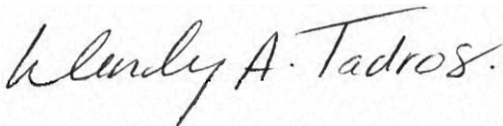


# Transportation Safety Board of Canada

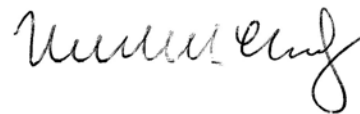
## Departmental Performance Report

For the period ending  
March 31, 2006



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Wendy A. Tadros  
Chair  
Transportation Safety Board of Canada



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Michael D. Chong  
President  
Queen's Privy Council for Canada



Canada



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## The Chair's Message

This year has been marked by a concern to continue to improve the efficiency of the Transportation Safety Board of Canada (TSB). We have continued to significantly reduce the number of investigations in process and the average time to complete an investigation. These achievements allow us to communicate the gained safety knowledge to Canadians and the international community more rapidly, and to reduce the risks within the transportation system. Our efforts to expand our communications activities were successful. The number of visitors to our website more than doubled over last year.

Although we have not fully achieved all of our objectives stated in the Report on Plans and Priorities, we have made good progress on all of our commitments. In particular, we have started to implement our TSB Investigation Information Management System. That system allows the TSB to meet government information and technology management requirements, while improving the efficiency required to achieve our mandate.

A substantial portion of this work was made possible by the efforts of the management team to ensure a good balance between the resources available and the uptake of new investigations. We therefore ensure that the organization does not overextend itself and that the high quality standards that Canadians expect are maintained in all of our work.

Once again this year, various indicators show that Canada maintains a very good transportation safety record. For example, a review of transportation accident rates over the past 10 years continues to reveal a progressive downward trend. We therefore believe that the efforts of the TSB toward advancing transportation safety, in concert with the work of many other organizations, are having a beneficial impact.

Canadians expect and demand a safe and sound transportation system. As we look to the future and the challenges that lie ahead, we are committed to sustaining our efforts and to contributing to a transportation system that is safe and reliable – a system upon which everyone can rely and of which they are confident.





# Section 1: Overview

## 1.1 Raison d'être

The Transportation Safety Board of Canada (TSB) is an independent agency created in 1990 by an Act of Parliament (*Canadian Transportation Accident Investigation and Safety Board Act*). It operates at arm's length from other government departments and agencies such as Transport Canada, the Department of Fisheries and Oceans, and the National Energy Board to ensure that there are no real or perceived conflicts of interest. Under the legislation, the TSB's only object is the advancement of transportation safety in the federally regulated elements of the marine, pipeline, rail and air transportation systems. This mandate is fulfilled by conducting independent investigations that can include, if necessary, public inquiries into transportation occurrences. The purpose of these investigations and inquiries is to make findings as to the causes and contributing factors of the occurrences and to identify safety deficiencies. Therefore, recommendations may be made to improve safety and reduce or eliminate risks to people, to property and to the environment. The TSB has the exclusive authority to make findings as to causes and contributing factors when it investigates a transportation occurrence.

The jurisdiction of the TSB includes all marine, pipeline, railway or aviation transportation occurrences in or over Canada that fall under federal jurisdiction. The TSB may also represent Canadian interests in foreign investigations of transportation accidents involving Canadian registered, licensed or manufactured ships, railway rolling stock or aircraft. In addition, the TSB carries out some of Canada's obligations related to transportation safety at the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO).

A transportation occurrence is any accident or incident associated with the operation of an aircraft, ship, railway rolling stock, or pipeline. It also includes any hazard that could, in the Board's opinion, induce an accident or incident if left unattended.

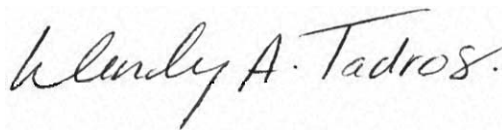


## 1.2 Management Representation Statement

I submit, for tabling in Parliament, the 2005-2006 Departmental Performance Report for the Transportation Safety Board of Canada.

This document has been prepared based on the reporting principles contained in the *Guide for the Preparation of Part III of the 2005-2006 Estimates: Reports on Plans and Priorities and Departmental Performance Reports*:

- It adheres to the specific reporting requirements outlined in the Treasury Board Secretariat guidance;
- It is based on the department's approved accountability structure as reflected in the Management, Resources and Results Structure;
- It presents consistent, comprehensive, balanced and reliable information;
- It provides a basis of accountability for the results achieved with the resources and authorities entrusted to it; and
- It reports finances based on approved numbers from the Estimates and the Public Accounts of Canada.



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Wendy A. Tadros  
Chair

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22 September 06

Date

## 1.3 Operating Framework

The TSB is primarily funded by Parliament through a program expenditures vote and, as a departmental corporation, it has authority to spend revenues received during the year. The TSB operates within the context of Canada's very large, complex, dynamic and ever-changing transportation system. For more details on the operating context, see the Transport Canada website at [www.tc.gc.ca/pol/en/report/anre2005/toc\\_e.htm](http://www.tc.gc.ca/pol/en/report/anre2005/toc_e.htm) and the National Energy Board website at [www.neb-one.gc.ca/Publications/AnnualReports/2005/AnnualReport2005\\_e.pdf](http://www.neb-one.gc.ca/Publications/AnnualReports/2005/AnnualReport2005_e.pdf).

Many individuals and groups cooperate with the TSB in the fulfillment of its mandate. During the course of an investigation, the TSB interacts directly with

- individuals such as survivors, witnesses and next-of-kin;
- operators;
- other organizations and agencies such as medical examiners, police, manufacturers, owners and insurance companies; and
- other federal government departments and agencies.

Their cooperation is essential to the conduct of the TSB's business, whether they contribute information or support services. For more details on the investigation process, visit the TSB website at [www.tsb.gc.ca/en/investigation\\_process/index.asp](http://www.tsb.gc.ca/en/investigation_process/index.asp).

The TSB is one of many organizations involved in improving transportation safety nationally and internationally. Even if the TSB is operating at arm's length from other federal departments in the transportation field, it cannot achieve its strategic outcome without the cooperation of the other organizations. The TSB presents findings and issues recommendations in such a manner that other organizations feel compelled to act but it has no formal authority to regulate, direct or enforce specific actions. Its success implies ongoing dialogue, information sharing and strategic coordination with organizations such as Transport Canada, the National Energy Board and the Canadian Coast Guard.

The TSB must also continuously be in contact with industry and foreign regulatory organizations, and exchange information with them. Through various means, the TSB must present compelling arguments that will convince these "change agents" to take the necessary action in response to identified safety deficiencies.

The TSB has established memorandums of understanding with other federal government departments for the coordination of activities and the provision of support services. These agreements provide the TSB with access to a range of support services that can rapidly supplement internal resources (for example, assistance in the recovery of a wreckage, the documentation of evidence, and the examination or testing of components). The agreements also define operating practices to ensure good coordination of activities and to avoid potential conflicts that could arise from the simultaneous implementation of various organizational mandates. Such agreements are currently in place with the Department of National Defence, the Royal Canadian Mounted Police, the Canadian Coast Guard, Human Resources and Social Development Canada, and the National Research Council. Similarly, the TSB has established strategic cooperation alliances with provincial and territorial medical examiners and with certain provincial government departments for rail occurrences that fall under their jurisdiction.

Further alliances have been established with the TSB's counterpart agencies in other countries such as the United States, Australia, the Netherlands, New Zealand, France and the United Kingdom. The TSB cooperates on a reciprocal basis with foreign safety investigation agencies through the ad hoc exchange of specialized services or the

provision of assistance as a means of coping with capacity gaps. As one of the world leaders in its field, the TSB regularly shares its investigation techniques, methodologies and tools with other organizations. For example, the Recorder Analysis and Playback System (RAPS), originally developed by the TSB for decoding and analyzing flight data recorders (FDRs) and cockpit voice recorders (CVRs), is now used for safety investigations in more than 10 countries. In cooperation with our partners, we are also pursuing our efforts to develop a vessel movement simulation system based on the information contained in voyage data recorders (VDRs). Similarly, the TSB has contributed to the training of investigators from numerous countries, either by integrating foreign investigators into its in-house training programs or by sending senior staff to teach abroad. The TSB also gives information and copies of its reports to sister organizations, and participates in international working groups and studies to advance transportation safety.

## **1.4 Risks and Challenges**

The TSB faces many risks and challenges that could have a potentially significant impact on the organization's ability to achieve its mandate. Rapid technological changes, development of new materials and increasing demands for services with diminishing resources make the task of investigations and safety analysis increasingly complex and challenging. Conscious of the new risks and challenges that could affect its capacity to fulfill its mandate, the TSB evaluates its strategic risks every year and introduces measures to mitigate them. The following paragraphs describe the TSB's most important challenges in 2005-2006.

### **Managing External Expectations**

The TSB has a variety of stakeholders and clients with diverse information needs. Regulators and industry want information in order to fulfill their responsibilities in improving transportation safety. Next-of-kin want information about what happened to their loved ones in order to bring closure. Others want information from a business perspective. However, all agree that they would like safety information to be made available earlier and more effectively. Furthermore, stakeholders and the public would like the TSB to undertake more safety investigations than what is currently done. The TSB is therefore challenged to find the right balance between the level of activity to be undertaken, potential safety findings and the resources available. This implies an ongoing review of products, services and processes to ensure that resources are invested in the best possible way to achieve the optimum results. The TSB must also communicate effectively with its stakeholders and the public in order to convey its priorities and its limited capacity. The TSB must ensure that reasonable expectations are set through appropriate communication.

## **Maintaining Operational Capability**

The success of the TSB and its credibility as an organization depend largely on the expertise, professionalism and competence of its employees. Rapid technological changes in the transportation industry, along with the development of new materials, are making the task of investigation and safety analysis increasingly complex and specialized. The TSB must not only maintain an appropriate capital asset infrastructure, but must also keep up its technical expertise and knowledge base in order to maintain credibility within the industry. In recent years, the TSB has made a concentrated effort to catch up on essential training for employees and managers to ensure they have the knowledge and skills to meet mandatory job requirements. However, the challenge of retaining technical currency requires ongoing attention backed by adequate financial resources.

## **Increasing Awareness to Influence Positive Changes**

To achieve its mandate and to influence stakeholders to take actions that lead to positive changes in transportation safety, the TSB must present compelling arguments for change in its reports and other communication products. This requires a solid understanding amongst stakeholders and the public about who we are, what we do and how we contribute to transportation safety. We believe that improving awareness about the TSB and its work will better position the TSB to influence key change agents. To that end, the TSB has approved a three-year Communications Plan, which is essentially a road map of how we want to improve communications. The Plan represents a more active approach to publicizing key safety messages to influence positive changes.

## **Implementing Government-wide Initiatives**

Over the past years, the Government has launched a number of government-wide initiatives and reviews that have had, and will continue to have, an impact on the TSB. For example, initiatives such as the proactive disclosure of information on travel and hospitality, position reclassifications and contracts have resulted in new work for the TSB with no additional resources being provided. The series of Government Operations Reviews (for example, shared corporate administrative services, IT services, procurement, institutional governance) has also had a significant impact on workload. As these reviews now come to conclusion and decisions are made, and as the TSB proceeds with the implementation of the required changes, further impacts are expected. The implementation of Human Resources Management Modernization also directly affects TSB resources. The challenge for the TSB is to continue to incorporate these cumulative requirements into daily activities within the resource envelope available, while maintaining a suitable balance between the fulfillment of the TSB's mandate and the implementation of the Government's overall agenda.

## Balancing Resources and Results

The TSB, like all other government departments and agencies, must operate with a fixed resource base. Over time, this base is eroded by numerous external factors such as inflation, new service fees and general price increases. The TSB must therefore contend with diminishing resources as time passes. Furthermore, the Government has directed that new requirements be funded through reallocation rather than the provision of incremental funding. This results in a challenge for the TSB to maintain an appropriate balance between the level of operational activity in a context of increasing demand for services and diminishing resources.

For some time now, the TSB has been struggling with the issue of performance measurement. Progress has been made on the development of meaningful performance indicators. However, more work is required in this regard and particularly with respect to linking resources to results. Given that no two investigations are identical, and that some investigations lead to safety changes whereas others do not, it is very difficult to establish the return on investment in safety investigations. The direct and positive impact of TSB investigation activities can be readily demonstrated, but conveying the value for money using traditional financial measures is much more challenging.

### 1.5 Resources

The following table summarizes the total financial and human resources allocated to the TSB in 2005-2006, as well as the actual resources utilized for the delivery of the mandate. Section 3 of this report provides detailed information on the overall financial results of the TSB and Annex E provides the audited financial statements.

<b>Table 1: TSB Resources</b>		
<b>Total Financial Resources (in thousands of dollars)</b>		
Planned Spending	Total Authorities	Actual Spending
35,548	34,388	34,602
<b>Total Human Resources (full-time equivalents)</b>		
Planned	Actual	Difference
240	234	6

In 2005-2006, the TSB over-expended approved authorities by \$214,000. A part of this amount was used to deploy an investigation team to the site of the passenger ferry *Queen of the North* that sunk on March 22, 2006 near Prince Rupert, British Columbia.

