railroad 	Investigates railroad accidents involving a fatality, substantial property damage, or a passenger train.	None.
Pipeline 	Investigates pipeline accidents in which there is a fatality, substantial property damage, or significant injury to the environment.	None.
Hazardous materials 	Investigates releases of hazardous materials in any mode that involves a fatality, substantial property damage, or significant injury to the environment. For all modes, NTSB also evaluates the adequacy of safeguards and procedures for the transportation of hazardous materials and the performance of other departments, agencies, and instrumentalities of the government responsible for the safe transportation of that material.	None.

Source: GAO analysis of legislative, regulatory, and NTSB documents.

NTSB allocates most of its staff resources to conduct a significant number of aviation accident investigations. As mentioned earlier in this report, NTSB is required by statute to investigate all domestic civil aviation

accidents and certain other aviation accidents. However, in 2004, citing a severe shortage of regional investigators, the Office of Aviation Safety issued a memorandum to investigators intended to manage its aviation workload due to the shortage of aviation investigators. The memorandum calls for, among other things, more selectivity in which accidents to investigate on-scene in order to minimize investigative efforts on accidents in which there is minimal safety "payback," equalize regional workloads, and reassign some accidents to NTSB headquarters for investigation. Even with this guidance, the number of NTSB's staff that investigates aviation accidents may limit the resource amounts that NTSB can use to investigate accidents in other modes, especially rail, which may have broader or more critical safety implications, which we discuss later in this report.

In addition, NTSB investigates general aviation and small aircraft accidents that are also investigated by FAA. In some cases, NTSB uses FAA investigators and inspectors to leverage its resources.[43] NTSB's size prevents it from being on-site for many general aviation investigations; therefore, the agency conducts "desk investigations" in which NTSB investigators do not go to the scene of the accident to gather information but rather correspond with FAA by mail, e-mail, or phone to gather information and conduct analyses.

As with the aviation mode, NTSB is also mandated to investigate certain types of transportation accidents in nonaviation modes. NTSB has orders or guidelines that define the safety program for each mode and identify the types of accidents that are investigated and the procedures for doing so. Furthermore, in an attempt to manage resources and ensure the maximum safety benefit, the highway office has adopted policies that are within the framework of the legislation and board orders and that identify and prioritize candidate accidents for investigation. For example, in an effort to ensure better use of resources, the highway office has a four-tier system to identify accidents for investigation based on the severity of the accident and the amount of property damage, among other things. This system provides risk-based criteria for the office to determine which of the approximately 6 million highway accidents each year it will investigate. In contrast, the marine office, which investigates significantly fewer accidents than the highway office—in 2005, NTSB, investigated 32 highway accidents compared with 3 marine accidents—has instituted

[43]FAA can also conduct separate investigations looking into compliance issues with federal aviation laws and regulations. 49 U.S.C. §40113(a).

guidance that provides less restrictive criteria for determining which accidents to investigate. For example, the regulations and a memorandum of understanding with the Coast Guard require NTSB to investigate selected major marine accidents, which include casualties that result in the loss of six or more lives or property damage of $500,000 or more, while additional guidance calls for investigating accidents with one or more fatalities or $75,000 or more in property damage.

In contrast to the highway mode, NTSB does not have documented, risk-based criteria for selecting rail, pipeline, and hazardous materials accidents to investigate. Board orders for these modes contain the statutory language for selecting accidents to investigate but no further criteria. As a result, officials from NTSB's rail, pipeline, and hazardous materials offices told us that it is difficult to determine which accidents to investigate given their resource constraints. They said that the number of investigators has decreased since 2000 and that attrition has been a significant problem for them because they are losing expertise. Since 2000, the office experienced a 16 percent decline in the number of investigators and technical specialists—the 37 staff filling these positions in fiscal year 2000 dropped to 31 at the beginning of fiscal year 2007.

As a result of not having a policy for selecting accidents in these modes, the agency lacks assurance and transparency that it is managing resources in a manner that ensures a maximum safety benefit. For example, a rail stakeholder that we spoke with questioned why NTSB did not investigate four railroad accidents in 2006 that resulted in one fatality, several injuries, and significant property damage. Moreover, at least three of these accidents resulted from collisions, which they identified as a recurring problem in the rail industry that NTSB has placed on its "Most Wanted List"—which includes those safety recommendations that NTSB has designated as critical—meaning that changes are needed to reduce transportation accidents and to save lives.[44] According to NTSB officials, safety issues that they have already identified, such as those on the "Most Wanted List," are a lower priority to investigate than new safety issues. While this is a reasonable approach, it is not documented policy and clearly has not been communicated to industry or the public.

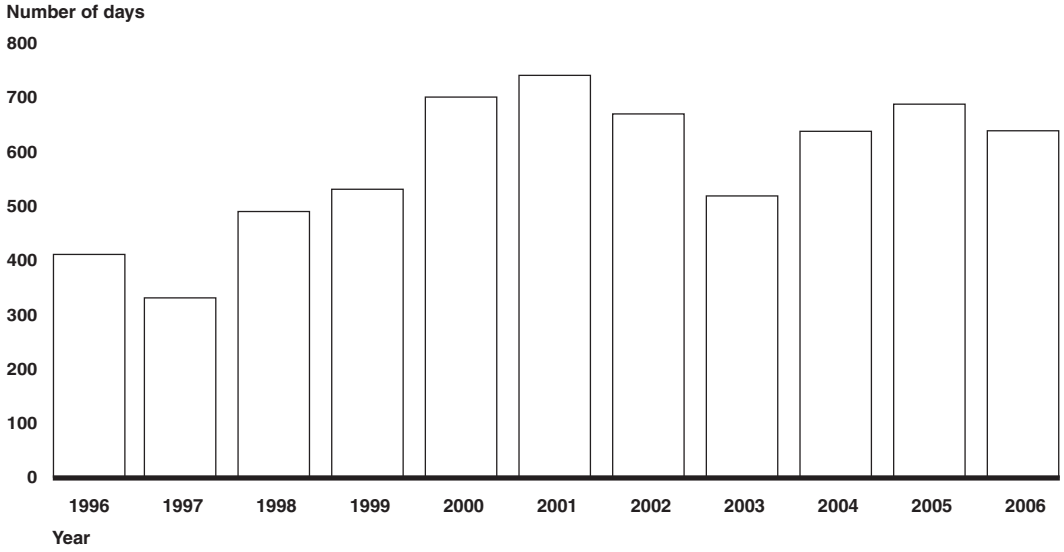
[44]To prevent train collisions and overspeed accidents, NTSB's "Most Wanted List" includes a recommendation that FRA require automatic control systems to override mistakes by human operators.

In addition, while stakeholders recognize that NTSB lacks resources to investigate many rail accidents, they believe that NTSB most often investigates only large or controversial rail accidents. For example, of the 3,191 railroad accidents that occurred in 2005, NTSB investigated 9. By comparison, FRA, with a staff of 435 field inspectors compared to 13 NTSB railroad investigators, investigated 98 accidents that year. Rail stakeholders told us that they believe that there are some "small" accidents with root causes and contributing factors that could have prevented larger accidents. While these small accidents may not result in great human or property loss, they may have significant safety implications and serve as forecasts for future accidents, as well as providing background data to inform investigators of mitigating circumstances in other accidents. As a result, stakeholders are unsure why certain accidents are selected for investigation and believe that rail accident investigation criteria should be reviewed.

NTSB Has Taken Steps to Reduce the Potential Negative Consequences of Lengthy Investigations

The length of NTSB investigations can adversely impact transportation safety by delaying the final report and any safety recommendations. NTSB, recognizing that investigations are lengthy, has processes that address transportation safety issues before the release of a report. The initial, on-scene phase of the accident investigation, and the subsequent analysis of evidence, has taken an average of 1.5 years (or 18 months) to complete. Moreover, the average duration of accident investigations has increased over the last 10 years. For example, in 1996 the average length of an investigation was 410 days, compared with 638 days in 2006. (See fig. 10.)

Figure 10: Average Duration of Accident Investigations for Which Recommendations were Issued, Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

There is no specific time line for how long an accident investigation should take, according to NTSB; the complexity of the accident dictates the time frame for completing the on-scene phase of the investigation. Two additional factors also are likely to affect the length of accident investigations. First, investigators sometimes need to investigate new accidents before completing ongoing investigations. Second, NTSB managers and investigators told us that resource constraints are contributing factors in how they accomplish their mission. Specifically, rail officials said that declining numbers of investigators affect the number of accidents that they investigate.

The potential negative effect of a lengthy accident investigation is that a full report outlining details of the accident, including probable causes and sometimes safety recommendations, is not issued until the completion of the investigation. In certain cases, this may hinder transportation safety as recommendations for improvements may be delayed until the report is issued. However, NTSB employs two tools to help ensure transportation safety in this instance. First, NTSB can issue safety recommendations before a report is issued. NTSB designates priority recommendations as "urgent." Since 2001, the agency has issued 26 urgent recommendations, of

which 6 have been implemented.[45] An urgent recommendation outlines immediate actions for the transportation industry to take to prevent impending loss or damage due to a similar accident. For example, NTSB issued urgent recommendations to the Northeast Regional Commuter Railroad Corporation to install an automatic train control system and to the Washington Metropolitan Area Transit Authority to provide written instructions for identifying and responding to emergency train rollback situations. Second, during the course of an investigation, investigators can also issue suggestions for improvements that can be addressed to a variety of entities such as states, private organizations, or manufacturers. Once these suggestions have been implemented, they then become safety accomplishments. Since fiscal year 2001, NTSB has issued 256 safety accomplishments, of which over 90 percent have been in the aviation mode.

External Sources Provide Essential Services during Accident Investigations

Outside experts provide critical assistance to NTSB investigators throughout the on-scene phase of an investigation. During the course of an investigation when additional support is needed for fact finding or technical analysis, NTSB supplements its investigative staff through the use of "parties" and outside contractors.[46] "Party" participants are individuals, agencies, companies, and associations that can provide technical expertise relevant to a specific accident during the fact-finding phase. For example, in an aviation accident, the parties to the investigation may include the aircraft manufacturer and operators; by statute, FAA is always a party to an aviation investigation. While the party process may provide technical information that is important for determining the cause of an accident, it presents inherent conflicts of interest for entities that are both parties in an investigation and potential defendants in related litigation. For example, in a commercial aviation accident, the principal defendants in litigation for damages are likely to be

[45]Of the 26 urgent recommendations, 21 were aviation, 3 were highway, and 2 were rail-related.