## 1.6 Departmental Performance Summary

In its 2005-2006 Report on Plans and Priorities, the TSB identified five priorities aimed at strengthening the organization from within. All were strategic investments to find ways to enhance the TSB's relevance and contribution to transportation safety in Canada and internationally thereby allowing communities to live in a safe and secure environment.

Overall, substantial progress was achieved against all priorities. However, not all objectives were fully achieved, due to our limited human resources capacity and events outside of our control. On many occasions throughout the year, managers were faced with the difficult choice of reallocating people from one project or investigation to another. Despite the challenges, positive results have been achieved and lessons have been learned with respect to project planning and resource allocation. The table below provides a quick overview of the results achieved this year against our priorities.

<b>Table 2: TSB Priorities</b>				
<b>TSB Strategic Outcome</b>	To advance transportation safety, thereby reducing risks to people, property and the environment.			
<b>Alignment to Government of Canada Priorities</b>	Social Affairs: safe and secure communities			
<b>TSB Priorities</b>	<b>Type</b>	<b>Performance Status</b>	<b>Planned Spending</b> (in thousands of dollars)	<b>Actual Spending</b> (in thousands of dollars)
1) Continuous Improvement of Products and Services	Ongoing	Meets expectations in part	63	70
2) Sustainable Human Resources	Ongoing	Meets all expectations	210	227
3) Organizational Continuous Improvement Process	Previously Committed	Meets expectations in part	553	589
4) Awareness of the TSB and its Activities	Previously Committed	Meets expectations in part	75	71
5) Developing Partnerships	New	Meets expectations in part	85	69

## **Continuous Improvement of Products and Services**

The TSB had committed to pursuing the implementation of changes to its range of products and services, namely by implementing the TSB Investigation Information Management System. This system was designed to benefit from knowledge, skills and abilities, to eliminate disparities in processes and systems, and to provide employees with an integrated central repository of essential tools and information.

This year, we tested almost all the components in the Reference Centre of this system, whose purpose is to collect in one place all the policies, guides and other reference tools that employees need to do their work. Investigation teams also tested the modules containing the main tools they need to manage and conduct investigations into transportation occurrences. However, implementation of these modules was delayed because of staff turnover within the project team.

## **Sustainable Human Resources**

The TSB continued to put sustained emphasis on the strategic management of human resources to ensure that it recruited competent, devoted employees who remained with the organization, while offering a workplace atmosphere that promoted learning and professional development for all. The following observations contained in the *Final Report on the Safety Oversight Audit of the Civil Aviation System of Canada*<sup>1</sup> show that the efforts were successful: “The TSB has established adequate qualification criteria for the recruitment of its investigators and has full control over the recruitment of its personnel. Investigators are provided with the appropriate initial, recurrent and specialized training as may be deemed necessary to acquire and maintain the level of expertise required.” These results are also corroborated by the TSB results to the 2005 Public Service Employee Survey, where 83 per cent of respondents said that they believed that, in their work unit, people were hired who could do the job, and 74 per cent said that they got the training they needed to do their job. The competency of the TSB’s employees and the quality of their investigation reports and safety communications were also recognized last March by the International Aeronautical Federation. The federation gave an award to TSB investigators for their contribution to the multidisciplinary and complex international investigation into the Swissair Flight 111 accident off the coast of Nova Scotia on September 2, 1998.

The TSB also met all requirements of the *Public Service Modernization Act* (PSMA) on time. The TSB first developed and implemented a communications and training strategy on the PSMA for employees and managers, and set up monitoring mechanisms. It also developed and implemented the prescribed policies, processes and guidelines, and initiated consultations with unions, employees and managers.

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<sup>1</sup> International Civil Aviation Organization Universal Safety Oversight Audit Programme, *Final Report on the Safety Oversight Audit of the Civil Aviation System of Canada* (April 12 to 22, 2005).



## **Organizational Continuous Improvement Process**

For the past few years, the TSB has made significant progress to become a better-managed, more innovative organization. In the last year, the TSB completed an important step in its continuous improvement process by implementing certain key components of its new TSB Investigation Information Management System, as mentioned above. Management also developed different measures to mitigate the risks associated with this project and to ensure its success, which included increasing employee awareness of the project through communication and training. In addition, the TSB undertook to integrate risk management more closely into management decision making. A departmental risk profile was developed to use as a point of reference in this respect.

## **Awareness of the TSB and its Activities**

Over the past few years, the TSB has undertaken a number of communications initiatives to enhance the visibility of the organization and its programs among the public and stakeholders. The TSB must nevertheless manage its communications resources carefully and focus on activities that offer the greatest potential with respect to results. This year, it dedicated its resources to developing a video to promote its role and activities and the way it contributes to improving transportation safety. Sustained efforts to increase the amount of information available to the public on its website also helped to more than double the number of visitors to the site compared to the previous year.

Sustained efforts regarding internal communications were also introduced to ensure that all employees were fully up to date on TSB products and services and the results achieved for Canadians. The TSB stood out from the Public Service as a whole in this respect, since 90 per cent of TSB respondents in the 2005 Public Service Employee Survey said that they could clearly explain to others the direction of their organization. The percentage for the Public Service of Canada as a whole was 73 per cent.

## **Developing Partnerships**

The TSB cooperates with many other agencies in the course of its operational and administrative activities. In the context of an evolving environment, and in order to optimize its limited resources and fulfill its mandate efficiently, the TSB conducted a study to explore these partnerships from a strategic angle.

The study allowed it to explore which of its activities could benefit from a partnership approach. It also examined means for managing the risks that such partnerships could present, in light of potential obstacles such as the need to remain independent and avoid conflicts of interest. Finally, the policy and guidelines for establishing the partnerships that were proposed at the end of the study are currently under review by management in preparation for imminent implementation.



## **Section 2: Analysis of Program Activity**

### **2.1 Performance Management Framework**

The TSB has developed and implemented an integrated performance management framework. This framework consists of five key documents. The five-year TSB Strategic Plan is used to set the strategic directions. The annual Business Plan is then used to set the short-term priorities and to guide the activities and resource allocation decisions for the coming year. The Report on Plans and Priorities, based on the Business Plan, defines the commitments to Parliament and Canadians. The Balanced Scorecard defines specific performance indicators and is used by management to measure and monitor progress. Finally, the Departmental Performance Report closes the accountability loop by reporting to Parliament on the results achieved.

### **2.2. Plans and Priorities Commitments**

In its 2005-2006 Report on Plans and Priorities, the TSB had only one strategic result and one program activity. The five priorities mentioned in the first section of this document are aimed at supporting and enhancing the TBS's ability to conduct safety investigations and to communicate safety information.

In order to optimize the use of resources and to effectively respond to its stakeholders, the TSB has defined four key service areas based on the four transportation modes included in its mandate: marine, pipeline, rail and air. This approach enables alignment with the transportation industry and the way it operates.

Resources are therefore allocated and managed separately for each of these key service areas. Table 3 below shows information on planned and actual spending on financial and human resources for the key service areas in 2005-2006. Sections 2.7 to 2.10 provide detailed financial information on each key service area of our program activity.

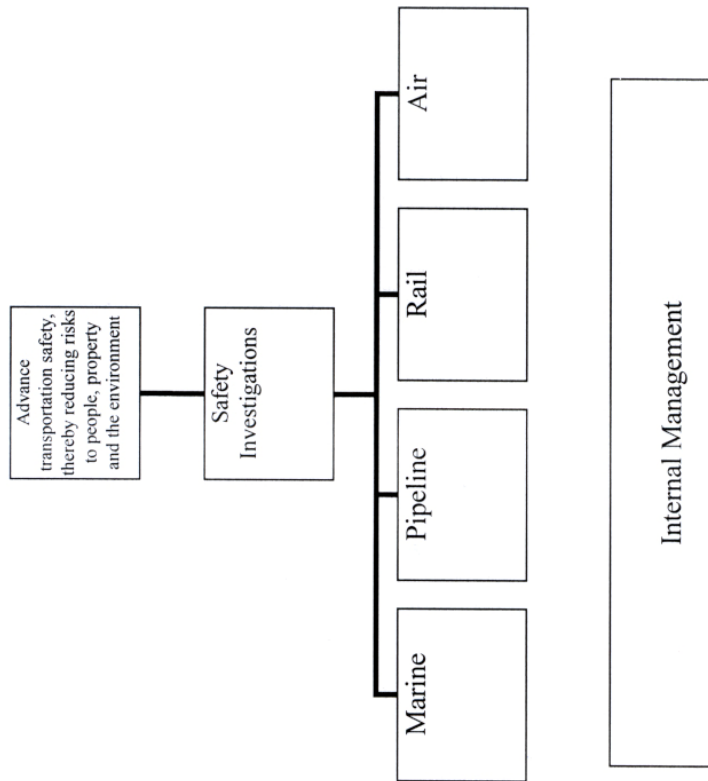
<b>Table 3: TSB Resources by Key Service Area</b>		
<b>Financial Resources</b> (in thousands of dollars)		
	<b>Planned Spending</b>	<b>Actual Spending</b>
Marine	7,295	7,294
Pipeline	790	531
Rail	6,455	6,916
Air	20,008	19,861
Total	34,548	34,602
<b>Human Resources (FTE)</b>		
Marine	58	51.3
Pipeline	5	4.4
Rail	52	50.7
Air	125	127.2
Total	240	233.6

## 2.3 Performance Measurement

The TSB developed a balanced scorecard to track its performance and the progress accomplished regarding its strategic objective, and thereby demonstrate the usefulness of its program for Canadians. The scorecard provides information on the organization's performance according to four perspectives: financial, clients and stakeholders, internal business processes, and learning and growth, and links them with the priorities for the current year.

In fiscal year 2005-2006, the TSB continued its process to acquire a structured approach to measure its performance. However, it should be mentioned that progress with respect to performance measurement was more limited this year because of key staff turnover within the Corporate Services team. The table below illustrates the existing linkages between its strategic objective, program activity and the results that can be expected by Canadians, as well as its performance indicators. The TSB does not report on all of its performance indicators because some baseline data are not yet available.

**PROGRAM ACTIVITY ARCHITECTURE**



**EXPECTED RESULTS**

- ↑ Increased awareness of safety issues and a strengthened safety culture on the part of governments, industry and the public
- ↑ Timely implementation of safety actions by stakeholders to improve transportation safety for Canadians
- ↑ Identification and communication to stakeholders and the public of safety deficiencies in the transportation system
- ↑ Effective Management of Resources

**INDICATORS**

- Cost of Business Plan projects
- Stakeholder and client awareness of TSB profile and impact
- Safety outputs issued
- Timely availability of safety information on the web
- Timely availability of other TSB information on the web
- Cost of Business Plan projects
- Timely safety actions taken
- Cost of investigations
- Other operating costs
- Responsiveness to TSB recommendations and advisories
- Safety outputs issued
- Number of investigations in process
- Average time in process
- Investigations completed per investigator
- Employee job satisfaction
- Investment in training per person
- Effective use of partnerships
- Human Resources management modernization deliverables

Most of the data used in this report comes from TSB information systems, supplemented by Transport Canada information where appropriate. Anecdotal evidence that illustrates the performance assessment was obtained from various sources such as stakeholder feedback, magazine articles, press clippings, individual testimonials, survey results and audit reports. Where sources of information external to the TSB are used, they are identified.

## 2.4 Report on Transportation Occurrences

In 2005, a total of 2,037 accidents and 1,371 incidents were reported in accordance with the TSB's regulations for mandatory reporting of occurrences.<sup>2</sup> The number of accidents in 2005 increased by 5 per cent from both the 1,945 accidents reported in 2004 and the 2000-2004 annual average of 1,946 accidents. The number of reported incidents decreased to 1,371 in 2005, down from 1,483 in 2004 and the 2000-2004 average of 1,414. There were also 615 voluntary incident reports. Fatalities totalled 189 in 2005, up 3 from the 2004 total but equal to the 2000-2004 average.

**Figure 1: Occurrences Reported to the TSB**

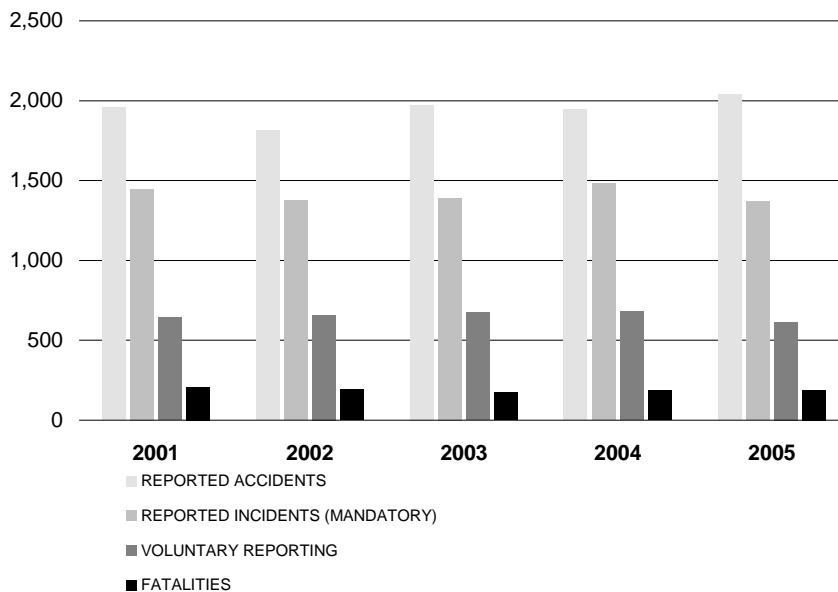


Table 4 presents data on accident rates by mode for the current year, as well as the five-year average. Even if these rates are based on limited data, activity level indicators provide a general point of reference on transportation safety. Overall, Canada continued to maintain a good safety record in 2005. The 2005 accident rates, per activity level for all modes, reflect a downward trend from the five-year average.

<sup>2</sup> While the TSB activities are for the 2005-2006 fiscal year, occurrence statistics are for the 2005 calendar year. Comparisons are generally to the last 5 or 10 years.

<b>Table 4: Accident Rates in Transportation by Mode in 2005 Compared to the Previous Five-Year Average (2000-2004)</b>				
	Marine <sup>1</sup>	Pipeline <sup>2</sup>	Rail <sup>3</sup>	Air <sup>4</sup>
Accidents				
2005	2.8	0.4	3.1	6.7
2004	3.0	0.5	2.8	6.5
Five-Year Average	2.9	1.5	2.8	7.3
<sup>1</sup> Canadian-flag shipping accidents for vessels with a gross tonnage of 15 or more (excluding passenger vessels, passenger ferries and fishing vessels) per 1,000 movements <sup>2</sup> Per exajoule <sup>3</sup> Accidents (other than crossing or trespasser accidents) that occur on a main track or spur per million main-track train-miles. Since April 1, 2005, the accidents that occurred on former BC Rail's network are included. <sup>4</sup> Canadian-registered aircraft accidents (excluding ultralights, gliders, balloons and gyrocopters) per 100,000 hours.				

Reported accidents and incidents provide indicators of the transportation system's safety performance and help focus efforts on those initiatives and activities that have high safety benefits. Table 5 presents the statistics on transportation occurrences by mode, including comparisons with the five-year average. Taking into account the level of activity in each mode, the number of accidents for 2005 continued to exhibit a general downward trend in the marine, pipeline and air modes. However, an increase of 18.1 per cent in the number of rail accidents from the previous five-year average is observed. Another indicator of the safety performance of the transportation system is the number of fatalities. In 2005, the air and marine modes showed a decrease in fatalities compared to the five-year average. However, there was a 10.8 per cent increase in the number of fatalities in the rail mode over the previous five-year average. A reduction in accidents and fatalities would be expected to positively influence the public's confidence in the safety of the transportation system.

<b>Table 5: Transportation Occurrences by Mode in 2005 Compared to the Previous Five-Year Average (2000-2004)</b>				
	Marine	Pipeline	Rail*	Air
Accidents				
2005	480	5	1,246	306
2004	492	7	1,138	308
Five-Year Average	514	19	1,055	349
Fatalities				
2005	19	0	103	67
2004	28	0	101	57
Five-Year Average	28	0	93	74
Incidents				
2005	225	79	244	823
2004	248	74	252	909
Five-Year Average	226	44	300	837
* Since April 1, 2005, occurrences on the former BC Rail's network are included in the number of occurrences.				

Despite fluctuations in the number of accidents and incidents reported on an annual basis, the trend over the past 10 years shows a progressive decline in accident rates in all modes (see the figures for each mode in sections 2.7 to 2.10). Therefore, Canada has one of the safest transportation systems in the world and continues to work diligently to further improve it. These improvements in transportation safety are the result of the combined efforts of many stakeholders including manufacturers, carriers, crews, regulators, and the TSB. All these efforts are also reflected in the results of a survey conducted by EKOS in March 2005 where 95 per cent of those Canadians who had an opinion on the subject have rated the air, rail and marine transportation modes as moderately or very safe and secure.<sup>3</sup> More comprehensive information is available on the TSB website at [www.tsb.gc.ca/en/stats/index.asp](http://www.tsb.gc.ca/en/stats/index.asp) or in Chapter 4 of the *Transportation in Canada 2005: Annual Report* published by Transport Canada ([www.tc.gc.ca/pol/en/Report/anre2005/toc\\_e.htm](http://www.tc.gc.ca/pol/en/Report/anre2005/toc_e.htm)).

## 2.5 Investigations and Safety Action

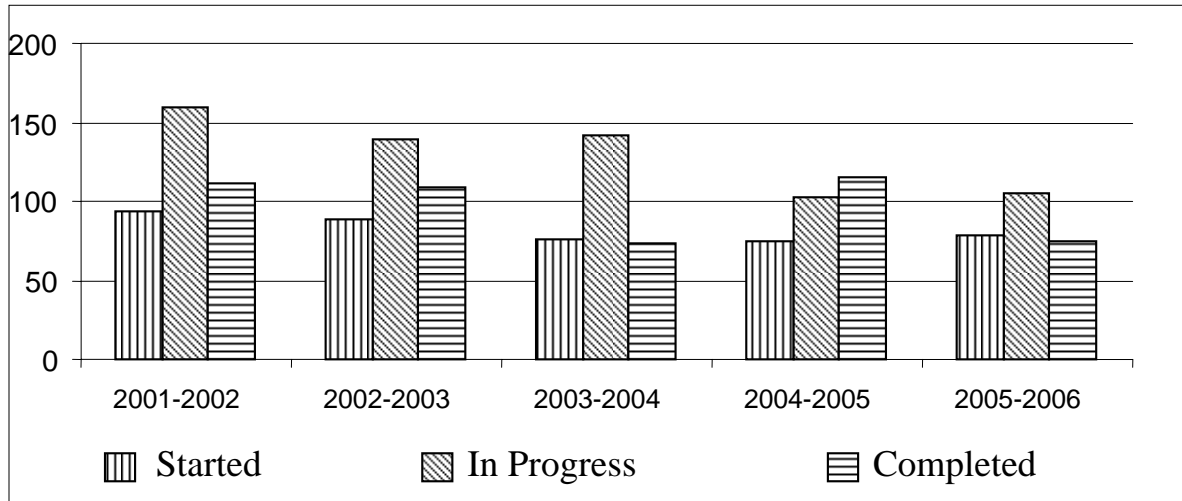
All reported occurrences were examined in accordance with the Board's Occurrence Classification Policy to identify those with the greatest potential for advancing transportation safety. Information was entered into the TSB database for historical record, trend analysis and safety deficiency validation purposes. Investigations were undertaken for 78 of the approximately 4,000 occurrences reported to the TSB in fiscal year 2005-2006. In that same period, 75 investigations were completed, compared to 115

<sup>3</sup> Transport Canada, *Transportation in Canada 2005: Annual Report*, TP 13198.



in the previous year.<sup>4</sup> This result can be attributed partly to the fact that the TSB was investigating major occurrences that required a high degree of effort and tight management of resources. It was nonetheless offset by the fact that smaller investigations were completed more rapidly.

**Figure 2: Investigations Started, in Progress, and Completed**



The number of investigations in process increased to 105 at the end of this fiscal year from 102 at the start. Of the 105 investigations in progress at year end, 7 were more than two years old, 33 were between one and two years old and 65 were less than one year old. The average time to complete an investigation decreased to 464 days in 2005-2006 from 619 days in the previous year because of the TSB's continuous effort to improve its efficiency.

<sup>4</sup> Investigations are considered complete after the final report has been issued.

<b>Table 6: TSB Productivity</b>										
	Marine		Pipeline		Rail		Air		Total	
	2004-2005	2005-2006	2004-2005	2005-2006	2004-2005	2005-2006	2004-2005	2005-2006	2004-2005	2005-2006
Investigations Started	16	17	0	2	14	9	44	50	74	78
Investigations Completed	21	12	2	1	25	9	67	53	115	75
Average Duration of Completed Investigations (Number of Days)	881	651	1,081	922	618	519	524	404	619	464
Note: Results can fluctuate significantly from year to year due to a number of factors such as staff turnover, the complexity of investigations and the investigation of major occurrences.										

Overall, the TSB has been successful in identifying safety deficiencies and in reducing risks in the transportation system. TSB investigations result in reports identifying safety deficiencies and, where appropriate, containing recommendations to reduce risks. Over this past year, in all cases where the TSB undertook an investigation, safety deficiencies or contributing factors were identified and communicated. These results reflect careful application of the TSB's Occurrence Classification Policy in deciding whether to investigate, and a thorough implementation of the investigation methodology. This systematic approach ensures that TSB investigation resources are invested in areas with the greatest potential safety payoffs.

In 2005-2006, in addition to investigation reports, the TSB issued a total of 55 safety outputs: 12 recommendations, 21 safety advisories and 22 safety information letters (see Table 7 for a breakdown by mode).

<b>Table 7: Safety Outputs by the TSB</b>			
<b>Mode</b>	<b>Recommendations</b>	<b>Safety Advisories</b>	<b>Safety Information Letters</b>
Marine	6	5	8
Pipeline	0	0	1
Rail	0	9	8
Aviation	6	7	5
<b>TOTAL</b>	12	21	22
Note: In 2005-2006, a total of 12 marine safety concerns, 1 rail safety concern and 2 air safety concerns were identified.			

These outputs led to concrete actions by other organizations that directly improved safety and/or reduced risks. For example, Transport Canada submitted an information paper on incident prevention to the International Maritime Organization, worked with a manufacturer to improve the safety of its products, revised one of its training programs, amended a Management, Operation and Maintenance Agreement with a corporation to ensure an appropriate emergency response, issued alert bulletins to inform industry about specific safety concerns, and introduced changes to safety regulations and procedures. Similarly, industry has reacted to the TSB's work by undertaking numerous safety actions such as changes in operating practices and procedures, preventive modifications to equipment, replacement of parts, and the modification of training programs. Sections 2.7, 2.9 and 2.10 provide specific examples of such safety actions that were taken during 2005-2006.

Safety information is also provided informally to key stakeholders throughout the investigation process, permitting them to take immediate safety actions where appropriate. It is common practice for industry and government to take safety actions during the course of TSB investigations. Such safety actions range widely in scope and importance. Operators will often take immediate remedial action after discussion with TSB investigators (for example, to clear the sight-lines at a railway crossing by trimming bushes and vegetation). Regulators such as Transport Canada and the Federal Aviation Administration in the United States regularly issue mandatory directives requiring inspections and/or component replacement based on the TSB's preliminary findings. In such situations, rather than issuing recommendations, the TSB can then report on the corrective actions already taken by industry and government agencies.

In accordance with the *Canadian Transportation Accident Investigation and Safety Board Act*, a federal minister who is notified of a TSB recommendation must, within 90 days, advise the Board in writing of any action taken or proposed to be taken in response, or the reasons for not taking action. The Board considers each response, assessing the extent to which the related safety deficiency was addressed. When a recommendation generates responses from within and outside Canada, the Board's assessment is based primarily on the Canadian response. This year, the TSB started to publish on its website ([www.tsb.gc.ca](http://www.tsb.gc.ca)) its assessment of industry and government organization responses to its recommendations made after January 1, 2005.

<b>Table 8: Board Assessment of Responses to Recommendations</b>						
Responses Received in Fiscal Year 2005-2006	Fully Satisfactory Attention to Safety Deficiency	Satisfactory Intent to Address Safety Deficiency	Attention to Safety Deficiency Satisfactory in Part	Unsatisfactory Attention to Safety Deficiency	To be Assessed	<b>T O T A L</b>
Marine	1	2*	1	0	0	4
Pipeline	0	0	0	0	0	0
Rail	0	0	0	0	1	1
Air	1	0	1	0	6	8
Total	2	2	2	0	7	13
* includes recommendation M02-04, which was issued in 2002-2003						

## **2.6 Liaison with the Canadian and Foreign Transportation Community**

The TSB continues to promote awareness of safety issues and of a safety culture among transportation stakeholders. Every opportunity is taken to reiterate key messages and create awareness of safety issues. In 2005-2006, the TSB published 75 investigation reports, as well as monthly and annual statistical reports. One issue of the *Reflexions* safety digest was published during fiscal year 2005-2006. This digest contributes to the advancement of transportation safety by reflecting on the safety lessons learned from accident and incident investigations. It also provides an effective tool to disseminate the results of safety investigations to a broader audience.

The TSB maintains a proactive approach to the dissemination of information. Pertinent information is made readily available to industry, next-of-kin, the media and the public throughout the investigation process. Investigators are encouraged to maintain a dialogue with key stakeholders, including the early communication of safety issues that arise during the investigation. The TSB tries to satisfy both the public and the media's expectation for up-to-date factual information. In 2005-2006, it had 1,434 subscribers to its website, it responded to 1,284 information requests received through its website and 431 media calls, not including those inquiries handled at an accident site or at a report release news conference. The TSB attended 8 outreach events, held 3 news conferences and issued 46 news releases. The TSB's Macro-analysis Division responded to 593 requests for complex transportation occurrence database information.

The TSB also uses its website to increase awareness of safety issues and other transportation safety information. The TSB website ([www.tsb.gc.ca](http://www.tsb.gc.ca)) received an average of more than 86,700 daily hits and 4,870 daily visits, a 112 per cent increase in daily

visits over the previous year. The visitors are Canadians and people from all around the world. The increased traffic can be partly attributed to the media coverage given to certain accidents, the press releases issued by the TSB, the ease of access to the site and the vast amount of information found.