[46]NTSB contracts with experts who deal with specific facets of the investigation for which NTSB does not need to retain continual expertise. For example, following an accident involving casualties, NTSB's Office of Transportation Disaster Assistance, which is responsible for providing support to victims' families, may contract a team of forensic specialists who respond to mass fatality events. These outside contractors are used by all modes depending upon the accident and the type of information and analysis needed. Since 2004, NTSB has contracted with 10 different companies, which provided services such as radiological testing, pipeline testing, and report writing, for a total cost of $282,757.

the airline and aircraft manufacturer, who may face liability for dozens of deaths. In addition, both entities are likely working with NTSB as parties to the investigation.

Despite such challenges, the party system appears to be working well. RAND found that the party system works well in that it allows NTSB to leverage its resources to provide critical safety information in regard to the accident under investigation. In addition, NTSB officials told us that the system is an efficient way of gathering and sharing information about the accident with investigators and other parties. Also, having multiple parties on an investigation offsets concerns of conflict of interest and impartiality.

NTSB May Also Conduct Public Hearings During Investigations, Which Are Infrequent and Resource Intensive

Although public hearings can provide useful information to NTSB investigators to assist in the accident investigation and define policy issues or emerging areas of transportation safety, they occur infrequently because NTSB managers view them as an inefficient use of resources. Public hearings are inquiries intended to supplement the facts discovered during the on-scene and subsequent follow-up investigation of an accident. They are generally held with regard to a major accident in which there is wide and sustained public interest, or significant safety issues. They are intended to produce comprehensive coverage of all relevant factual data and publicly record the substance of all the evidence. Since 1997, NTSB has held 29 public hearings, primarily for aviation accidents (see table 3). Of those 29 hearings, 16 were as a result of an accident, and the other 13 were on general transportation safety issues such aviation image recorders[47] or pipeline safety. Of the 16 accident hearings, 13 were held within 1 year of the accident, and the remaining 3 were held within two years of the accident.

[47]Aviation imaging recorders are crash-protected imaging systems often called video recorders on aircraft used in commercial air transportation operation.

Table 3: Number of Public Hearings by Mode, Calendar Years 1997-2006

Year	Aviation	Marine	Rail, pipeline, and hazardous materials	Highway	Total
1997	1	0	0	0	**1**
1998	1	1	1	2	**5**
1999	1	2	2	3	**8**
2000	2	0	1	1	**4**
2001	0	0	0	0	**0**
2002	2	0	1	0	**3**
2003	1	0	0	1	**2**
2004	1	0	0	0	**1**
2005	1	0	1	0	**2**
2006	2	0	0	1	**3**
Total	**12**	**3**	**6**	**8**	**29**

Source: GAO analysis of NTSB data.

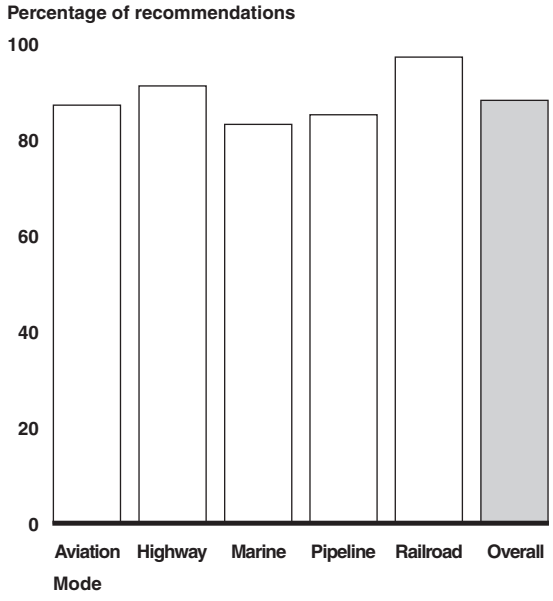
Note: Calendar year 2006 includes data through August 2006.

NTSB managers have cited resource constraints as reasons for the limited use of public hearings. However, on occasion, board members have voted to hold a public hearing despite staff recommendations to the contrary. NTSB officials told us that the coordination and preparation of witnesses to testify at the hearings requires significant administrative planning and logistical organization and that this process can sometimes be costly, take resources away from accident investigations, and delay reports. However, NTSB was not able to provide data on how much time is spent preparing for public hearings because it lacks a full cost accounting system. Nonetheless, transportation industry stakeholders felt that hearings were valuable for public transparency because they allowed for the parties to the investigation to question the witnesses. In an effort to reduce travel costs associated with public hearings, in 1999, NTSB began holding all public hearings in Washington, D.C., whereas previously hearings were held near the site of the accident. In addition, NTSB has also begun webcasting public hearings so that individuals interested in or associated with the accident may view it without traveling to the hearing.

Most NTSB Recommendations Are Accepted, but Some Recommendations Are Impractical for the Industry to Implement

NTSB has a good record of making recommendations to improve transportation safety and having a large percentage of recommendations implemented. Since 1996, NTSB has issued 2,417 recommendations, of which 1,647 (or 68 percent) were closed. Of the closed recommendations, 88 percent have been closed out with the agencies having taken acceptable or favorable action toward implementation. The remaining 12 percent of closed recommendations were closed out with an "unacceptable" status classification. NTSB uses the unacceptable classification for situations such as the agency not agreeing to implement the recommendation, taking longer to implement than NTSB would like, or taking alternative action to meet the intent of the recommendation, which NTSB finds unacceptable. (See app. III for further information.) The recommendation acceptance rate for closed recommendations varies across modes—with rail having the highest acceptance rate and marine the lowest—and the overall rate has remained relatively high over the last decade. (See fig. 11.) Regarding NTSB's open recommendations for this same time period, about 15 percent of NTSB's open recommendations are classified with an unacceptable agency response. Aviation has the highest percentage of open recommendations with an unacceptable response, while pipeline has the lowest. (See fig. 12.)

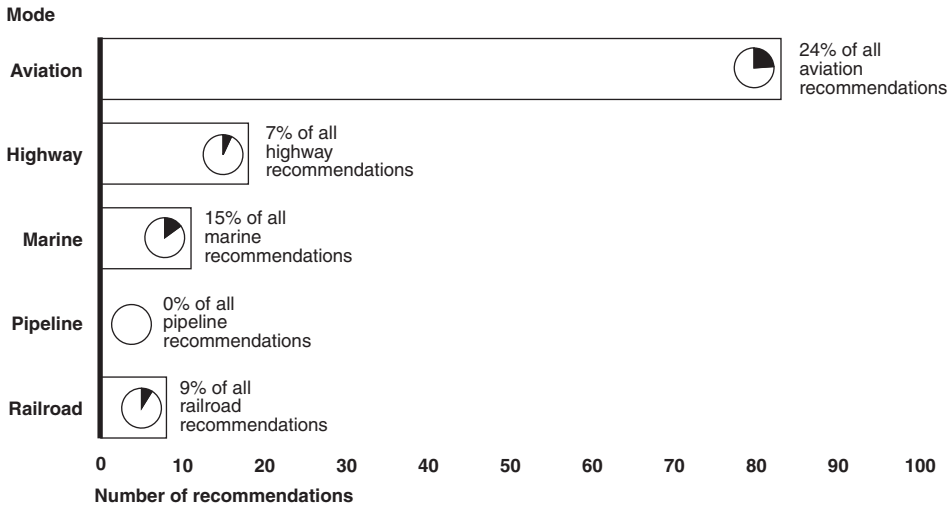
Figure 11: Acceptance Rate by Mode, Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

Note: Calendar year 2006 includes data through June 8, 2006.

Figure 12: Percentage and Number of Open Recommendations with Unacceptable Agency Action Issued During Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

Note: For each mode of transportation, the bar shown represents the number of recommendations that were open as of June 8, 2006, and have an unacceptable action status category assigned by NTSB. The embedded pie chart for each mode shows what percentage these unacceptable recommendations make up of that mode's total number of open recommendations. Calendar year 2006 includes data through June 8, 2006.

Although there may be several reasons why agencies do not implement some NTSB recommendations, cost is a contributing factor. NTSB does not determine the costs associated with the benefits of a particular safety recommendation. As a result, agencies determine that some recommendations are impractical for industry to implement. Some of those recommendations that the industry considers impractical are deemed of high importance to NTSB, which has placed them on its "Most Wanted List." For example, a recommendation from this list that remains open due to an analysis of excessive cost by the FAA is to improve audio and data recorders on aircraft, based on an original safety recommendation from 1999. FAA determined that after an analysis of the benefits of having two systems, it was unable to justify the excessive cost that would be incurred in the installation of two complete systems and, therefore, this change has not been required by FAA.

While cost may be an important factor for why some recommendations are not implemented, agencies also site redundancies that some recommendations may cause as a reason for disagreement with the recommendation. For example, in 1997, NTSB recommended that FRA require the recording of train crew members' voice communications for

use in accident investigations. However, after review, FRA found that this recommendation was impractical because there were already devices in place that would better capture and preserve data that would provide information to investigators in an accident investigation. For this reason, FRA concluded that the implementation of cab voice recorders was not justified and did not accept this recommendation.

The process of closing out or changing recommendations is time consuming and paper-intensive and relies on a series of sequential reviews that can take months to complete. As a result, resources within NTSB are inefficiently used, and federal agencies may be unaware of whether their response has been accepted or not accepted by NTSB. In our prior work, we recommended that NTSB improve the efficiency of the review process for recommendations by computerizing the documentation and implementing concurrent reviews. NTSB agreed with this recommendation and would like to replace its current process with an automated one. However, they stated that their ability to do this will depend on the availability of funds. In the meantime, in response to our recommendation, NTSB has created the position of Associate Managing Director for Quality Assurance. This individual is analyzing the manual review process for changing the status of recommendations and is expected to recommend strategies to ensure that the process is effective and efficient, according to NTSB officials.

NTSB Takes Proactive Steps Outside of Specific Accident Investigations

NTSB complements its accident investigation activities through supplemental tools that are not necessarily a part of the accident investigation process. Safety studies, public forums, and symposia are mechanisms that NTSB uses to gather further information on transportation safety. Safety studies consist of research undertaken by NTSB on safety issues that may be relevant to more than one accident. They are intended to provide improvements in transportation safety by affecting changes to policies, programs, and activities of agencies that regulate transportation safety. Safety studies also allow NTSB to assess and reassess techniques and methods of accident investigation and may result in recommendations to reduce the likelihood of recurrence of transportation accidents. Since 2000, NTSB conducted four safety studies. (See table 4.) The four studies resulted in 41 recommendations addressed to FAA and PHMSA. For example, in a 2005 study of risk factors associated with general aviation accidents, NTSB recommended that FAA revise guidance material associated with pilot weather briefings to include guidance on applicable sources of weather information, such as the Internet and satellites; NTSB also recommended that FAA develop a

means to identify pilots whose overall performance history indicates that they are at future risk of accident involvement and develop a program to reduce risk for those pilots. Industry stakeholders told us they would like NTSB to conduct more safety studies, which they believe address NTSB's mission in a more proactive way. For the most part, safety studies are initiated at the request of NTSB staff, and recent studies have taken between 1 and 3 years to complete. According to NTSB, the number of safety studies it conducts is resource-driven. However, NTSB officials recognize the importance of these studies and would like to find ways to make them less resource intensive and more effective by decreasing the duration of these studies and the resources involved and finding ways to issue recommendations prior to completion of the studies.