As part of the TSB's efforts to keep abreast of technological change and to maintain contact with the transportation industry in Canada, TSB staff and Board members attend and participate in various conferences and technical meetings pertinent to transportation safety. A list of these activities is presented in Appendix A.

The TSB's mandate is to advance transportation safety, not only in Canada, but worldwide. This cooperation comes in many forms, through participation in safety symposiums, international safety organizations and international investigations. A list of these activities is presented in Appendix B.

Although it is difficult to measure the results of TSB activity in this area, tangible signs continue to point toward a certain degree of effectiveness in achieving the desired outcome. For instance, requests for TSB safety information continue to increase year after year. Stakeholders and the media make use of TSB safety messages in their activities. There is a sustained level of interest, both in Canada and around the world, in TSB techniques and methodologies.

## **2.7 Marine Sector**

### **2.7.1 Annual Statistics**

In all, 480 marine accidents<sup>5</sup> were reported to the TSB in 2005, a 2 per cent decrease from the 2004 total of 492 and a 7 per cent decrease from the 2000-2004 average of 514. Marine fatalities totalled 19 in 2005, down from both the 2004 total and the 2000-2004 average of 28.

Shipping accidents, which comprised 91 per cent of marine accidents, reached a 30-year low of 435 in 2005, down from 442 in 2004 and the five-year average of 456. Nearly half of all vessels involved in shipping accidents were fishing vessels. Accidents to persons aboard ship, which include falls, electrocution, and other types of injuries requiring hospitalization, totalled 45 in 2005, a 10 per cent decrease from the 2004 total of 50 and a 22 per cent decrease from the five-year average of 58.

Marine activity for Canadian commercial non-fishing vessels increased by 5 per cent from the 2000-2004 average, resulting in a 7 per cent decrease in the accident rate from 3.0 to 2.8 accidents per 1,000 movements. Although marine activity for foreign

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<sup>5</sup> These accidents include those resulting directly from the operation of a ship other than a pleasure craft. See the *Transportation Safety Board Regulations* for more information.

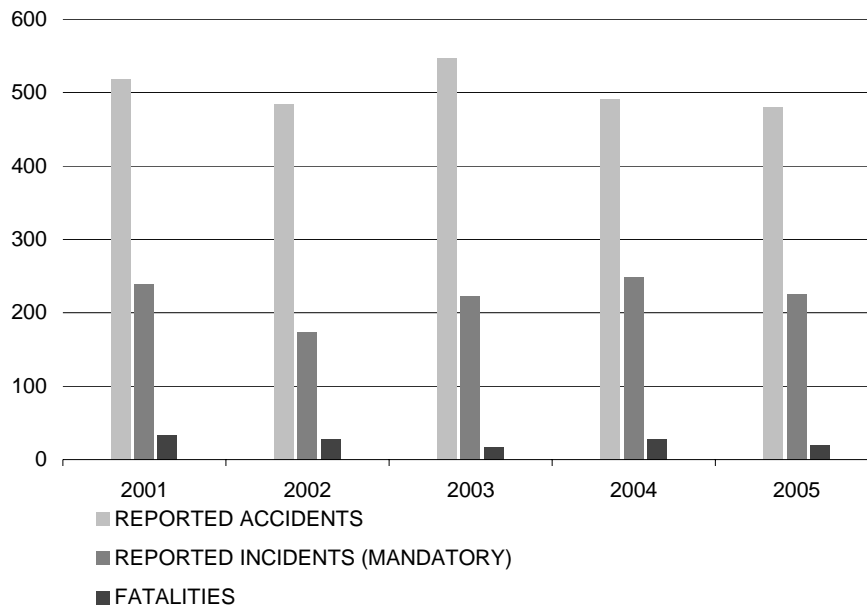
commercial non-fishing vessels remained relatively unchanged compared to the 2000-2004 average, accidents increased, yielding a 47 per cent increase in the accident rate from 1.5 to 2.2 accidents per 1,000 movements.

In 2005, shipping accidents resulted in 12 fatalities, down from 22 in 2004 and the five-year average of 17. Accidents aboard ship resulted in 7 fatalities, up 1 from the 2004 total but down 4 from the five-year average.

Twenty-two vessels were reported lost in 2005, equal to the 2004 total but down from the five-year average of 36.

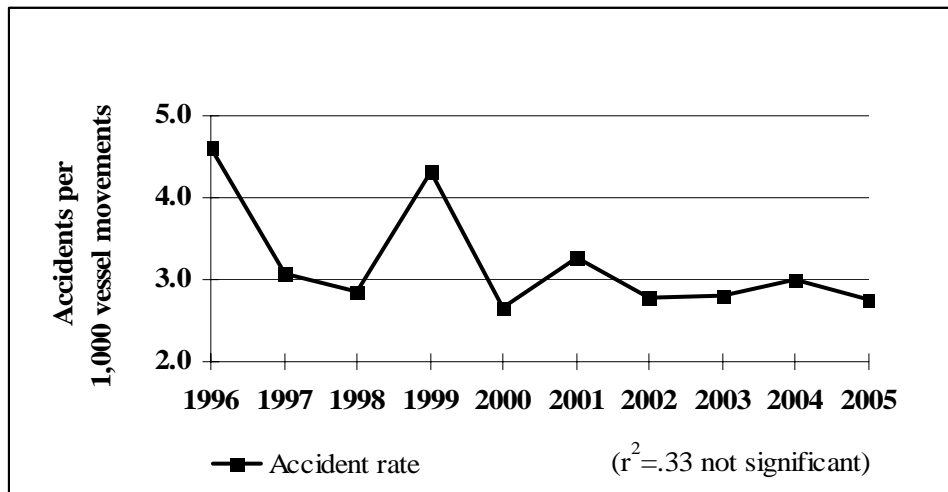
In 2005, 224 marine incidents were reported to the TSB in accordance with the mandatory reporting requirements. This represents a 10 per cent decrease from the 2004 total of 248 but is comparable to the five-year average of 226.

**Figure 3: Marine Occurrences and Fatalities**



One indicator of marine safety in Canada is the Canadian-flag shipping accident rate. This accident rate has decreased from 3.0 accidents per 1,000 movements in 2004 to 2.8 in 2005. However, this downward trend over the past 10 years is not statistically significant.

**Figure 4: Canadian-Flag Shipping Accident Rates**



### 2.7.2 Investigations

In 2005-2006, 17 marine investigations were started and 12 investigations were completed. This represents an important decrease (from 21 to 12) of the number of investigations completed compared to 2004-2005. The decrease is linked to the decrease in the number of investigators during the current fiscal year. The average duration of completed investigations dropped to 651 days compared to 881 the year before and to 839 days between 2001-2002 and 2004-2005. This is attributable to the concentrated efforts made to complete older cases. A complete list of all marine reports released in 2005-2006 is available on the TSB website ([www.tsb.gc.ca/en/publications/annual\\_report/2006/report2005\\_2006\\_2.asp](http://www.tsb.gc.ca/en/publications/annual_report/2006/report2005_2006_2.asp)).

<b>Table 9: Marine Productivity</b>					
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Investigations Started	16	13	14	16	17
Investigations Completed	18	15	18	21	12
Average Duration of Completed Investigations (Number of Days)	817	703	953	881	651
Recommendations	5	5	7	4	6
Safety Advisories	12	7	6	9	5
Safety Information Letters	11	14	11	8	8
Note: Results can fluctuate significantly from year to year due to a number of factors such as staff turnover, the complexity of investigations and the investigation of major occurrences.					

### 2.7.3 Link to Resources Utilized

Table 10 provides a picture of the net cost to Canadians of marine investigations. Although net costs dropped slightly compared to the previous year, the average net cost per investigation completed increased by 61 per cent because of different factors such as the expenditure associated with the major investigation undertaken when the ferry *Queen of the North* sunk near Prince Rupert, British Columbia, the overtime worked to make up for a lack of investigators as well as the expenditure to implement a new work approach to speed up the investigations and the quality of the reports produced. The number of investigations started per investigator increased slightly, whereas the number of investigations completed per investigator decreased compared to 2004-2005.

<b>Table 10: Marine Resources</b>				
	2004-2005		2005-2006	
	FTE	In thousands of dollars	FTE	In thousands of dollars
Actual Costs – Marine Branch	27.3	2,975	22.9	2,797
Internal Professional and Communication Service Costs	19.2	2,115	17.7	1,823
Corporate Services Costs	13.6	1,291	10.7	1,196
Contributions to Employee Benefit Plans		803		781
Services Received Without Charge		747		696
Net Cost of Marine Investigations	60.1	7,931	51.3	7,294
<b>Indicators</b>				
	2004-2005		2005-2006	
Number of Marine Investigators	23		20.4	
Average Net Cost per Investigation Completed	\$377,670		\$607,820	
Investigations Started by Investigator	0.70		0.83	
Investigations Completed by Investigator	0.91		0.59	

### 2.7.4 Safety Actions Taken

Six marine safety recommendations were issued in 2005-2006. To date, safety actions have been undertaken on three of these recommendations and actions will be taken on the three other recommendations in the coming year.



The Marine Branch also re-assessed responses to published recommendations. In 2005, 57 active recommendations were examined. With Board approval, 20 recommendations went from active to inactive status and 37 recommendations remained active. Five recommendations issued subsequent to the Board's approval of the re-assessments were not included in the assessment.

#### 2.7.4.1 Marine Recommendations issued in 2005-2006

Strait of Georgia, British Columbia – August 4, 2002 Switchboard Fire – Passenger Vessel <i>Statendam</i>	Report No. M02W0135
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Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>M05-01 The Department of Transport submit a paper to the International Maritime Organization requesting a review of requirements for structural fire protection and fire-extinguishing systems to ensure that the fire risks associated with compartments containing high levels of electrical energy are adequately assessed, and that the provisions of the International Convention for the Safety of Life at Sea (SOLAS) dealing with structural fire protection and fixed fire-extinguishing systems are addressed.</p>	<p>Transport Canada (TC) believes that the TSB should prepare an information paper on the issue and TC would submit it to the International Maritime Organization (IMO) Fire Protection Sub-Committee at the next meeting in January 2006.</p>	<p>Fully Satisfactory</p>	<p>TC agreed to submit an information paper (as drafted by TSB staff) to the IMO Fire Protection Sub-Committee that will call for a review to ensure that the fire risks associated with compartments containing high levels of electrical energy are adequately assessed and addressed by the provisions of SOLAS. The paper, dated October 4, 2005, was submitted to the IMO.</p>

<b>Recommendation</b>	<b>Response</b>	<b>Board Assessment of Response</b>	<b>Safety Action Taken</b>
M05-02 The Department of Transport, in conjunction with the manufacturer, ensure that all present and future owners of Ovatek liferafts receive information that will allow users to properly de-water and right a swamped liferaft and encourage all users to practice these procedures.	<p>The Minister of Transport accepts the recommendation. TC is working with the manufacturer to ensure that information on de-watering is provided to all current and future owners of Ovatek liferafts.</p> <p>As part of the revisions to the Marine Emergency Duties Training Program and Marine Emergency Duties A3/A4 courses, TC will introduce special training, where applicable, concerning the boarding of a rigid liferaft.</p>	Satisfactory Intent	<p>TC is to follow up with the manufacturer in early March 2006 before the commencement of the 2006 fishing season to confirm that the proposed actions have been completed.</p> <p>The revisions to training are to be implemented with the new proposed Marine Personnel Regulations in November 2006.</p>

Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>M05-03                      The Department of Transport develop and implement performance-based standards to ensure that all liferafts deployed on Canadian vessels are capable of operating in severe marine conditions and, further, encourage the International Maritime Organization to adopt a parallel approach internationally.</p>	<p>The Minister of Transport notes the recommendation, and TC will continue to work with the IMO to improve the testing and performance criteria of all survival equipment. Currently, work at the IMO is focused on improving the testing criteria for lifeboats and release mechanisms, as this has been a concern internationally and domestically.</p> <p>TC is planning to carry out research regarding thermal requirements of liferafts. The current IMO standards specify a need for insulated floors and canopies in liferafts without specifying the value of thermal protection required. This research will assist in improving the performance criteria of liferafts.</p>	<p>Satisfactory in Part</p>	<p>There is no indication in the response of any other domestic initiative under consideration or being taken regarding liferaft-related testing and performance criteria for operating in more severe marine conditions. However, TC is working at the international level through the IMO to further improve the testing and performance criteria of survival equipment. The development of goal- or performance-based standards is well under way within the IMO to address a variety of maritime matters. A correspondence group of the IMO Sub-Committee on Ship Design and Equipment (48th session, February 21 to 25, 2006) is expected to prepare performance requirements for survival craft used on future passenger ships.</p>

Off Cape Bonavista, Newfoundland and Labrador –  
September 19, 2004 – Capsizing and Loss of Life – Small  
Fishing Vessel *Ryan's Commander*

Occurrence No. M04N0086

Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>M05-04 The Department of Transport ensure that the Board's previous recommendations M03-05 and M03-06 are immediately implemented.</p>	<p>Until such time as the new Fishing Vessel Safety Regulations come into force, TC has established an interim measure for determining, based on a list of risk factors, whether a small fishing vessel requires a stability booklet. This interim measure, which will take effect immediately and apply to new and existing vessels, will require that a stability booklet be on board all vessels that have any of the identified risk factors.</p>	<p>Pending</p>	<p>To be reported next fiscal year</p>

Queen Charlotte Channel, British Columbia – May 12, 2003  
Engine Room Fire and Subsequent Failure of the CO<sub>2</sub>  
Distribution Manifold – Ro-Ro Passenger Ferry *Queen of Surrey*

Report No. M03W0073

Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>M05-05 The Department of Transport, in conjunction with other stakeholders, review Canadian and international marine regulations respecting fixed fire-extinguishing systems to ensure that their design, maintenance, inspection, and testing regimes effectively demonstrate continued structural and functional integrity.</p>	<p>Awaiting response</p>	<p>Pending</p>	<p>To be reported next fiscal year</p>

Recommendation	Response	Board Assessment of Response	Safety Action Taken
M05-06 The Department of Transport require Canadian passenger vessels over 500 gross tonnage to meet a standard of structural fire protection that ensures a level of safety equivalent to SOLAS-compliant vessels.	Awaiting response	Pending	To be reported next fiscal year

#### 2.7.4.2 Other Marine Safety Actions

Transport Canada (TC) issued Ship Safety Bulletin 01/2005, *The Use of Passive Anti-Roll Tanks (ART) on Small Fishing Vessels*, to caution operators of vessels fitted with passive anti-roll tanks about the safety hazards associated with their use.