Table 4: Number of Safety Studies by Mode, Calendar Years 2000–2005

Year	Number of studies	Mode
2000	1	Aviation(1)
2001	1	Aviation (1)
2002	0	Not applicable
2003	0	Not applicable
2004	0	Not applicable
2005	2	Aviation (1), pipeline (1)

Source: GAO analysis of NTSB data.

Another method by which NTSB accomplishes its transportation safety function is the use of public forums and symposia. Unlike public hearings, these deliberations are intended to gather information about safety issues affecting all modes of transportation, instead of one specific accident or mode. Public forums highlight safety issues that have been a factor in past accident investigations and that will perhaps be an issue in the future should the transportation industry not take action. NTSB managers find that forums and symposia are not as resource intensive or as costly as public hearings because they do not require coordination of witnesses, parties, technical panels, and court reporters.

NTSB's Training Center Is Not Cost-Effective; Options Could Increase Cost-Effectiveness, but Vacating Space May Be Least-Cost Strategy

While NTSB staff and other students at the training center have been positive about the quality of the courses, NTSB's training center is not cost-effective, as the combination of the training center's revenues and external training costs avoided by NTSB staff's use of the training center do not cover the training center's costs. Training center revenues are affected by several factors, including low utilization of the training center and the availability of similar courses elsewhere that may reduce the number of students interested in training center classes. Furthermore, NTSB's courses are already priced at or above market prices, making it unlikely that NTSB could raise its course prices, although decreasing course prices may attract more students and, thereby, increase total revenue. Potential strategies to increase revenues or decrease costs could increase the cost-effectiveness of the training center, although vacating the space may be the least-cost strategy, even if NTSB had to buy out the remaining lease.

Training Center's Revenues and Avoided Costs Do Not Cover Training Center's Costs

Assessing the financial impact of the training center on NTSB requires looking at both the revenues the training center generates and any costs that it enables NTSB to avoid, and comparing these revenues and avoided costs with the direct costs of the training center. The training center generates revenues through tuition fees, subleasing space to other agencies for events such as conferences, and contracts with federal agencies that would allow them to use training center space for "continuity of operations" in emergency situations.

For the first 2 full years of operation, fiscal years 2004 and 2005, NTSB's training center did not generate sufficient revenues to cover the costs of providing training, as shown in table 5. As a result, those portions of the training center's costs that were not covered by the revenues from tuition and other sources—approximately $6.3 million in fiscal year 2004 and $3.9 million in fiscal year 2005—were offset by general appropriations to the agency. The salaries and other personnel-related expenses associated with NTSB investigators and managers teaching at the training center, which would be appropriate to include in training center costs, are not included in table 5. In addition, NTSB lacks a full cost-accounting system that would facilitate doing so. The table shows expenses directly associated with the training center and does not include an allocation of agencywide supporting services, such as the Managing Director's office, IT, human resources, and legal support. Some of the expenses during these 2 years were one-time expenses—such as over $125,000 for furniture and equipment (included in table 5 as office supplies and equipment for fiscal year 2005) and $499,000 to move the wreckage of the TWA flight 800

airplane[48] from storage near the crash site in New York to the training center (included in the table as miscellaneous government contract services in fiscal year 2004). Space rental is a fixed annual expense of about $2.5 million. When that fixed expense is excluded from training center expenses, the remaining operating expenses exceeded revenues by about $3.7 million in fiscal year 2004 and about $1.4 million the subsequent year.

Table 5: Direct Expenses and Revenues for the NTSB Training Center, Fiscal Years 2004 and 2005 (unaudited)

	Fiscal year 2004	Fiscal year 2005	Percentage difference
Personnel related	$1,011,716	$978,591	-3%
Travel	$24,428	$56,912	133%
Space rental[a]	$2,521,440	$2,500,896	-1%
Maintenance/repair of buildings	$706,279	$238,203	-66%
Miscellaneous government contract services	$2,204,880	$558,540	-75%
Office supplies and equipment	$12,939	$153,249	1,084%
Miscellaneous expenses[b]	$29,320	$28,887	-1%
Total expenses	**$6,511,002**	**$4,515,278**	**-31%**
Earned revenue[c]	$258,760	$634,800	145%
Overall deficit	-$6,252,242	-$3,880,478	-38%
Deficit when space rental expense is excluded	-$3,730,802	-$1,379,582	-63%

Source: GAO analysis of information from NTSB.

[a]NTSB leases the training center from George Washington University under a 20-year lease that will expire in 2021.

[b]Miscellaneous expenses such as telephone, mail, photography services, and printing.

[c]Earned revenue includes imputed fees for NTSB students.

Other sources of revenue would be needed for NTSB to be able to recover the full costs of the training center. For fiscal year 2004, over $12,000 in revenue (about 5 percent of total revenues) was collected from sources other than course fees to cover some of those costs.[49] For fiscal year 2005, the revenue from other sources increased to over $91,000 (about 14 percent of total revenues). Other sources of income during these 2 years

[48]The wreckage is used for certain courses.

[49]In fiscal year 2004, NTSB offered 11 gratis offerings to attract users and showcase the facilities. In fiscal year 2005, there were no gratis offers as the promotional aspect was no longer needed, according to NTSB.

included subleasing space to other organizations, such as the Society of Automotive Engineers, George Washington University, and the National Association of State Boating Law Administrators for meetings, conferences, and boat storage. NTSB determines facility usage fees for subleasing space by assessing the square footage of each room, then using that square footage to determine what that figure represents in terms of the percentage of overall space. This percentage is then valued against the lease for the facility, calculated on a per-day basis. Each room and lab space, therefore, carries a half day, full day, and weekly value that carries a charge reflecting its value, in terms of space, to the overall lease, but not in terms of the full cost of the space. In addition, NTSB has contracted with two agencies—the Federal Energy Regulatory Commission and the U.S. Veterans Affairs Courts—for continuity of operations. According to NTSB officials, it has explored this option with other organizations but has not found others who will pay a yearly retainer for the use of the space.

However, additional revenues from continuing the current practice of subleasing training center space is not likely to cover training center costs due to the magnitude of the training center's deficit and because the fee structure does not cover the full cost of the space. Furthermore, NTSB does not have a business plan or marketing strategy that seeks to optimize opportunities for additional revenues. Previously, we recommended NTSB develop a comprehensive marketing plan that includes such things as outreach to potential users, marketing classroom and conference space, and conducting market research for additional curriculum development.[50] In response to our recommendation, NTSB has stated that it intends to formalize a marketing plan for the training center and make efforts to expand the current utilization of the space.

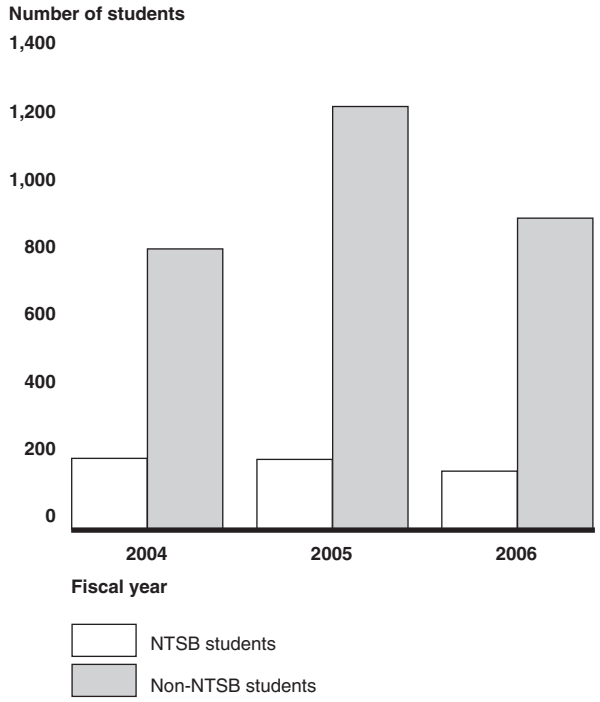
Another element in the training center's cost-effectiveness is the extent to which the training center has allowed NTSB to avoid costs associated with external training. However, thus far, the training center has had a limited impact on external training costs—of about $1,041,000 annually—as the majority of students at the training center have been non-NTSB staff, and NTSB staff have taken a majority of their training courses through external sources. About 20 percent of the training center's approximately 1,000 students[51] in fiscal year 2004 were NTSB staff, about 14 percent of the

[50]GAO-06-801T.

[51]The total number of students is the sum of the participants in all classes. Individuals who attended more than one class at the training center were, therefore, counted multiple times.

1,400 students in fiscal year 2005 were NTSB staff, and about 16 percent of the 1,066 students in fiscal year 2006 were NTSB staff. During fiscal years 2004 through 2006, about 570 NTSB students[52] attended 55 of the 71 class sessions conducted at the training center. (See fig. 13.) NTSB is making efforts to have staff more fully utilize the facility. In fiscal year 2004, 1 of 18 sessions was only for NTSB investigators; in fiscal year 2005, 5 of 31 sessions were only for NTSB investigators.[53] However, in fiscal year 2006, none of the 22 sessions was only for NTSB investigators.

Figure 13: Number of NTSB and Non-NTSB Students, Fiscal Years 2004-2006



Source: GAO analysis of NTSB data.

NTSB staff receive most of their training from outside the training center, which may be due to the training center courses lacking the subject matter that they require. Our analysis of staff training requests for fiscal year 2006 showed that 97 percent of all training was expected to be from external

[52]Individuals that attend more than one class are counted multiple times.

[53]These course sessions were Conducting Effective Technical Presentations; two sessions each of Media Training and Major Investigation Protocol and Processes; and a joint training class with the Federal Bureau of Investigation.

sources and the remaining training from NTSB's training center. NTSB staff requested external training being provided by organizations that include FAA's Transportation Safety Institute (TSI), the University of Southern California, the U.S. Department of Agriculture, and Kettering University on subjects such as human factors in aviation safety, turbine engine investigation, and automotive design and safety.[54] Staff training requests also cover other specialties such as helicopter training, flight training currency for pilots, technical writing, supervisory and management skills, and industry conferences. A majority of the 25 investigators and writer-editors with whom we spoke had positive views on the quality of training center courses but provided several reasons for not taking further courses there. Ten of the 25 investigators and writer-editors we interviewed told us that they had taken (or taught) courses at the training center and thought the courses were excellent;[55] none of the investigators and writer-editors had anything negative to say about the quality of any training center course. In addition, our review of students' course evaluations for fiscal years 2004 and 2005 indicated high positive responses. However, none of the NTSB staff we talked with had plans to attend training center courses in fiscal year 2007. One reason noted for this situation was the remoteness of Ashburn, Virginia, from their residences. Another reason was the lack of courses on new transportation technologies and the skills and competencies needed by an investigator-in-charge. Eight investigators told us that they find workshops by manufacturers, such as aircraft and automobile manufacturers, more valuable to their work than courses held at the training center.

The training center is not utilized more by NTSB staff, in part, because the agency has not developed a core curriculum for its staff that could then be offered at the training center. The training center only offers one course that is required for NTSB's aviation investigator staff—-a 2-week course on aviation accident investigation. There are no refresher courses for aviation accident investigation. The Deputy Manager of the training center told us that the training center plans to eventually offer more internal training covering subjects such as management skills, retirement, and computers.[56] However, no milestones or specific plans have been established for that

[54]Some subjects, such as human factors, are also taught at NTSB's training center.

[55]Our review of course evaluations for fiscal years 2004 and 2005 indicated high positive responses by students to the training center courses. The data lacked information for us to compare evaluations by NTSB students and non-NTSB students.

[56]NTSB is considering contracting out more courses such as these.

effort, and the cost of developing those courses has not been estimated. Moreover, even if NTSB were able to completely replace external training with courses at the training center (an unlikely scenario), avoiding NTSB's current external training costs of $1,041,000 annually would not come close to offsetting the training center's annual lease costs of $2.5 million.

Training Center Revenues Are Affected by Low Utilization, Availability of Courses Elsewhere, and Courses at or Above Market Prices

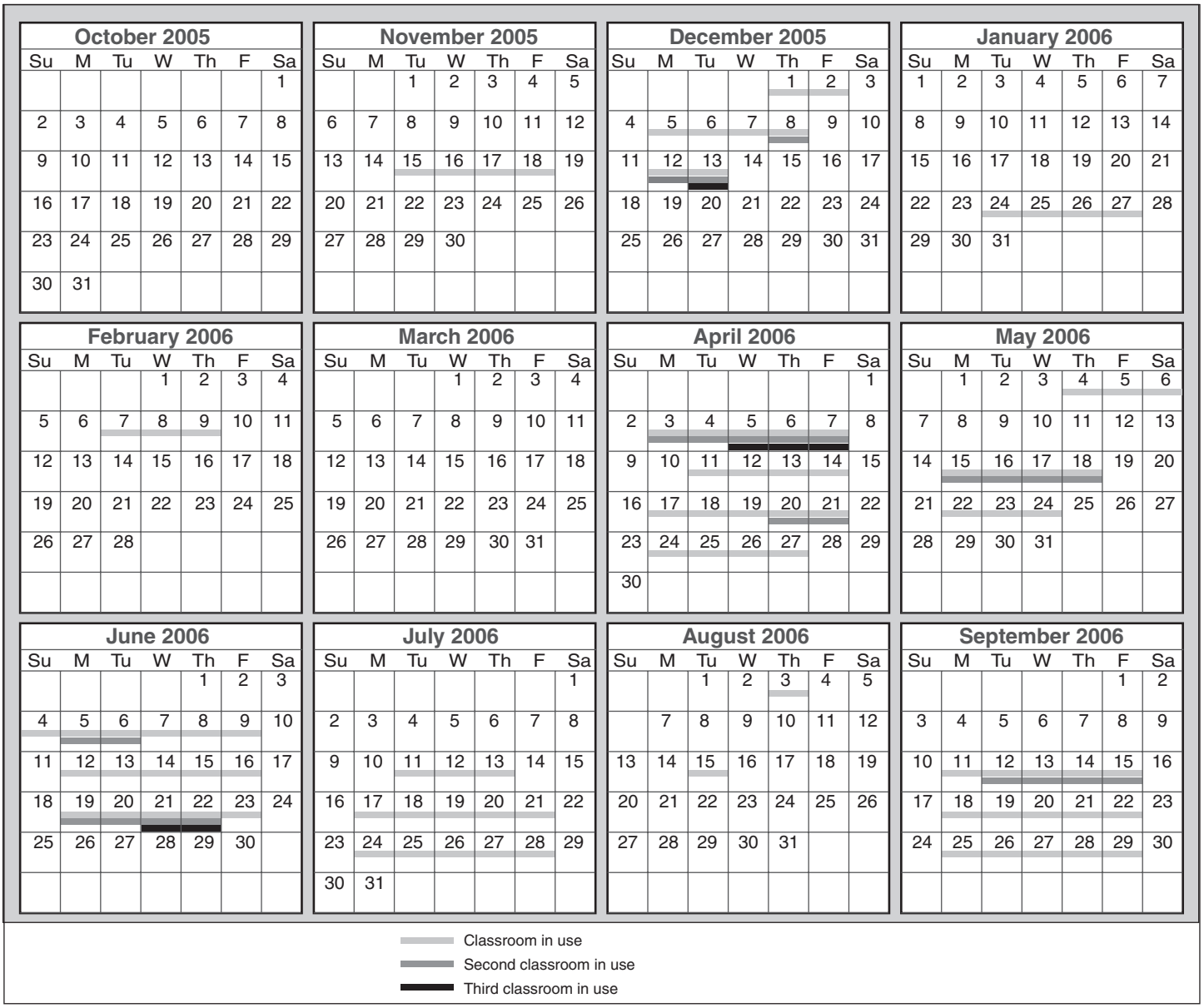
The training center's revenues are affected by several factors, including low utilization, the availability of similar courses elsewhere, and the fact that the courses are already at or above market prices. Although there is no statutory requirement that NTSB's training center generate sufficient revenues to cover its costs, in July 2005, NTSB was encouraged in the Senate report accompanying the Fiscal Year 2006 DOT Appropriations Act to be more aggressive in imposing and collecting fees to cover the costs.[57] To the extent that NTSB maximizes the use of the training center, it can produce additional revenues that may help cover costs. However, NTSB has not maximized the use of its training center.[58] We estimate that, overall, less than 10 percent of the available classroom capacity was used during fiscal years 2005 and 2006.[59] Figure 14 shows the days in which classroom space was used for 22 class sessions and 22 other events, such as workshops and seminars by organizations that subleased the space during fiscal year 2006. As shown in the figure, classroom space was not used at all during October 2005 and March 2006 and during November, January, February, and August, classrooms were in use 4 days or less. In addition, at any given time, no more than three classrooms were in use at one time.

[57]Senate Report 109-109 accompanying Pub. L. No. 109-115, the Transportation, Treasury, the Judiciary, Housing and Urban Development, and Related Agencies Appropriations Act of 2006.

[58]The training center facility contains five classrooms (including an auditorium); a large area that houses the TWA flight 800 reconstruction, aircraft, and other wreckage; eating and lounge areas; and office space for six employees who constitute NTSB's Mid-Atlantic Regional Aviation Office.

[59]We excluded federal holidays and the last week in December from our analysis because we would not expect space to be used on those days. In some cases, courses used multiple classrooms. We estimated one classroom was used per course because we lacked specific information on which courses used multiple classrooms. To account for that situation, we rounded up the percentage of space utilized.

Figure 14: Utilization of Training Center Classrooms by Classes and Other Events, Fiscal Year 2006



Source: GAO analysis of NTSB information.

Note: Bars indicate courses or events. For example, two stacked bars indicate that two courses or events took place on a particular day.

The training center's revenues are also affected by limitations associated with current course offerings and the fact that NTSB has not identified a

market niche for its course offerings. Most students at the training center are from outside NTSB; however, several factors affect the agency's ability to attract additional outside students. The training currently offered at the training center is similar to training provided by other institutions. FRA, FAA, and PHMSA officials told us that their inspectors do not attend NTSB training because similar training is provided in-house by DOT's TSI. For example, an FAA inspector told us that new inspectors take a basic accident investigation course at TSI and subsequently take midcareer follow-up courses there. Furthermore, our comparison of NTSB's fiscal year 2006 curriculum with that of several other institutions that teach courses on accident investigations showed that other institutions offered courses similar to 12 of NTSB's 19 courses. For example, TSI offers basic courses on aviation and bus accident investigations, and the University of Southern California offers a course on human factors related to accident investigations. Moreover, as mentioned previously, NTSB staff described choosing external training over NTSB courses because of more specialized offerings that are only offered elsewhere, such as workshops by aircraft manufacturers.

NTSB is unlikely to be able to increase revenue by increasing course prices, as its courses are already offered at or above market prices. While NTSB charges tuition at a level to generally cover the class costs (excluding facility costs), charging higher tuition to include facility costs would put NTSB at a competitive disadvantage to other institutions that provide courses on accident investigations. Currently, NTSB determines tuition prices by estimating direct course costs (such as the costs for course materials, contracted instructors, and the instructors' travel) and dividing that cost by the projected class size. As a result, for certain courses, the NTSB training center charges as much or more per course than the average cost per course charged by other safety institutions, and any additional charges for NTSB's courses could reduce the training center's revenues by pricing the courses out of comparable range for other transportation safety training institutions. For example, the cost of NTSB's Aviation Accident Investigation course for the upcoming year is $2,950 for 10 days of instruction. TSI's 8-day course on aviation accident investigation currently costs $1,844, and the Southern California Safety Institute's similar 11-day course costs $2,875. If enrollment is sensitive to the course price, NTSB may be able to increase revenue by lowering course prices to increase enrollment. However, NTSB would have to compare the change in revenue with the change in cost from the increased enrollment.

Furthermore, NTSB training center's courses are also priced higher than comparable courses when measured by cost per student hour, even when the fixed annual expense of leasing the facility is not considered as part of the cost.[60] For example, NTSB's cost per student hour of $55.71 is considerably higher than the $18.64 average cost per student hour of TSI's,[61] a fee-for-service organization that provides transit, aviation, pipeline, motor carrier, highway safety, hazardous material, and risk management training nationally and internationally. If the cost to lease training center space, a fixed annual expense of about $2.5 million, were divided among the students who now attend the training center, class costs would dramatically increase and would be even less competitive with fees charged by other institutions for similar courses unless the annual fixed cost was offset by revenue from a large influx of additional students. For example, if the training center lease cost of $2.5 million was divided among the 36,160 student hours in fiscal year 2005, the additional cost per student hour would be about $69 for a new total of almost $125 per student hour. For NTSB's 10-day Aircraft Accident Investigation course, the additional cost per student would be $5,530, increasing the cost to the student from $2,950 to nearly $8,500.