The Canadian General Standards Board published its amended standard CAN/CGSB-65.16-2005, Immersion Suit Systems. The amended standard requires that information concerning the donning, fitting, operation, maintenance and cleaning of the suit system be made available to purchasers at the point of sale.

A West Coast marine insurance company advised its members of the potential deficiencies associated with the use of single crossbar type hatch covers.

TC completed special audits with respect to operational readiness on board some passenger ferries operating in Canada.

TC is reviewing all fire safety regulatory requirements, together with other international standards. Low-location lighting, emergency lighting and supplemental lighting requirements will be included in the review. TC anticipates that the new Fire Safety Regulations will come into force by November 2006.

The ferry operator Northumberland Ferries Ltd. made modifications to the control levers of a horizontal sliding door to make the operation of the door easier; the lever now actuates the door in the same direction of travel and the handles are now very close to the door opening. The time required for the horizontal watertight door to close from fully opened was also adjusted to 26 to 30 seconds as per the manufacturer's specifications.

The Canadian Coast Guard issued Fleet Bulletin 06-2005, *Concerns about Stability of Aluminum Barges*, to its fleet personnel to remind them to give careful consideration to the impact of cargo handling work on stability and the operating restrictions of barges.

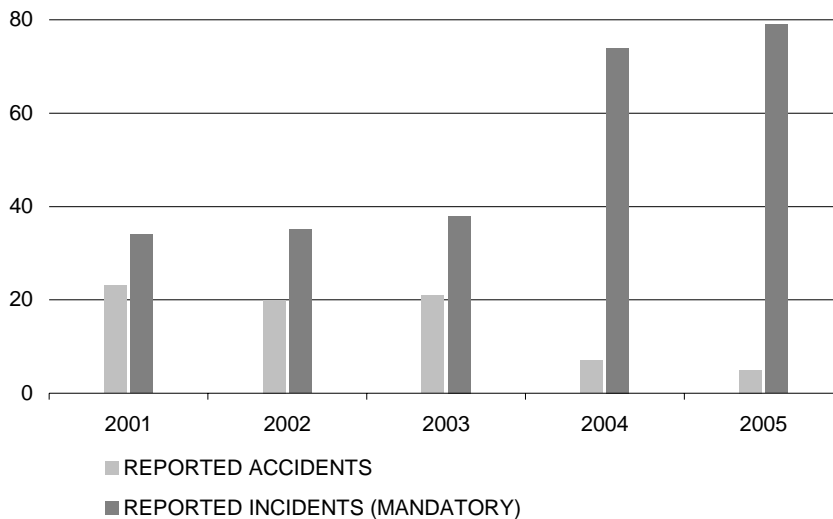
## 2.8 Pipeline Sector

### 2.8.1 Annual Statistics

In 2005, 5 pipeline accidents were reported to the TSB, down from the 2004 total of 7 and from the 2000-2004 average of 16. Pipeline activity is estimated to have decreased by 1 per cent from the previous year. The accident rate decreased to 0.4 pipeline accidents per exajoule in 2005, down from 0.5 in 2004 and the 2000-2004 average rate of 1.48. The last fatal pipeline accident in the portion of the industry under federal jurisdiction occurred in 1988, and the last accident involving serious injury occurred in 2000.

In 2005, 79 pipeline incidents were reported to the TSB in accordance with the mandatory reporting requirements, up from 74 in 2004 and from the five-year average of 44. In all, 90 per cent of those incidents involved uncontained or uncontrolled release of small quantities of gas, oil and high-vapour-pressure products.

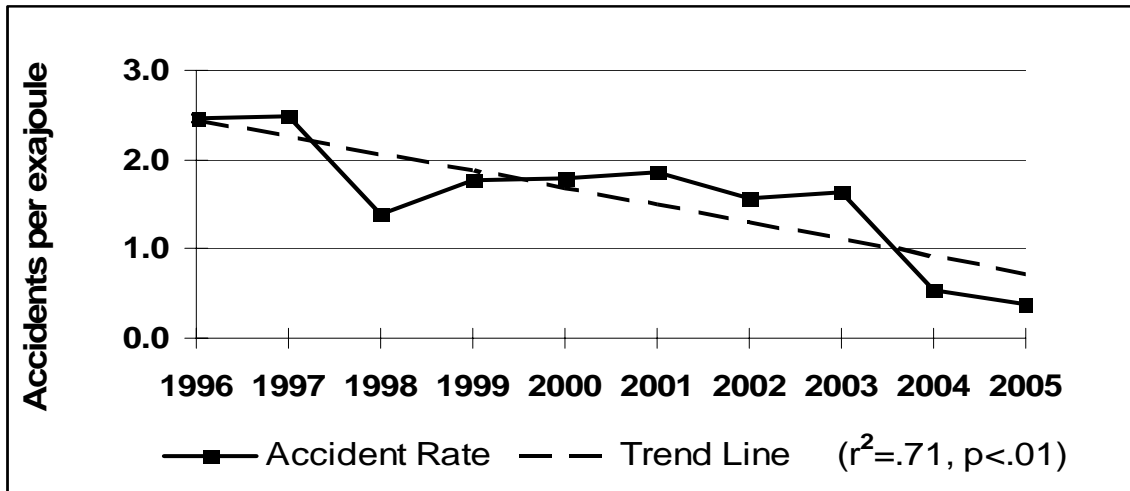
**Figure 5: Pipeline Occurrences**



\*No pipeline fatality has been reported since 1988.

One indicator of pipeline transportation safety in Canada is the pipeline accident rate. This rate decreased to 0.4 pipeline accidents per exajoule in 2005, down from 0.5 in 2004 and the 2000-2004 average of 1.48. The trend line also indicates a clear downward direction.

**Figure 6: Pipeline Accident Rates**



### 2.8.2 Investigations

In 2005-2006, two pipeline investigations were started and one investigation was completed. The completed investigation required 922 days. This duration appears high if it is compared to the average investigation time in 2001-2002 and 2002-2003. However, the investigation was very complex and required a high degree of effort to gather and analyze the data. The pipeline report released in 2005-2006 is available on the TSB website ([www.tsb.gc.ca/en/publications/annual\\_report/2006/report2005\\_2006\\_2.asp](http://www.tsb.gc.ca/en/publications/annual_report/2006/report2005_2006_2.asp)).

<b>Table 11: Pipeline Productivity</b>					
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Investigations Started	1	2	0	0	2
Investigations Completed	3	2	0	2	1
Average Duration of Completed Investigations (Number of Days)	531	410	0	1,081	922
Recommendations	0	0	0	0	0
Safety Advisories	2	0	0	0	0
Safety Information Letters	0	1	0	0	0
Note: Results can fluctuate significantly from year to year due to a number of factors such as staff turnover, the complexity of investigations and the investigation of major occurrences.					

### 2.8.3 Link to Resources Utilized

Table 12 provides a picture of the net cost to Canadians of pipeline investigations. The net cost of pipeline investigations increased slightly compared to 2004-2005. The average net cost per investigation undertaken increased by 101 per cent compared to 2004-2005. This high cost can be attributed to the complexity of the investigation that was completed and the need to use outside expertise to complete some components. This situation also explains the drop in the number of investigations completed per investigator compared to 2004-2005.



<b>Table 12: Pipeline Resources</b>				
	2004-2005		2005-2006	
	FTE	In thousands of dollars	FTE	In thousands of dollars
Actual Costs – Pipeline Branch	1.0	198	2.0	203
Internal Professional and Communication Service Costs	0.7	141	1.5	133
Corporate Services Costs	0.5	86	0.9	87
Contributions to Employee Benefit Plans		53		57
Services Received Without Charge		50		51
Net Cost of Pipeline Investigations	2.2	528	4.4	531
<b>Indicators</b>				
	2004-2005		2005-2006	
Number of Pipeline Investigators	1.0		1.8	
Average Net Cost per Investigation Completed	\$263,913		\$530,584	
Investigations Started by Investigator	0.00		1.11	
Investigations Completed by Investigator	2.00		0.56	

#### **2.8.4 Safety Actions Taken**

No pipeline safety recommendations were issued in 2005-2006.

## **2.9 Rail Sector**

### **2.9.1 Annual Statistics**

A total of 1,246 rail accidents were reported to the TSB in 2005, a 9 per cent increase from the 2004 total of 1,138 and an 18 per cent increase from the 2000-2004 average of 1,055. Rail activity is estimated to have increased by 3 per cent over 2004 and by 6 per cent over the five-year average. The accident rate increased to 13.0 accidents per million train-miles in 2005, compared to 12.3 in 2004 and the five-year rate of 11.7. Rail-related fatalities totalled 103 in 2005, compared to 101 in 2004 and the five-year average of 93.

Six main-track collisions occurred in 2005, compared to five in 2004 and the five-year average of seven. In 2005, there were 195 main-track derailments, a 28 per cent increase from the 2004 total of 152 and a 47 per cent increase from the five-year average of 133.

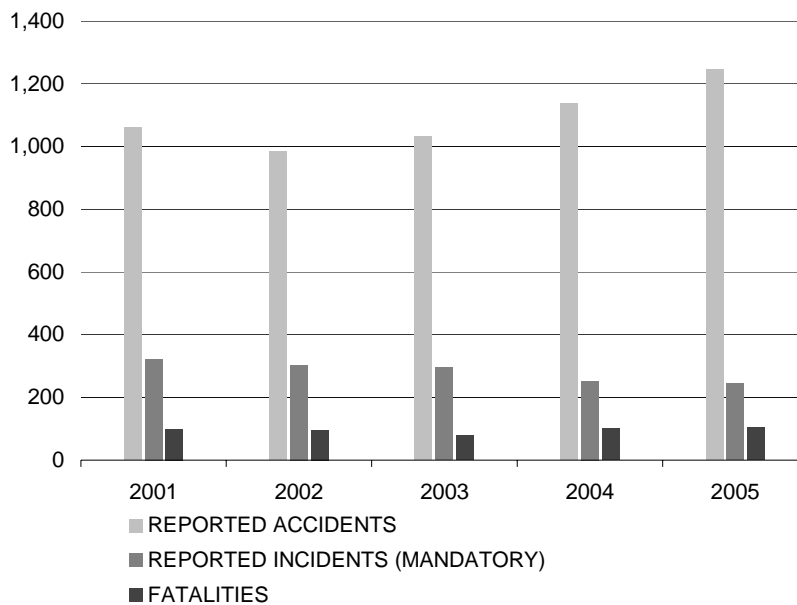
Non-main-track derailments also showed a significant increase in 2005, totalling 538 compared to 450 in 2004 and the five-year average of 392. Several factors may have influenced the number of derailments that occurred in 2005. Out of them we noted the weather conditions but also the significant increase of the gross tonnage of trains on Canadian railways, which resulted in increased loading of the infrastructure.

In 2005, crossing accidents increased to 270 from the 2004 total of 237 and from the five-year average of 258. Crossing-related fatalities numbered 38, up from 25 in 2004 and the five-year average of 35. Trespasser accidents showed a 17 per cent decrease from 2004, from 99 to 82, but a 4 per cent increase over the five-year average of 79. With a total of 63 fatalities in 2005, trespasser accidents continue to account for the majority of rail fatalities.

In 2005, 215 rail accidents involved dangerous goods (this also includes crossing accidents in which the motor vehicle is carrying a dangerous good), up from 208 in 2004 but down from the five-year average of 222. Six of these accidents resulted in a release of product.

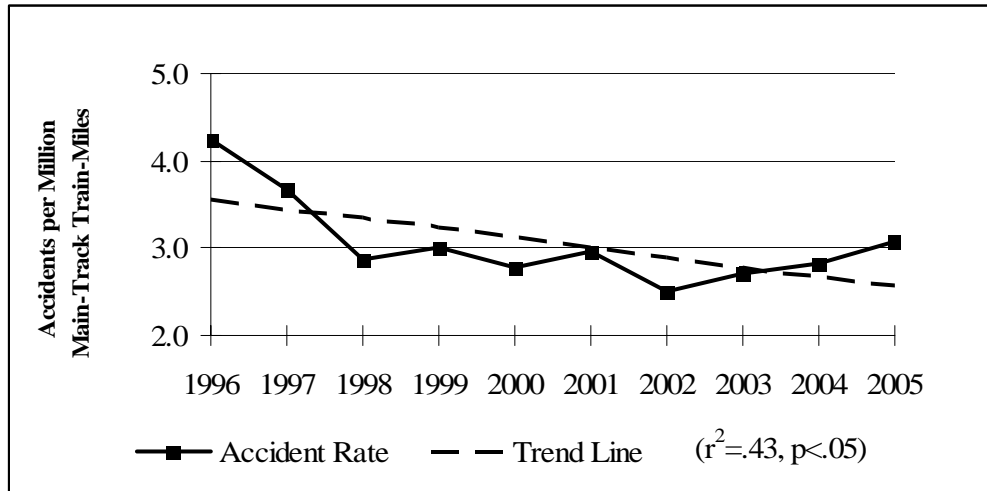
In 2005, rail incidents reported to the TSB in accordance with the mandatory reporting requirements reached a 23-year low of 244, down from 252 in 2004 and the five-year average of 300. Dangerous goods leakers not related to train accidents account for the largest proportion of total incidents each year. In 2005, dangerous goods leakers decreased to 124 from the 2004 total of 131 and from the five-year average of 166.

**Figure 7: Rail Occurrences and Fatalities**



One indicator of rail transportation safety in Canada is the main-track accident rate. Although this accident rate increased from 2.8 accidents per million main-track train-miles in 2004 to 3.1 in 2005, it compares with the average accident rate (3.1) recorded over the past 10 years. The trend line also indicates a slight downward direction.

**Figure 8: Main-Track Accident Rates**



## 2.9.2 Investigations

Nine new rail investigations were started in 2005-2006 and 9 investigations were completed. This represents a significant decrease in the number of investigations completed compared to the previous year (from 25 to 9). This difference can be attributed to the fact that three extensive investigations consumed a large share of the resources available in 2005-2006. The average duration of completed investigations dropped to 519 days compared to 618 days the year before. This also represents a significant reduction in comparison to the past four years. The reduction is attributable to the concentrated efforts made to complete very old cases. A complete list of all rail reports released in 2005-2006 is available on the TSB website

([www.tsb.gc.ca/en/publications/annual\\_report/2006/report2005\\_2006\\_3.asp](http://www.tsb.gc.ca/en/publications/annual_report/2006/report2005_2006_3.asp)).

<b>Table 13: Rail Productivity</b>					
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Investigations Started	12	18	14	14	9
Investigations Completed	16	22	15	25	9
Average Duration of Completed Investigations (Number of Days)	708	755	894	618	519
Recommendations	4	5	4	3	0
Safety Advisories	7	6	7	6	9
Safety Information Letters	8	9	11	10	8
Note: Results can fluctuate significantly from year to year due to a number of factors such as staff turnover, the complexity of investigations and the investigation of major occurrences.					

### 2.9.3 Link to Resources Utilized

Table 14 provides a picture of the net cost to Canadians of rail investigations. The net cost of rail investigations increased slightly compared to the previous year. The average net cost per investigation completed increased by 178 per cent compared to the previous year. This difference can be attributed to the fact that the average net cost per investigation completed in 2004-2005 was low because several of these investigations had been started in earlier years. The number of investigations started per investigator dropped slightly, whereas the number of investigations completed per investigator decreased significantly.

<b>Table 14: Rail Resources</b>				
	2004-2005		2005-2006	
	FTE	In thousands of dollars	FTE	In thousands of dollars
Actual Costs – Rail Branch	23.2	2,595	22.7	2,652
Internal Professional and Communication Service Costs	16.2	1,845	17.5	1,728
Corporate Services Costs	11.5	1,126	10.6	1,134
Contributions to Employee Benefit Plans		701		741
Services Received Without Charge		652		660
Net Cost of Rail Investigations	50.9	6,919	50.8	6,916
<b>Indicators</b>				
	2004-2005		2005-2006	
Number of Rail Investigators	19.0		20.0	
Average Net Cost per Investigation Completed	\$276,749		\$768,444	
Investigations Started by Investigator	0.74		0.45	
Investigations Completed by Investigator	1.32		0.45	

## 2.9.4 Safety Actions Taken

No rail recommendations were issued in 2005-2006.

The railway industry and the regulator provided updated information as to the response to Board recommendations. The response to recommendations was reassessed for all 118 recommendations issued since 1991. The information provided prompted reassessment of active recommendations that were being monitored for industry response. The number of active recommendations was reduced from 54 to 26 as the response to 28 recommendations was assessed as fully satisfactory.

### 2.9.4.1 Other Rail Safety Actions Taken

In response to a Transport Canada (TC) Notice and Order issued by a TC Railway Safety Inspector, Canadian National (CN) took measures to ensure the accuracy of train journals. CN installed additional cameras to monitor cars during switching in rail yards and enhanced automatic car identification systems technology to facilitate prompt correction of any errors between train journals and clearing trains.

Subsequent to a derailment caused by truck hunting at speeds over 50 mph by gondola wood chip cars (TSB Report R04Q0006), the Board expressed concern that these particular cars, which are not equipped with supplementary stabilization systems, are prone to truck hunting at speeds in excess of 50 mph and present a risk of derailment. “Truck hunting” is rapid oscillation of an empty car truck at high speeds, where the flanges tend to ride up on the head of the rail.

Subsequent to a derailment in Bolton, Ontario, at a location with a combination of adverse track conditions (TSB Report R04T0013), Canadian Pacific Railway (CPR) identified two additional track geometry defect types to be measured by the CPR track evaluation car. The new defect types take into consideration the effect of a combination of cross-level and alignment deficiencies and a combination of the train speed exceeding the design speed on a curve with unbalanced superelevation.

The TSB issued a Rail Safety Advisory subsequent to a crossing accident at Castleford, Ontario (TSB Report R04H0014). The advisory discusses the changing of the crossing warning signals from left-hand to right-hand orientation as viewed by an approaching motorist. This change was done to comply with a new standard that crossing signals be right-hand oriented. However, the curvature of the approaching roadway mandated that the signals be left-hand oriented to provide a better sightline of the signals when approaching. Left-hand oriented signals are in the process of being installed at that crossing.

After several derailments involving a breach of containment in tank cars loaded with anhydrous ammonia and subsequent exposure injury, including fatal injury, the classification of anhydrous ammonia is being changed from Class 2.2, non-flammable and non-toxic gases, to Class 2.3, toxic gases, with a sub-class 8, corrosive. The revisions to the *Transportation of Dangerous Goods Regulations* are expected to be published in fiscal year 2006-2007.

Subsequent to a derailment in Estevan, Saskatchewan, CPR developed and distributed a “Tech Tip” poster across its system to illustrate what to look for when inspecting freight car centre plates and side bearings (TSB Report R04W0148). CPR instructed all certified car inspectors to review the poster. As well, CPR developed and implemented a system-wide risk assessment process that requires its Engineering and Field Operations departments to jointly perform a risk assessment on the track condition before any significant operational changes or when traffic is expected to increase substantially.

TC-approved *Railway Locomotive Inspection and Safety Rules* were revised, effective January 2006, with changes to the criteria and timeliness of safety inspections on locomotives.

TC developed a *Canadian Road/Railway Grade Crossing Detailed Safety Assessment Field Guide* (TP 14372E), dated April 2005, to promote enhanced pedestrian crossing protection as part of its compliance, awareness and research programs, and to guide persons performing grade crossing assessments.

Subsequent to the complete fracture and failure of a draft gear stop block in a dangerous commodities tank car (TSB Occurrence R04H0018), which was fortunately caught by inspection, the TSB Engineering Laboratory conducted a failure analysis of the fractured steel. It was determined that the stop block did not conform to the applicable Association of American Railroads (AAR) standard. A TSB Rail Safety Information Letter with this information was forwarded to the AAR.

The AAR revised Standard S-580, *Locomotive Crashworthiness Requirements*, effective July 2005, to include requirements for car body-to-truck attachment and for emergency interior lighting on locomotives manufactured after 2008.

In response to a TSB Rail Safety Advisory and a Rail Safety Information Letter concerning improper loading of steel products on flat cars, CN set off all line shipments of such steel products to confirm that the loading was in compliance with the AAR rules. CN took measures to ensure that shippers of such steel products reviewed the proper loading requirements and provided copies of the required loading patterns. The AAR developed revisions to the *Open Top Loading Rules* to clarify the guidelines for such loads, and published the revisions in AAR Circular Letter C-10146.

In response to a TSB Rail Safety Advisory concerning shattered rim defects in Southern CH36 wheels manufactured in 1995 and the resultant derailments, the AAR declared that those wheels must be removed from the North American car fleet whenever the cars are in a repair shop and must not be put on another car. The *Field Manual of the AAR Interchange Rules* was revised accordingly. CN and CPR initiated programs that go beyond the requirements of the AAR. They are removing all Southern wheels from their equipment and have instructed their suppliers not to install Southern wheels on any cars owned or leased by them.

## **2.10 Air Sector**

### **2.10.1 Annual Statistics**

Canadian-registered aircraft, other than ultralights, were involved in 258 reported accidents in 2005, a 2 per cent increase from the 2004 total of 252 but a 10 per cent decrease from the 2000-2004 average of 287. The estimate of flying activity for 2005 is 3,832,000 hours, yielding an accident rate of 6.7 accidents per 100,000 flying hours, up from the 2004 rate of 6.5 but down from the five-year rate of 7.3. Canadian-registered aircraft, other than ultralights, were involved in 34 fatal occurrences with 51 fatalities in 2005, higher than the 24 fatal occurrences with 37 fatalities in 2004 but comparable to the five-year average of 32 fatal occurrences with 54 fatalities. A total of 20 fatal

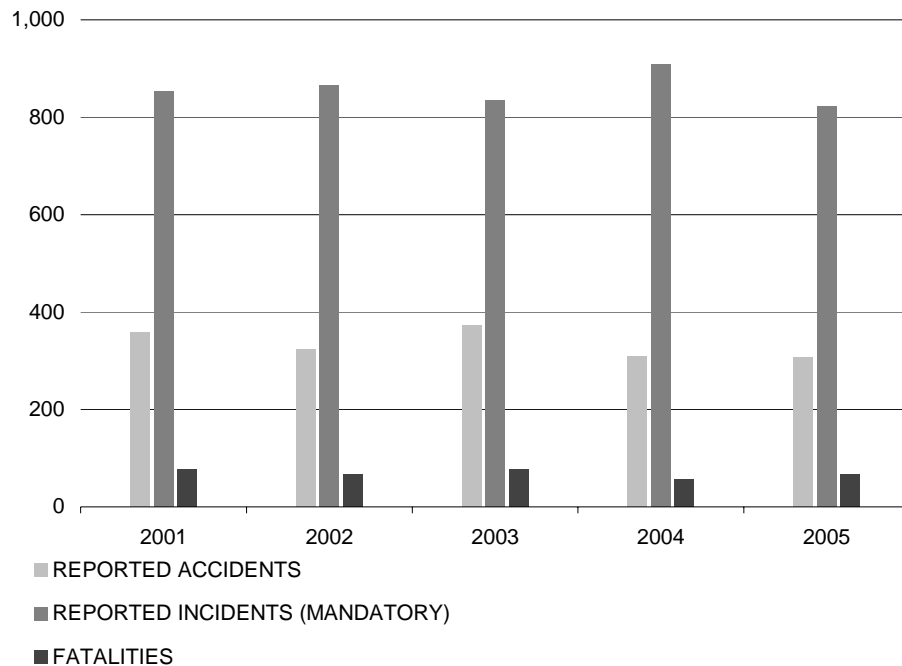
occurrences involved privately operated aircraft (13 aeroplanes, 6 helicopters and 1 glider), and 12 of the remaining 14 fatal occurrences involved commercial operators (9 aeroplanes and 3 helicopters).

The number of accidents involving ultralights decreased to 30 in 2005 from 36 in 2004, and the number of fatal accidents decreased slightly to 5 in 2005 from 6 in 2004.

The number of foreign-registered aircraft accidents in Canada decreased to 18 in 2005 from 20 in 2004. Fatal accidents increased to 6 in 2005, from 3 in 2004.

In 2005, a total of 823 incidents<sup>6</sup> were reported to the TSB in accordance with the mandatory reporting requirements. This represents a 9 per cent decrease from the 2004 total of 909 and a 2 per cent decrease from the 2000-2004 average of 837.