Several Options Could Increase Revenues or Reduce Costs

To determine a long-term strategy for the training center, options to increase revenues or to reduce costs need to be considered. Alternatively, it could be determined that the center is not self-sufficient and subsidies are necessary. We have summarized various alternatives.

The first option would involve attempting to increase training center revenues through attracting more external students. However, to cover the $2.5 million annual cost of NTSB's lease, the training center would have to add approximately 44,875 student hours above the approximately 36,000 student hours in fiscal year 2005. Revenues gained in this manner would be offset by increased costs of additional classes and instructors; moreover, this option remains unlikely to attract additional DOT students as DOT agencies prefer to send students to its own institute (TSI).

[60]We calculated NTSB's cost per student hour by dividing its operating costs for fiscal year 2005 of $2,014,382 by its total number of fiscal year 2005 student hours—36,160—for a cost per student hour of $55.71. TSI has a budget of $10,840,000, and its 581,397 student training hours brings its cost per student hour to $18.64. We do not know how the NTSB and TSI courses compare in quality because such information is not available.

[61]DOT's TSI was established in 1971 to assist DOT modal administrations accomplish their mission essential training requirements.

Officials from FRA, FAA, and PHMSA told us that their inspectors do not attend NTSB training because TSI provides similar training in-house. Moreover, to the extent that NTSB competes with other federal training entities, its training center is contrary to the governmentwide initiative to consolidate and share services. However, if NTSB were to identify a market niche and offer different courses, it could potentially attract and retain new students and would not be out-of-step with the governmentwide initiative. To attract more external students to the training center, NTSB could create unique courses and aggressively market them. A marketing study could help NTSB assess the demand for different types of courses. Other actions NTSB could take include marketing courses through GSA and the U. S. Department of Agriculture's Graduate School and listing the availability of training center courses on the GSA Web site,[62] which allows GSA to identify training opportunities for personnel in the federal aviation community, such as "annual aviation workshops" and "training for federal aviation." Other training entities, including TSI, Embry-Riddle Aeronautical University, and the Southern California Safety Institute, publicize their aviation training on this site.

Second, our analysis of the training center lease indicates that NTSB has the flexibility to use the facility in other ways to increase revenues. For example, the lease does not preclude NTSB from subletting unused space to other users. Since certain space is already configured as classrooms, and the training center is located in an academic setting on George Washington University's suburban Virginia campus, it may be possible to market space to academic users. NTSB could also potentially sublease the entire facility. However, subleasing may not help NTSB to recover training center costs.

In the past, NTSB has subleased portions of the facility and has retained resulting funds for their own uses. NTSB maintains that they have specific authority to retain these funds rather than depositing them in the General Fund of the Treasury.[63] NTSB has stated that when they sublease the training center facilities they, as a general principle, require for nonfederal entities that the use or user has a relationship to transportation safety and/or accident investigation; however, NTSB does not require this of federal agencies.

[62]www.gsa.gov/aircraftpolicy.

[63]The Miscellaneous Receipts statute, 31 U.S.C § 3302(b), would require the funds to be deposited into the General Fund of the Treasury.

NTSB has authority under its statue to "negotiate and enter into agreements…for the provision of facilities, accident-related and technical services or training in accident investigation theory and techniques…."[64] NTSB reads the authority for the "provision of facilities" as allowing it to sublease space, since that authority is in a distinct, independent clause and is not restricted (as are services and training) to accident-related purposes. NTSB's reading that the "provision of facilities" is not restricted to accident-related purposes is a reasonable interpretation given the structure of the statute and the absence of any contrary indication in the legislative history.[65] Thus, NTSB has authority to enter into agreements for the provision of facilities and retain the resulting fees, including those resulting from subleasing the NTSB training facility.[66]

Third, NTSB could work to minimize the loss incurred by the training center by using the training center to reduce NTSB costs in other areas. NTSB has the ability to provide more courses that are geared to NTSB staff in order to replace some of the external courses they currently take, perhaps at less cost. To attract more internal students, we have recommended that NTSB develop a core curriculum and add more classes that address the skills and competencies needed by its investigative staff. Other actions that NTSB could take to increase internal enrollment at the training center include allowing transportation manufacturers to conduct company-sponsored symposiums and technical training at the training center, which could help NTSB investigators keep up with new technologies and offering more internal training on subjects such as management skills, retirement, and computers. Attracting more internal students would not increase revenues for NTSB but would lower its external training costs.

Fourth, NTSB is not precluded by its training center lease or its lease for headquarters space in Washington, D.C., from relocating some

[64]49 U.S.C. § 1113(b)(1)(I).

[65]While the legislative history of this provision demonstrates that it was amended during reauthorization to address NTSB's authority to enter into agreements to provide accident-related training and services to foreign governments, there is nothing to elucidate the purposes for the provision of facilities.

[66]NTSB additionally asserts that 49 U.S.C. § 1118(c) grants them specific authority to retain funds resulting from subleases. Because 49 U.S.C. § 1113(b)(1)(I) specifically provides for the provision of facilities, it is consequently determinative of NTSB's authority in this instance rather than 49 U.S.C. §1118(c) where no such specific provision exists. Thus, it is unnecessary to address the issue of whether a sublease is a "service" under § 1118(c)(2).

headquarters staff to the Virginia facility. The lease for the office space in Washington, D.C., expires in October 2010. Such a move, however, would incur one-time costs that include relocating staff, moving furniture and equipment, reconfiguring space and utilities, as well as recurring travel costs for staff that must travel between the two locations. Such costs would have to be weighed against the reduced cost of leasing less space in Washington, D.C. Moreover, the desirability of working at this location would also have to be considered. Some staff told us they do not attend classes at the training center because of its undesirable location.

At this time, there is very little difference in the base cost of the training center lease and the headquarters lease at L'Enfant Plaza. Specifically, the headquarters lease requires an additional expense of real estate taxes at about $3 per square foot since the lease is through a privately-owned business, while the training center is leased through a nonprofit organization, which is exempt from those taxes. Upon renewal in fiscal year 2011, the cost of the downtown lease could increase or decrease, but that is unknown. Furthermore, the costs of relocation could equal or exceed the savings that NTSB might realize by moving some staff to the training center and renting less space in Washington, D.C. For example, the training center is currently configured as 4 classrooms and an auditorium so an immediate cost would be new construction to configure office space. Other costs could include computer and phone networks, relocating staff, moving furniture and laboratory and other equipment. We have recommended that NTSB conduct a study to determine the costs and feasibility of moving certain functions from headquarters to the training center.[67]

A fifth option to reduce costs would be to buy out the lease and vacate the space. Considering the severe budget environment and the projection that NTSB courses will most likely never cover training center costs, this may be the least-cost strategy. NTSB does not have a cancellation clause in the lease. Lack of a cancellation clause is not unusual because it allows for a lower monthly payment for the agency, but it also precludes NTSB from freeing up these funds for any other use during the life of the lease. Since there is no cancellation clause in the lease, NTSB may have to pay the remainder of the 20-year lease should it vacate the facility, which could amount to about $2.5 million annually through 2021 (a total cost of $42.5 million). Some additional costs would be incurred to move training center

[67] GAO-06-801T.

and regional office staff from the training center facility to NTSB's headquarters office. This option would eliminate the possible yearly cost of several million dollars (the current deficit) and allow the money to be used for other purposes. For example, if the funds currently going to the training center were used for NTSB's investigations and investigative staff, they would more directly support NTSB's mission. We estimate that the net expenses of the training center, including the cost of the lease, totaling $3,880,478 in fiscal year 2005 could fund over 25 additional investigative positions each year.

Conclusions

NTSB's progress in following some leading management practices, such as correcting some computer security vulnerabilities, developing a detailed staffing plan, and improving communications from senior management to staff, are positive steps in ensuring that the agency's management is designed to support its mission. In addition, NTSB's steps toward responding to our recent recommendations regarding leading management practices in areas such as strategic planning and communication are further positive steps. However, key gaps in NTSB's management practices remain. The continued lack of comprehensive plans and policies in the areas of IT, knowledge management, strategic human capital management, and certain acquisition practices suggest that NTSB is still not ensuring that its management of these areas is aligned to fully and effectively support its mission.

Since NTSB lacks the resources to investigate all accidents, ensuring that it performs investigative activities with the greatest transportation safety payoff is also critical to its ability to effectively support its mission. While NTSB's investigative activities contain many strong elements, we identified some limitations that make it difficult for NTSB to ensure it is using its resources as wisely as possible. Specifically, NTSB's lack of risk-based criteria for investigations in some modes reduces its assurance it is using its resources effectively. Furthermore, when criteria exist, they are sometimes included in an interoffice memorandum, rather than in a transparent policy document, such as a board order. In addition, NTSB's limited use of safety studies (only four in the past 6 years) to proactively examine and highlight safety issues may limit the effectiveness of its work on behalf of improving overall transportation safety.

Finally, NTSB is facing several challenges related to the costs of its training center. First, although NTSB has identified the fact that it is in violation of the Anti-Deficiency Act because it is making lease payments for the training center annually when it should have been funded from its

budget authority in fiscal year 2001, it does not have the resources to correct this deficiency. Second, NTSB is missing opportunities to make the training center cost-effective. Without a comprehensive business plan, NTSB will likely be unable to efficiently attract users who would help pay the ongoing costs of the facility. However, in the final analysis, NTSB may have difficulty increasing revenues or decreasing external training costs enough to ever fully offset the training center's costs. It is, therefore, important to consider the option of buying out the lease and vacating the center entirely when considering how best to proceed.

Recommendations for Executive Action

To improve the efficiency of agency operations, we recommend that the Chairman of the National Transportation Safety Board take the following five actions:

- To improve agency performance in the key management areas of IT, knowledge management, and human capital management, NTSB should develop plans or policies for IT and knowledge management and develop a strategic human capital plan that is linked to its overall strategic plan. The human capital plan should include strategies on staffing, training, diversity management, and recruitment and retention. The IT plan should include a strategy to guide IT acquisitions.

- To make the most effective use of its investigation resources and increase transparency, NTSB should develop orders for all transportation modes that articulate risk-based criteria for determining which accidents would provide the greatest safety benefit to investigate or, in the case of aviation accidents, explain which accidents are investigated at the scene, or remotely, in a limited manner.

- To be more proactive in identifying and correcting safety problems before accidents occur, NTSB should increase its utilization of safety studies.

- NTSB should develop a business plan to increase the utilization of its training center or vacate it and submit the plan to Congress. As part of this effort, NTSB should determine the costs and feasibility of alternative actions such as adding more courses for NTSB staff, moving headquarters staff to the center, subleasing space to other entities, or buying out the lease.