**Figure 9: Air Occurrences and Fatalities**

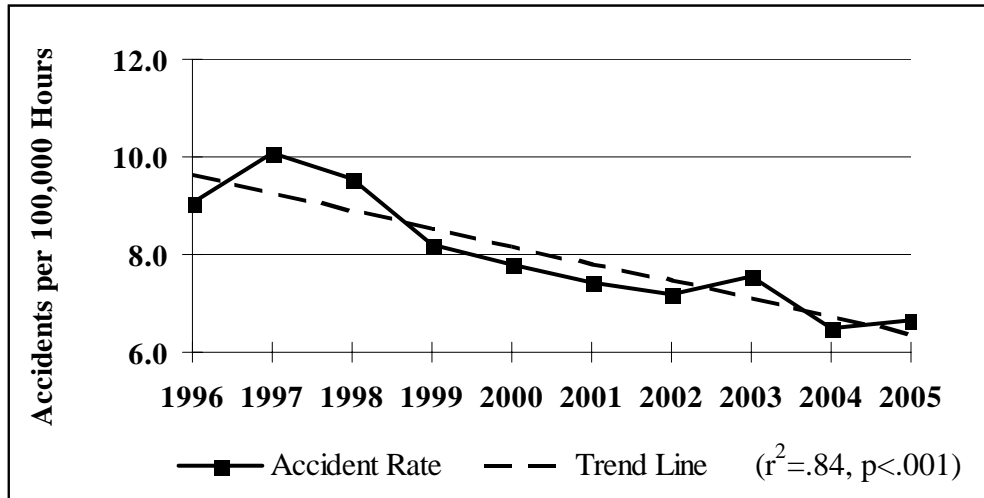


<sup>6</sup> These incidents include those resulting directly from the operation of an airplane having a maximum certificated take-off weight greater than 5,700 kg or of a rotorcraft having a maximum certificated take-off weight greater than 2,250 kg. See the *Transportation Safety Board Regulations* for more information.



One indicator of air transportation safety in Canada is the accident rate for Canadian-registered aircraft. This rate increased slightly from 6.5 accidents per 100,000 hours in 2004 to 6.7 in 2005, but remained below the five-year average. The trend line also shows a downward direction over the past 10 years.

**Figure 10: Canadian-Registered Aircraft Accident Rates**



### 2.10.2 Investigations

A total of 50 air investigations were started in 2005-2006 and 53 investigations were completed. This represents a significant decrease in the number of investigations completed compared to the previous year (67). The average duration of completed investigations has also decreased to 404 days, compared to 524 the year before. This is attributable to the concentrated efforts made to complete older cases. A complete list of all air reports released in 2005-2006 is available on the TSB website ([www.tsb.gc.ca/en/publications/annual\\_report/2006/report2005\\_2006\\_3.asp#12.0](http://www.tsb.gc.ca/en/publications/annual_report/2006/report2005_2006_3.asp#12.0)).

<b>Table 15: Air Productivity</b>					
	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006
Investigations Started	65	56	47	44	50
Investigations Completed	74	70	40	67	53
Average Duration of Completed Investigations (Number of Days)	505	494	485	524	404
Recommendations	7	17	0	4	6
Safety Advisories	14	13	9	9	7
Safety Information Letters	8	6	8	6	5
Note: Results can fluctuate significantly from year to year due to a number of factors such as staff turnover, the complexity of investigations and the investigation of major occurrences.					

### 2.10.3 Link to Resources Utilized

Table 16 provides a picture of the net cost to Canadians of air investigations. Compared to the previous year, the net cost of investigations decreased slightly. However, the average net cost per investigation completed increased by 24 per cent because of the scope of the investigations conducted. The number of investigations started per investigator rose slightly, whereas the number of investigations completed per investigator decreased.

<b>Table 16: Air Resources</b>				
	2004-2005		2005-2006	
	FTE	In thousands of dollars	FTE	In thousands of dollars
Actual Costs – Air Branch	59.4	7,567	56.9	7,617
Internal Professional and Communication Service Costs	41.7	5,378	43.8	4,963
Corporate Services Costs	29.5	3,283	26.5	3,258
Contribution to Employee Benefit Plans		2,043		2,128
Services Received Without Charges		1,902		1,896
Net Cost of Air Investigations	130.6	20,173	127.2	19,861
<b>Indicators</b>				
	2004-2005		2005-2006	
Number of Air Investigators	54.0		51.7	
Average Net Cost per Investigation Completed	\$301,088		\$374,741	
Investigations Started by Investigator	0.81		0.97	
Investigations Completed by Investigator	1.24		1.03	

#### **2.10.4 Safety Actions Taken**

Six air safety recommendations were issued in 2005-2006. To date, responses are pending for each one.

The Air Branch re-assessed responses to recommendations issued in the previous years. The Board approved these re-assessments in May 2005 and sent them to Transport Canada's Director General, Civil Aviation in June 2005. In 2005, 57 active recommendations were examined. With Board approval, 22 recommendations went from active status to inactive status. In summary, following the Board's 2005 re-assessment, there were 35 active recommendations remaining. The re-assessment of responses to recommendations issued in this sector in 2004-2005 is contained in Appendix C.

### 2.10.4.1 Air Recommendations Issued in 2005-2006

Winnipeg, Manitoba – October 6, 2005 Cessna 208 Operation into Icing Conditions – Morningstar Air Express Inc.	Occurrence No. A05C0187
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Recommendation	Response	Board Assessment of Response	Safety Action Taken
A06-01 The Department of Transport take action to restrict the dispatch of Canadian Cessna 208, 208A, and 208B aircraft into forecast icing meteorological conditions exceeding “light,” and prohibit the continued operation in these conditions, until the airworthiness of the aircraft to operate in such conditions is demonstrated.	Awaiting response	Pending	To be reported next fiscal year
A06-02 The Department of Transport require that Canadian Cessna 208 operators maintain a minimum operating airspeed of 120 knots during icing conditions and exit icing conditions as soon as performance degradations prevent the aircraft from maintaining 120 knots.	Awaiting response	Pending	To be reported next fiscal year
A06-03 The Federal Aviation Administration take action to revise the certification of Cessna 208, 208A, and 208B aircraft to prohibit flight into forecast or in actual icing meteorological conditions exceeding “light,” until the airworthiness of the aircraft to operate in such conditions is demonstrated.	Awaiting response	Pending	To be reported next fiscal year
A06-04 The Federal Aviation Administration require that Cessna 208 operators maintain a minimum operating airspeed of 120 knots during icing conditions and exit icing conditions as soon as performance degradations prevent the aircraft from maintaining 120 knots.	Awaiting response	Pending	To be reported next fiscal year

Recommendation	Response	Board Assessment of Response	Safety Action Taken
A06-05 The Department of Transport, in coordination with other involved regulatory authorities and industry, urgently develop and implement an inspection program that will allow early and consistent detection of damage to the rudder assembly of aircraft equipped with part number A55471500 series rudders.	Awaiting response	Pending	To be reported next fiscal year
A06-06 The European Aviation Safety Agency, in coordination with other involved regulatory authorities and industry, urgently develop and implement an inspection program that will allow early and consistent detection of damage to the rudder assembly of aircraft equipped with part number A55471500 series rudders.	Awaiting response	Pending	To be reported next fiscal year

#### 2.10.4.2 Other Air Safety Actions Taken

Following an internal investigation into the occurrence involving control difficulties due to airframe icing, Northern Thunderbird Air Inc., as an interim safety action, distributed a memorandum to advise flight crews to review *all* available weather data before flights. The company has since developed a syllabus, examination and emergency checklist regarding severe icing and has implemented them as part of its training program to provide flight crews with more in-depth knowledge of severe icing conditions and exit strategies.

As a result of a tail-rotor strike by an external load and subsequent loss of control by a Transport Canada (TC) helicopter, the TC Aircraft Services Directorate issued a safety notice restricting operations with empty or light external sling loads. On 25 May 2005, the TC Aircraft Services Directorate produced draft standard operating procedures (SOPs) for helicopter external load operations. These SOPs restrict the use of bonnets and caution pilots about light and unstable loads.

Following an in-flight engine failure on a WestJet Airlines Boeing 737-200 aircraft, TC issued Service Difficulty Advisory 2004-05. This advisory strongly advises maintainers, operators and other responsible persons that compressor surging should be given the same attention as compressor stalls. Surges should be considered to be minor stalls, and the damage that can occur should not be underestimated. The advisory also stated that compressor surges and stalls can induce latent fatigue fractures culminating in engine failures.

As a result of a risk of collision occurrence, NAV CANADA initiated an airspace study entitled *Airspace Review of the Vancouver, Lower Mainland and Victoria Areas* on November 26, 2003. The purpose of the study was to determine the optimum airspace configuration, routes and procedures required for the area. Both operators involved in the occurrence are active participants in this study. Both operators and NAV CANADA are involved in frequent dialogue regarding traffic conflicts and the safety of their operations. Both operators believe that the number of conflicts has been reduced as a result.

As a result of an occurrence involving an elevator restriction at take-off, Bombardier issued a revised procedure for control checks following application of de-icing or anti-icing fluids. The operator took steps to ensure that, when two trucks are used to de-ice an aircraft, they operate symmetrically. The operator also incorporated lessons from this occurrence into flight crew briefings on winter operations and specifically highlighted the manufacturer's recommendation as to flight control checks. The operator amended the SOPs for the Dash 8 to include a new requirement for a control check to be performed after application of de-icing and anti-icing fluids.

Following an occurrence involving aircraft pitch-up/stall warning on departure, Air Canada implemented several initiatives aimed at enhancing flight crew safety awareness.

- Manuals were updated to reflect new information on speed protection annunciation and information received from Boeing that addresses autopilot operations in a degraded mode of operation.
- The Flight Crew Training Manual was updated with a description of the incident, along with a reminder that, when the aircraft is on autopilot and operating in a degraded mode, speed protection will not be available and crew intervention will be required.
- The 2004 Winter Instrument Procedures Flight had, as part of the pre-briefing, a PowerPoint presentation and instructor/candidate interactive dialogue that included what happened during this event.
- Flight crews now view a pictorial display of flight deck indications that demonstrate when crew intervention would be required.

- Flight technical personnel, in conjunction with Air Canada Tech Ops, are determining if all aircraft need to be configured to flight control computer Customer Option 6 or one of the other available options.
- An Aircraft Technical Bulletin has been created to make crews aware of speed protection annunciation and autopilot flight director system failures. This bulletin will remain active until all the relevant information is made available in the aircraft operating manual.
- Boeing 767 SOPs, Initial Climb, have been amended to include an automatic flight speed protection warning: “WARNING – The auto flight system design lacks airspeed protection in ALT CAP mode. Excessive rate of climb when transitioning to ALT CAP mode can create an insufficient energy condition resulting in rapid airspeed decay.”

As a result of a risk of collision occurrence, NAV CANADA developed and implemented procedures detailing helicopter operations at the London International Airport, Ontario. Local helicopter operators were briefed on the procedures. As well, NAV CANADA staffed the position of Unit Operations Specialist at the London control tower.

As a result of a wing scrape occurrence during the performance of a rejected approach in poor weather, TC is proposing changes to the *Canadian Aviation Regulations* that will define the use of pilot-monitored approaches as part of the new approach-ban regulations. In response to this occurrence, TC regional staff conducted an inspection of the weather observation service at Moncton, New Brunswick, on October 5, 2005. As a result of the findings, the floodlights near the ceiling projector were adjusted to reduce interference with weather observations, and NAV CANADA implemented new procedures to improve the communication of information related to changing weather conditions between the weather office and the tower personnel.

Following a fatal floatplane upset occurrence, TC published an article in Issue 1/2005 of the *Aviation Safety Letter*, and plans to prepare new or revised safety promotional material to address the topic of underwater egress. It also intends to develop an emergency procedures training program for its inspectors and to review information on seaplane operations to determine the best method to reach private operators with information on conducting thorough pre-flight briefings, including underwater egress and situational awareness.

TC published an article in Issue 2/2005 of the *Aviation Safety Letter* that summarized an occurrence in which a pilot had advised a friend of his proposed flight itinerary, but the friend was unaware of his responsibilities concerning search and rescue notification requirements. The *Aviation Safety Letter* is sent to all Canadian licensed pilots. The article emphasized the need for pilots to ensure that persons responsible for the flight itinerary fully understand the search and rescue notification requirements.

Following an occurrence in which a landing gear collapsed as a result of the installation of an incorrect part during maintenance and failure to properly check the installation, Northern Dene Airways Ltd. commissioned an independent safety audit of its complete operation. All maintenance staff of the authorized organization responsible for maintaining Northern Dene Airways Ltd.'s aircraft met to review the company's maintenance procedures outlined in its Maintenance Policy Manual. The following policy was reinforced: "No one is to install any parts on any aircraft without first referring to the appropriate parts and service manuals to ensure correct part number and also that the integrity of the affected aircraft system is still in place."

A Canadian Helicopters Limited helicopter departed into environmental conditions conducive to whiteout and collided with terrain with one fatality. Following the occurrence, the company, as part of its safety management system, completed an internal investigation to draw lessons from the accident. Canadian Helicopters Limited increased its use of full-motion flight simulator training to help replicate departures under whiteout conditions and to monitor flight crew interaction. Following a review of its existing SOPs, simulator training will also emphasize compliance. The company instituted a policy requiring a minimum of 50 hours on type before pilots perform departures under whiteout conditions. It is assessing the use of low-profile reflective markers at Northern Warning System helipads to provide additional visual cues along departure and approach paths.