- NTSB should identify and implement actions to correct its violation of the Anti-Deficiency Act and bring the agency in compliance with the act. These actions could include obtaining a deficiency appropriation for the full costs of the lease, renegotiating or terminating the training center

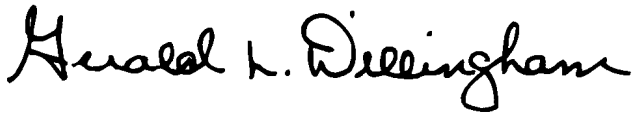
lease so that it complies with the Anti-Deficiency Act, or obtaining authority to obligate lease payments using annual funds over the term of the lease.

Agency Comments

We provided a draft of this report to NTSB for their review and comment. The agency provided written comments (see app. IV). NTSB agreed with our recommendations and provided technical clarifications, which we incorporated into this report.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 8 days from the report date. At that time, we will send copies of this report to the Chairman of the National Transportation Safety Board and interested congressional committees. We also will make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-2834 or dillinghamg@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix V.



Gerald L. Dillingham, Ph.D.
Director, Physical Infrastructure Issues

Appendix I: Scope and Methodology

To determine the extent to which the National Transportation Safety Board (NTSB) is following leading practices in selected management areas, we reviewed past GAO work on leading management practices in the areas of strategic planning, human capital management, communications, acquisition management, financial accountability and control, information technology, and knowledge management. We did not evaluate NTSB's performance in the area of capital decision making because the agency does not have a large amount of either capital assets or capital acquisitions. With assistance from GAO specialists in the functional areas, we assessed whether NTSB was mostly following the practices (plans or policies for all or nearly all practices have been developed and implemented properly), partially following them (plans or policies are in place and implemented properly for some practices), or minimally following them (plans or policies are lacking for all or nearly all practices). We reviewed the results of the Office of Personnel Management's (OPM) 2004 Federal Human Capital Survey for NTSB in the areas of recruitment, staff development and retention, training, communications, and knowledge management. OPM conducted the survey during the fall 2004. The survey included 88 items that measured federal employee perceptions about how effectively agencies are managing their workforces. For more information about the 2004 survey, see http://www.fhcs2004.opm.gov/. On the basis of our examination of the OPM data and review of prior GAO work concerning survey design, administration, and processing, we determined that the data were sufficiently reliable for the purpose of our review.

We reviewed recommendations made by the RAND Corporation[1] and Booz Allen Hamilton[2] and NTSB's responses to those recommendations. Both studies set forth recommendations aimed at strengthening NTSB's ability to carry out its safety mission. We interviewed current and former NSTB board members, senior officials, and division managers and selected investigators and writer-editors regarding their experience with those practices at NTSB and their perceptions of the effectiveness of those practices. We randomly selected 17 of the 203 investigators and 8 writer-editors roughly evenly across NTSB's four modal offices. The views of these particular individuals are not representative of all NTSB

[1]RAND Institute for Civil Justice, *Safety in the Skies: Personnel and Parties in NTSB Accident Investigations* (Santa Monica, CA.: 2000).

[2]Booz Allen Hamilton, *NTSB Organizational Process and Efficiency Study* (Washington, D.C.: Aug. 12, 2004).

investigators and writer-editors. We also determined NTSB's response to recommendations made by the Department of Transportation's Inspector General. We reviewed NTSB documents, including strategic, staffing, and performance management plans; management advisory e-mails; information regarding the current staffing levels; and employees' training plans for 2006.

To determine the extent to which NTSB accomplishes its accident investigation function, develops accident investigation reports, and closes safety recommendations in an efficient manner, we reviewed policy guidance, including orders, investigative manuals and data on the level of current and past investigation activity. Additionally, we reviewed studies by the RAND Corporation and Booz Allen Hamilton that examined NTSB's investigation process and determined the extent to which the agency had implemented their recommendations. We interviewed NTSB managers and staff mentioned previously, as well as industry and government stakeholders, including federal agencies that receive NTSB recommendations; aviation, rail, marine, and highway associations; and transportation safety advocacy groups (see table 6). We examined data on recommendations acceptance rates and closeout status from NTSB's recommendation database, and we determined that the data were sufficiently reliable for the objectives of this review.

Table 6: Entities Interviewed by GAO

Type	Name of entity
Federal agency	Federal Aviation Administration
	Federal Motor Carrier Safety Administration
	Federal Railroad Administration
	National Highway Traffic Safety Administration
	Pipeline and Hazardous Materials Safety Administration
	U.S. Coast Guard
Industry or safety organization	AFL-CIO
	Airline Pilots Association
	Air Transport Association
	American Association of Railroads
	Association of Flight Attendants
	Brotherhood of Locomotive Engineers and Trainmen
	Brotherhood of Railroad Signalmen
	Commercial Vehicle Safety Alliance
	International Organization of Masters, Mates, and Pilots

Type	Name of entity
	Maritime Institute for Research and Industrial Development
	Operation Lifesaver
	Regional Airline Association
	Transit Workers Union of America AFL-CIO
	Transportation Communications International Union
	United Transportation Union

Source: GAO.

To analyze safety recommendations issued recently by NTSB, we analyzed a data extract from NTSB's safety recommendations database for recommendations issued from October 1, 1995, and forward. A list of the data fields we requested is located in table 7. From the data NTSB provided, we determined the number of safety recommendations issued by year and by mode of transportation, as well as the number of accident investigations that yielded these recommendations. We determined the percentages of recommendations by mode that are open and closed, and also the "acceptance" rate by mode of closed recommendations only.

Table 7: Safety Recommendation Data Fields Analyzed

Field	Definition
Mode	Mode of transportation, such as aviation, highway, marine, pipeline, or rail
Recommendation number	Number assigned by NTSB to distinguish safety recommendations
Status	Status of the recommendation, such as open or closed and whether the addressee for the recommendation is taking acceptable or unacceptable action towards its implementation
Accident date	Date of the accident associated with the safety recommendation
Date issued	Date the safety recommendation was issued by NTSB to addressee(s)
Date closed	Date NTSB closed the recommendation
Addressee	Agency or organization that received the safety recommendation from NTSB
Addressee status	Status of a specific addressee's response to NTSB's recommendation

Source: NTSB.

To determine the extent to which NTSB's training center is a cost-effective investment and how it could be more cost-effective, we reviewed financial data on NTSB's training center, including the revenues and expenses for fiscal years 2004 and 2005. We reviewed the course curriculum of the training center and compared it with classes offered by the Department of Transportation's (DOT) Transportation Safety Institute, Embry-Riddle Aeronautical University, the University of Southern California, and the Southern California Safety Institute. We examined data on the student makeup of training center classes and analyzed data on the preparatory and teaching time used by NTSB investigators who taught at the training center. We interviewed NTSB investigators, writer-editors, and managers and senior officials at DOT's modal administrations regarding their current and planned use of the training center. We also examined the subleasing of NTSB's space for fiscal years 2004 through 2006, and examined the lease for the training center to determine how NTSB may utilize the space. Finally, we examined the Anti-Deficiency Act violation related to the lease agreement for the NTSB training center and reviewed legislation for corrective action.

We conducted our review from December 2005 to November 2006 in accordance with generally accepted government auditing standards.

Appendix II: Prior GAO Recommendations to NTSB

Based on our ongoing work as of May 2006, to improve the efficiency of agency operations we recommended the Chairman of the National Transportation Safety Board take the following eight actions:[1]

- Improve strategic planning by developing a revised strategic plan that follows performance-based practices; developing a strategic training plan that is aligned with the revised strategic plan and identifies skill gaps that pose obstacles to meeting the agency's strategic goals and curriculum that would eliminate these gaps; and aligning their organizational structure to implement the strategic plan and eliminate unnecessary management layers.

- Develop a full cost-accounting system that would track the amount of time employees spend on each investigation and in training.

- Develop mechanisms that will facilitate communications from staff-level employees to senior management, including consideration of contracting out a confidential employee survey to obtain employee feedback on management initiatives.

- Identify better practices in the agency and apply them to all modes. Consider such things as using project managers or deputy investigators-in-charge in all modes, using incentives to encourage performance in report development, and examining the layers of review to find ways to streamline the process, such as eliminating some levels of review and using concurrent reviews as appropriate.

- Improve the efficiency of the review process for changing the status of recommendations by computerizing the documentation and implementing concurrent reviews.

- Develop a comprehensive marketing plan for the training center. The plan should consider such things as outreach to potential users, working with the U. S. Department of Agriculture's Graduate School and the General Services Administration to market it as classroom and conference space, and conducting market research for additional curriculum development. If ethical and conflict-of-interest issues can be addressed, the plan should also consider options for allowing transportation manufacturers to conduct company-sponsored symposia and technical training at the facility, which would benefit NTSB investigators in keeping up with new

[1]GAO-06-801T.

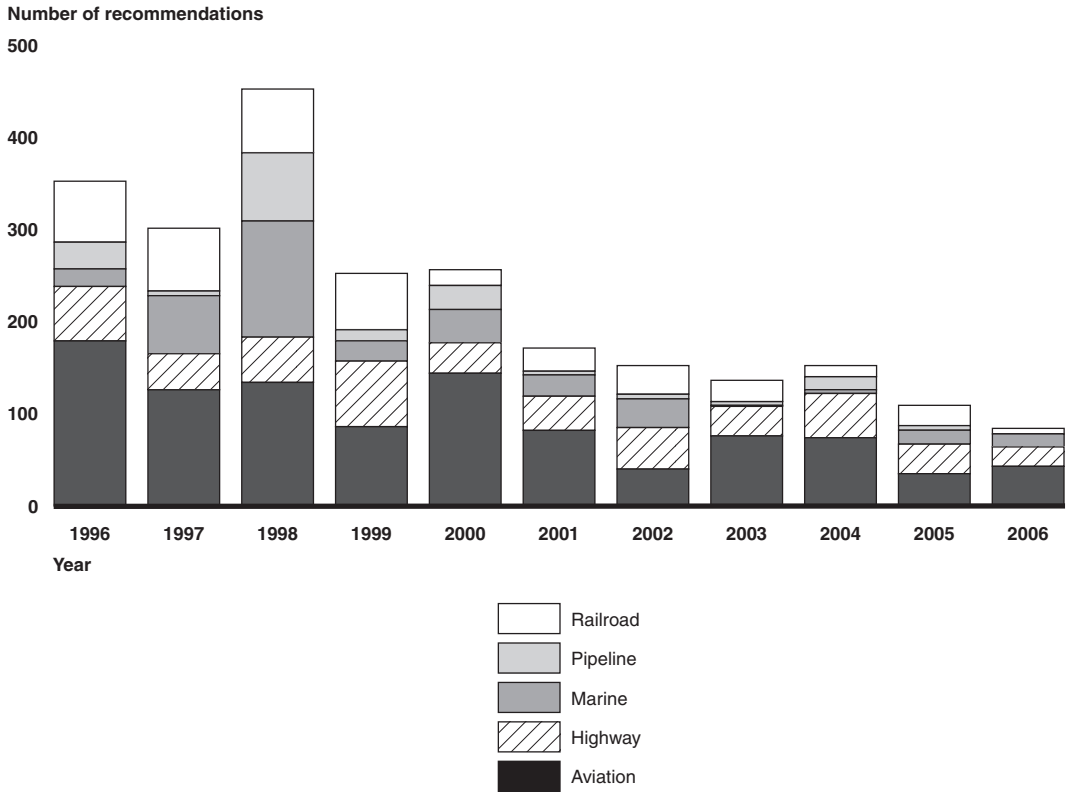
technologies. In addition, the plan should consider the feasibility of subleasing a portion of the training center's space.

- Develop core investigator curriculum for each mode and maximize the delivery of that training at the training center.

- Conduct a study to determine the costs and feasibility of moving certain functions from headquarters to the training center in preparation for the renegotiation of the headquarters lease, which expires in fiscal year 2011.

Appendix III: Additional Analysis of NTSB Safety Recommendations Data

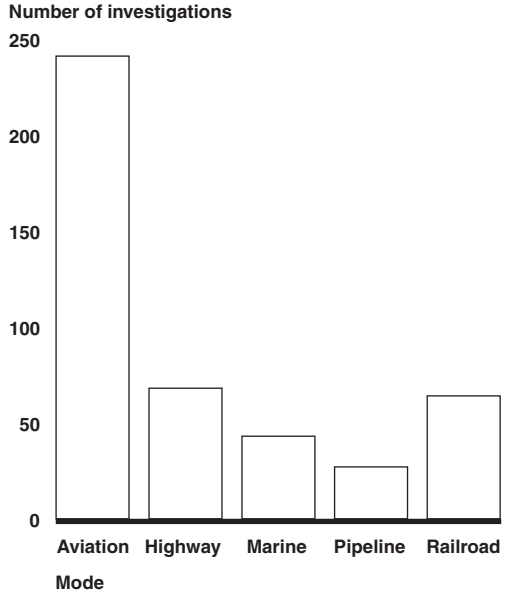
Figure 15: Number of Recommendations by Mode of Transportation and by Year Issued, Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

Note: NTSB issued a total of 2,417 safety recommendations from January 1, 1996, through June 8, 2006. Calendar year 2006 includes data through June 8, 2006.

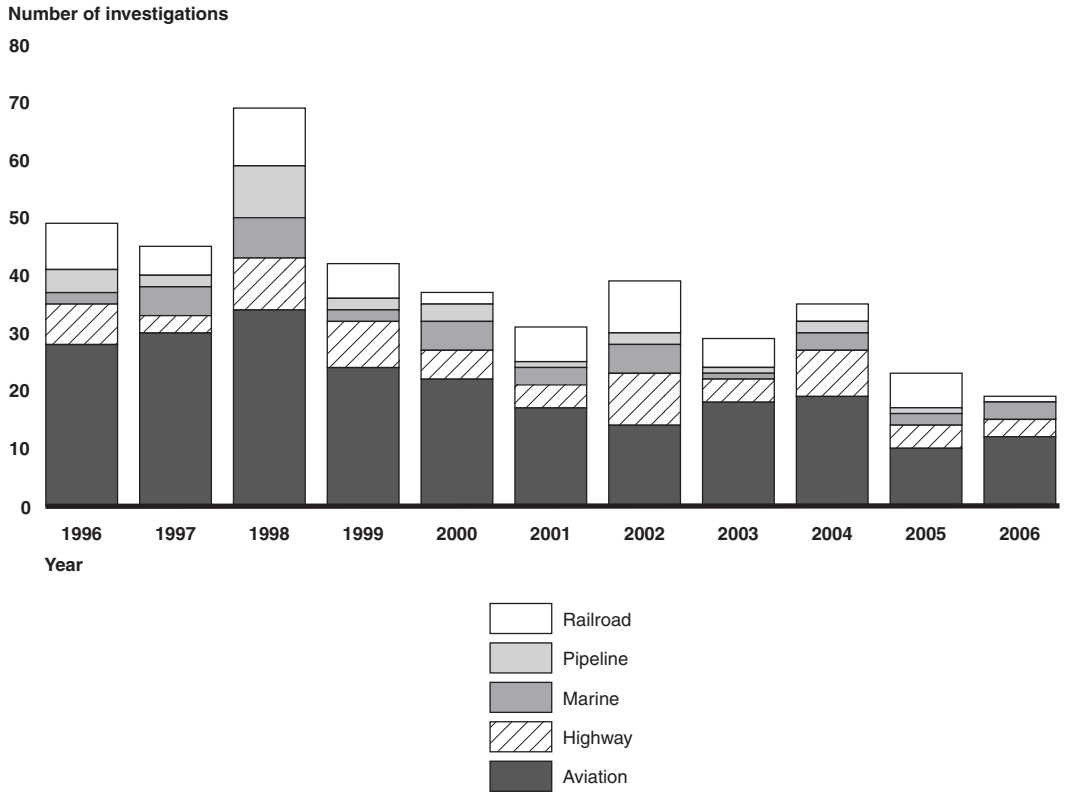
Figure 16: Number of Accident Investigations with Safety Recommendations, Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

Note: A total of 443 accident investigations resulted in safety recommendations. Calendar year 2006 includes data through June 8, 2006.

Figure 17: Number of Investigations Completed by Mode, Calendar Years 1996-2006



Source: GAO analysis of NTSB data.

Note: A total of 443 investigations that resulted in safety recommendations were completed from January 1, 1996, through June 8, 2006. Calendar year 2006 includes data through June 8, 2006.

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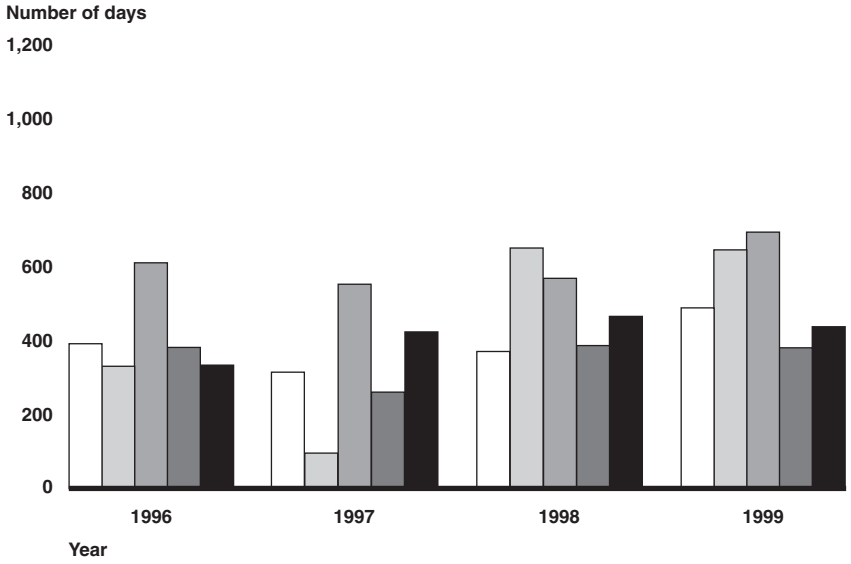
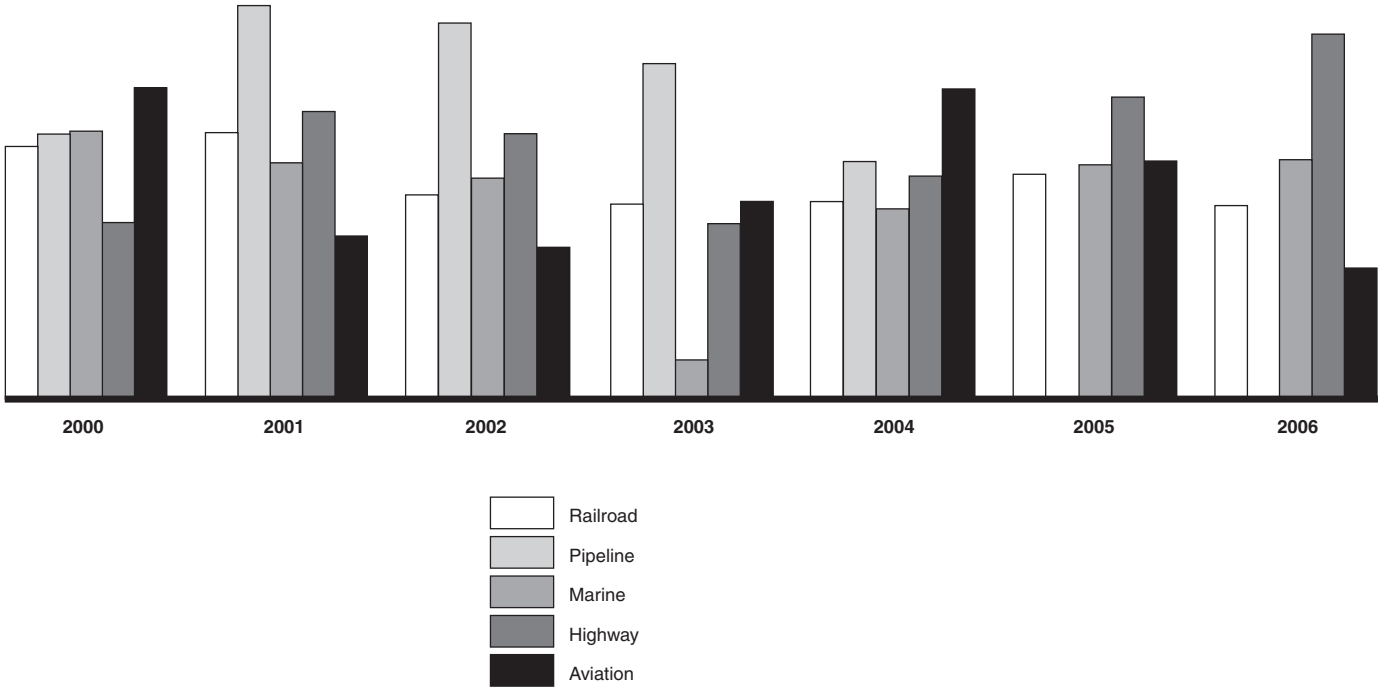
Figure 18: Average Investigation Duration by Mode, Calendar Years 1996-2006





Source: GAO analysis of NTSB data.

Note: A total of 443 investigations that resulted in safety recommendations were completed from January 1, 1996, through June 8, 2006. There were no pipeline investigations completed from January 1, 2005, through June 8, 2006, that resulted in safety recommendations. Calendar year 2006 includes data through June 8, 2006.

Table 8: Number and Percentage of NTSB Safety Recommendations with Closed Acceptable, Closed Unacceptable, and Open Status by Mode, for Recommendations Issued Calendar Years 1996-2005

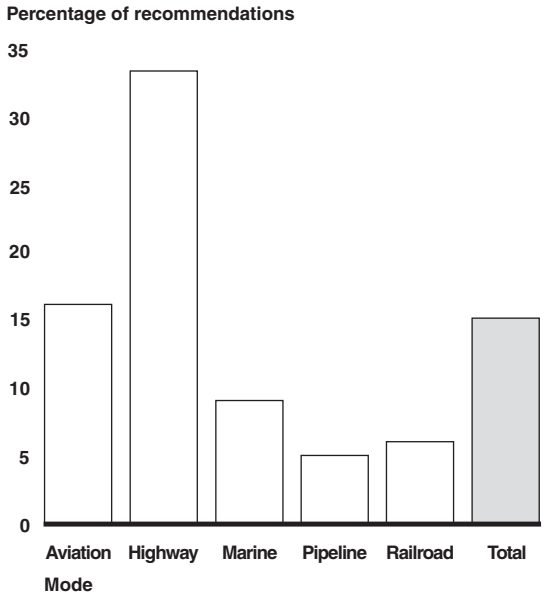
		Year issued									
Mode	**Status**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Aviation	Closed acceptable	140	105	91	60	90	50	21	22	6	2
		(78%)	(83%)	(68%)	(70%)	(63%)	(61%)	(53%)	(29%)	(8%)	(6%)
	Closed unacceptable	28	15	24	9	13	0	1	0	2	0
		(16%)	(12%)	(18%)	(10%)	(9%)	(0%)	(3%)	(0%)	(3%)	(0%)
	Open	11	6	19	17	41	32	18	54	66	33
		(6%)	(5%)	(14%)	(20%)	(28%)	(39%)	(45%)	(71%)	(89%)	(94%)
	Total	**179**	**126**	**134**	**86**	**144**	**82**	**40**	**76**	**74**	**35**
		100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Highway	Closed acceptable	39	30	33	39	14	11	15	8	11	2
		(66%)	(77%)	(67%)	(55%)	(42%)	(30%)	(33%)	(25%)	(23%)	(6%)
	Closed unacceptable	6	1	5	6	0	0	0	0	0	0
		(10%)	(3%)	(10%)	(8%)	(0%)	(0%)	(0%)	(0%)	(0%)	(0%)
	Open	14	8	11	26	19	26	30	24	37	30
		(24%)	(21%)	(22%)	(37%)	(58%)	(70%)	(67%)	(75%)	(77%)	(94%)
	Total	**59**	**39**	**49**	**71**	**33**	**37**	**45**	**32**	**48**	**32**
		100%	**101%**	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Marine	Closed acceptable	14	54	83	20	26	18	16	0	1	2
		(74%)	(86%)	(66%)	(91%)	(72%)	(78%)	(52%)	(0%)	(25%)	(13%)
	Closed unacceptable	5	7	32	0	1	0	2	0	0	0
		(26%)	(11%)	(25%)	(0%)	(3%)	(0%)	(6%)	(0%)	(0%)	(0%)
	Open	0	2	11	2	9	5	13	1	3	13
		(0%)	(3%)	(9%)	(9%)	(25%)	(22%)	(42%)	(100%)	(75%)	(87%)
	Total	**19**	**64**	**126**	**22**	**36**	**23**	**31**	**1**	**4**	**15**
		100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Pipeline	Closed acceptable	22	5	61	8	21	3	3	2	6	0
		(76%)	(100%)	(82%)	(67%)	(81%)	(75%)	(60%)	(50%)	(43%)	(0%)
	Closed unacceptable	7	0	11	2	3	0	0	0	0	0
		(24%)	(0%)	(15%)	(17%)	(12%)	(0%)	(0%)	(0%)	(0%)	(0%)
	Open	0	0	2	2	2	1	2	2	8	5
		(0%)	(0%)	(3%)	(17%)	(8%)	(25%)	(40%)	(50%)	(57%)	(100%)
	Total	**29**	**5**	**74**	**12**	**26**	**4**	**5**	**4**	**14**	**5**
		100%	**100%**	**100%**	**101%**	**101%**	**100%**	**100%**	**100%**	**100%**	**100%**
Railroad	Closed acceptable	64	59	63	61	11	18	14	9	1	2
		(97%)	(87%)	(93%)	(100%)	(65%)	(72%)	(45%)	(39%)	(8%)	(9%)

		Year issued									
Mode	**Status**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
	Closed unacceptable	2	3	4	0	0	0	0	1	0	0
		(3%)	(4%)	(6%)	(0%)	(0%)	(0%)	(0%)	(4%)	(0%)	(0%)
	Open	0	6	1	0	6	7	17	13	11	20
		(0%)	(9%)	(1%)	(0%)	(35%)	(28%)	(55%)	(57%)	(92%)	(91%)
	Total	**66**	**68**	**69**	**61**	**17**	**25**	**31**	**23**	**12**	**22**
		100%	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: GAO analysis of NTSB data.

Note: A total of 2,333 recommendations were issued from 1996 through 2005. Percentages do not always total to 100 due to rounding.

Figure 19: Percentage of Safety Recommendations Open for at Least 5 Years, by Mode



Source: GAO analysis of NTSB data.

Note: Recommendations were issued calendar years 1995-2001.

Appendix IV: Comments from the National Transportation Safety Board

Office of the Chairman

National Transportation Safety Board
Washington, D.C. 20594

November 15, 2006

Gerald L. Dillingham, Ph. D.
Director, Civil Aviation Issues
Physical Infrastructure
Government Accountability Office
441 G Street, NW, Room 2T23B
Washington, DC 20548

Dear Dr. Dillingham:

Thank you for the opportunity to comment on your proposed report entitled *National Transportation Safety Board: Progress Made, Yet Management Practices, Investigation Priorities, and Training Center Use Should Be Improved (GAO-07-118).* In general, we agree with your recommendations and are pleased that your report recognizes the number of significant improvements we have made to strengthen our management practices.

During this 12 month management study (December 2005–November 2006) between the Government Accountability Office (GAO) and the National Transportation Safety Board (NTSB), the NTSB has worked diligently to support your audit, and has been fully cooperative and completely forthcoming with information. We have made all NTSB staff available at the convenience of the GAO auditors, and we met with the auditors on more than 70 occasions. We responded expeditiously to all requests for information and we have furnished more than 200 documents and related data to support the auditors in their review. Further, your team of auditors has joined NTSB investigators on-site during one of our local general aviation accident investigations, and we provided complete and ready access to the highest leadership levels within the agency. My senior management team and I have not only welcomed the GAO review, but we generally agree with the 5 recommendations presented by the GAO. We believe that the GAO's recommendations will assist NTSB in our ongoing efforts to improve NTSB management practices, investigation priorities, and training center usage, and they will help us ensure that we execute our important mission efficiently and effectively.

As you are aware, in August 2006, I was sworn in as the Chairman of the NTSB, and I had been serving as Acting Chairman since March 2005. Also in March 2005, the

NTSB top leadership changed, and with this change came a renewed focus on improving the organizational development, communications, and strategic planning necessary to develop a robust, efficient, and dynamically led organization. Although many challenges remain, we are confident that the best practices that GAO is recommending, can help NTSB strengthen our management practices, investigation processes, and training center usage.

For example, for the first time in six years, the NTSB has in place a strategic plan, and we are currently making strides to evolve and improve that plan. Senior executives now have performance plans that are linked to our strategic plan, and both report production output and project tracking are greatly improved. Although the NTSB has more work to do in the area of human capital, we now have a human capital forecast and a staffing plan, which represent our first steps into a broad program of human capital planning, and we are building the framework for a targeted training program for our staff. Agency-wide communications have improved in both quality and quantity, and the information flow to the Board Members has also significantly improved.

In 2006, as directed by Congress, the NTSB developed a business plan for the Training Center. Even with this plan, like you, we understand that we still face the challenge of increasing the utilization of the Training Center. We are taking additional steps to address this issue and to improve the utility and cost effectiveness of the facility.

Finally, in 2003, the NTSB recognized that the Training Center lease should have been recorded as a capital lease rather than an operating lease. Capitalizing the full net present value of the lease created a funding deficiency for fiscal year 2001. The NTSB disclosed the resultant noncompliance with the Anti-Deficiency Act during fiscal year 2004. Since 2004, the NTSB has been working to bring the agency into compliance with the Anti-Deficiency Act. As we have noted before, the NTSB, in consultation with the GAO and the Office of Management and Budget, requested Congress to take the appropriate steps to address the Anti-Deficiency.

Thank you again for providing NTSB with the opportunity to comment on your proposed report and for acknowledging the management improvements that have been made at the NTSB.

Sincerely,

Mark V. Rosenker
Chairman

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

Gerald L. Dillingham, Ph.D., (202) 512-2834, or dillinghamg@gao.gov

Staff Acknowledgments

In addition to the contact named above, Teresa Spisak, Assistant Director; Maren McAvoy; Lauren Calhoun; Eric Fielding; Colin Fallon; Dave Hooper; Tom Keightley; Ayeke Messam; Josh Ormond; Jena Whitley; and Alwynne Wilbur made significant contributions to this report.

Related GAO Products

Enterprise Architecture: Leadership Remains Key to Establishing and Leveraging Architectures for Organizational Transformation. GAO-06-831. Washington, D.C.: August 14, 2006.

Managing for Results: Enhancing Agency Use of Performance Information for Management Decision Making. GAO-05-927. Washington, D.C.: September 9, 2005.

Human Capital: Selected Agencies Have Opportunities to Enhance Existing Succession Planning and Management Efforts. GAO-05-585. Washington, D.C.: June 30, 2005.

21st Century Challenges: Reexamining the Base of the Federal Government. GAO-05-325SP. Washington, D.C.: February 1, 2005.

Diversity Management: Expert-Identified Leading Practices and Agency Examples. GAO-05-90. Washington, D.C.: January 14, 2005.

Results-Oriented Government: GPRA Has Established a Solid Foundation for Achieving Greater Results. GAO-04-594T. Washington, D.C.: March 31, 2004.

Human Capital: A Guide for Assessing Strategic Training and Development Efforts in the Federal Government. GAO-04-546G. Washington, D.C.: March 1, 2004.

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Human Capital: Key Principles for Effective Strategic Workforce Planning. GAO-04-39. Washington, D.C.: December 11, 2003.

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Results-Oriented Cultures: Implementation Steps to Assist Mergers and Organizational Transformations. GAO-03-669. Washington, D.C.: July 2, 2003.

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