As a result of a component failure on a Lockheed L382 Hercules, Lockheed Martin issued Revision 3 of Service Bulletin 382-53-61/82-752, dated August 4, 2005. Revision 3 of the Service Bulletin specifically identified the need for a visual inspection of the wing-to-fuselage attach angles on applicable aircraft, to be accomplished within 30 days after receipt of the Service Bulletin to determine if repairs have been installed, and further recommended replacement of any previously repaired attach angle within 365 days.

Following an engine fire and crash of a Piper PA-31-350, TC confirmed, after consultation with the U.S. Federal Aviation Administration, that the intent of Airworthiness Directive (AD) 2002-12-07 was to include "ALL rebuild or overhauled engines." Effectively, the intent was to broaden the "Applicability" section of the AD to ensure that all affected (old-style) gaskets identified by part number LW 13388 be removed from service, purged from the system, and replaced with new gaskets identified by part number 06B23072, in accordance with Part II or Part III of Textron Lycoming Supplement 1 to Mandatory Service Bulletin (MSB) 543A. TC sent a Service Difficulty Alert (AL-2005-08), dated October 17, 2005, to all owners, operators and overhaul facilities to ensure that owners/operators and overhaul facilities of engines affected by AD 2002-12-07 had complied with all the requirements stated within the AD, incorporated Lycoming MSB 543 latest issue, and ensured that inventories of spare parts had been purged of any converter plate gaskets identified by part number LW.

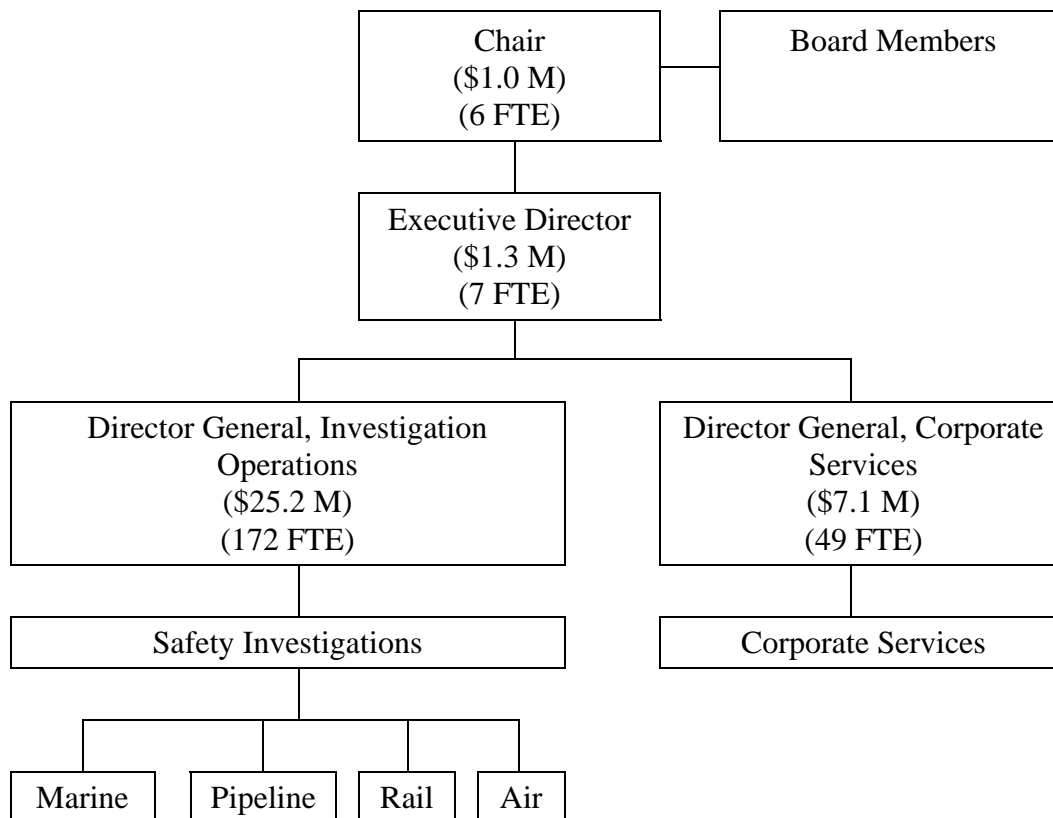


## Section 3: Supplementary Information

### 3.1 Organizational Structure

The TSB's Program Activity Architecture identifies a single program activity: safety investigations. The TSB reports annually to Parliament on its activities, findings and recommendations through the President of the Queen's Privy Council. The Chair, assisted by the Executive Director and the Director General, Investigation Operations, is responsible for all activities associated with this program activity. The Director General, Corporate Services, is responsible for the provision of the full range of corporate services in support of departmental operations.

**Figure 11: Program Activity Accountability Structure**



The Chair and Executive Director contribute to the program activity through the provision of leadership and vision, as well as the strategic management of all activities of the TSB. They also contribute by establishing strategic alliances with key stakeholders, client groups and change agents, and by communicating key safety messages through stakeholder outreach activities. Reporting to the Executive Director, the Communications Division ensures that communications are integrated into all phases of program planning, development, implementation and management.

Members of the Board contribute to the program activity through the review, approval and public communication of occurrence reports and safety recommendations. The Board also contributes to the communication of key safety messages through focused stakeholder outreach activities.

The Investigation Operations Directorate contributes to the program activity through the investigation of occurrences. It does so by assessing all occurrences and investigating those with the greatest potential for reduction of risks. The Directorate's work is focused on the collection and analysis of information, the drafting of reports and recommendations, the tracking and assessment of safety actions taken, data and trend analysis, as well as ongoing communication with the transportation safety community. The Directorate maintains a highly qualified staff of investigators who are experts in marine, pipeline, rail or aviation operations, engineering and other specialists, and investigation support staff.

The Corporate Services Directorate contributes to the program activity through the provision of sound corporate planning, financial, human resources, information management, information technology, administrative and materiel management services. The Directorate also contributes by promoting modern management practices and ensuring that the TSB complies with all government policies and directives.

### **3.2 Financial Information**

The TSB started the year with authorities of \$27.6 million. Special warrants from the Governor General procured an additional \$3.3 million. These funds came from the carry-forward of the previous year's lapse and a submission to the Treasury Board to recover the costs incurred for three major investigations. Treasury Board also authorized an adjustment of \$0.14 million for contributions to TSB employee benefit plans. These additional authorities brought the total budgetary authorities to \$31.1 million. In 2005-2006, the TSB exceeded the permitted authorities by \$214,000. Complete audited financial statements are enclosed in Appendix E.

## Financial Table 1: Voted and Statutory Items

The following table explains the way Parliament voted resources to the TSB and basically replicates the summary table listed in the Main Estimates.

(in thousands of dollars)		2005-2006			
Vote	Vote Wording	Main Estimates	Planned Spending	Authorities	Actual Spending
	<b>Canadian Transportation Accident Investigation and Safety Board</b>				
10	Program expenses	24,039	27,342	27,342	27,556
(S)	Contributions to employee benefit plans	3,563	3,921	3,707	3,707
(S)	Re-spendable revenues	0	23	36	36
	<b>Total Department</b>	<b>27,602</b>	<b>31,286</b>	<b>31,085</b>	<b>31,299</b>
Total authorities are Main Estimates plus Governor General's special warrants.					

The following table provides a detailed breakdown of the changes to the total authorities during the course of the year.

Authorities	Amount (in thousands of dollars)
Main Estimates	27,602
Governor General's special warrants #2	
- New collective agreements	1,328
- Reduction for savings on purchases	(40)
Governor General's special warrants #3	
- Carry-forward of previous year's lapse	762
- MK Airlines, Air France and Air Transat Investigations	1,021
- Human Resources Modernization	205
- New collective agreements	27
Re-Spendable Revenues	36
Year-end Adjustment to employee benefit plans	144
Total Authorities	31,085

**Financial Table 2: Comparison of Planned to Actual Spending (Full-Time Equivalents Included)**

The following table provides a comparison of the Main Estimates, planned spending, total authorities, and actual spending for the most recently completed fiscal year, as well as historical figures for actual spending by the TSB.

Program Activities (in thousands of dollars)	2003-2004 Actual	2004-2005 Actual	2005-2006			
			Main Estimates	Planned Spending	Total Authorities	Actual
Safety Investigations	25,284	25,562	21,044	24,668	24,509	24,865
Corporate Services	6,773	6,637	6,558	6,618	6,576	6,434
<b>Total</b>	32,057	32,199	27,602	31,286	31,085	31,299
Plus : Cost of services received without charge	3,105	3,351	3,262	3,262	3,303	3,303
<b>Total departmental spending</b>	35,162	35,550	N/A	34,548	N/A	34,602
<b>Full-Time Equivalents</b>	227	244	N/A	240	N/A	234
Total authorities are Main Estimates plus Governor General's special warrants.						

Overall, actual expenditures for 2005-2006 are lower than the expenditures in previous years. However, in 2003-2004 and 2004-2005, the TSB had received special short-term funding from Parliament to address specific resource pressures. The expenditures associated with this special funding amounted to \$2.4 million and \$2.1 million respectively. Consequently, if the special expenditures are excluded, the actual expenditures for 2005-2006 are higher than in the previous two years. This increase is attributed mainly to employee salary increases set out in the new collective agreements.

### Financial Table 3: Services Received Without Charge

The following table shows the services received without charge by the TSB.

(in thousands of dollars)	2005-2006
Accommodation provided by Public Works and Government Services Canada	1,821
Contributions covering employer's share of employees' insurance premiums and expenditures paid by Treasury Board	1,425
Audit services provided by the Office of the Auditor General	40
Workers' compensation coverage provided by Human Resources and Social Development Canada	16
<b>Total of services received without charge</b>	<b>3,303</b>

### Financial Table 4: User Fees

User Fee	Fee Type	Fee-setting Authority	Date Last Modified	2004-2005 Actual Revenue	2005-2006 Actual Revenue
Fees charged for the processing of access requests files under the <i>Access to Information Act (ATIA)</i>	Other products and services (O)	<i>Access to Information Act</i>	1992	\$1,375.60	\$2,625.61

Performance Standard	Performance Results	Stakeholder Consultation
Response provided within 30 days following receipt of request; the response time may be extended pursuant to section 9 of the ATIA. Notice of extension to be sent within 30 days after receipt of request.	See the 2005-2006 Annual Report to Parliament on ATIA for results on the TSB website at <a href="http://www.tsb.gc.ca/en/publications/index.asp#atip">http://www.tsb.gc.ca/en/publications/index.asp#atip</a>	The service standard is established by the <i>Access to Information Act</i> and the <i>Access to Information Regulations</i> . Consultations with stakeholders were undertaken by the Department of Justice and the Treasury Board Secretariat for amendments done in 1986 and 1992.

### 3.3 Response to Parliamentary Committees, Audits and Evaluations

During the reporting period, there were no Parliamentary Committee recommendations addressed specifically to the TSB. The Auditor General conducted an audit of the TSB financial statements and issued an unqualified opinion. A copy of the Auditor General's Audit Report is enclosed in Appendix E.

In 2005-2006, the Public Service Human Resources Management Agency undertook a review of the TSB's position classification files. The review has now been completed, but the results have not yet been communicated to the TSB.

The International Civil Aviation Organization (ICAO), a United Nations agency, also carried out an oversight audit of the safety of Canada's civil aviation system. Part of this audit involved aircraft accident and incident investigations, thus the TSB and its activities. The auditors concluded that "the TSB is an appropriately established, properly organized and adequately funded organization capable of accomplishing its functions and responsibilities effectively and efficiently." The audit report also stated that "the procedures developed and implemented by the TSB for the various phases of investigations are comprehensive and comply with ICAO requirements." The report nevertheless discussed the four recommendations that were responded to and followed up by the TSB. The complete report and the TSB's responses to the recommendations are published on the Transport Canada website at <http://www.tc.gc.ca/civilaviation/international/reports.htm>.

In 2005-2006, the TSB undertook three internal audits. Two of the audits were completed during the year. The first audit involved the mandatory use of standing offers for certain categories of products and services, whereas the second covered the internal controls associated with the commitment of funds pursuant to section 32 of the *Financial Administration Act*. In both cases, the auditors concluded that the TSB complied with government standards and that there were no major problems. However, recommendations were formulated concerning employee training, the update of internal procedures and the maintenance of records. Both audit reports and the relevant management responses are published on the TSB website at [www.tsb.gc.ca/en/common/disclosure/audit/overview.asp](http://www.tsb.gc.ca/en/common/disclosure/audit/overview.asp). During the year, the TSB also undertook a third internal audit covering hospitality expenses. This audit is still in progress and should be completed soon.

### 3.4 Other Information and Contacts

The TSB reports publicly on all its investigations. Most investigation reports published since 1995 are available on the TSB website. The TSB also publishes periodic statistical reports for each of the four transportation modes, which are also available on the website. Finally, the TSB publishes an annual report to Parliament and a periodic safety magazine entitled *Reflexions*, which are available in printed form upon request and on the TSB website.

Previous years' Reports on Plans and Priorities and Departmental Performance Reports and miscellaneous additional information are also available on the TSB website ([www.tsb.gc.ca](http://www.tsb.gc.ca)).

For further information, please contact us:

Communications Division  
Transportation Safety Board of Canada  
Place du Centre  
200 Promenade du Portage  
4th Floor  
Gatineau, Quebec  
K1A 1K8

E-mail: [communications@tsb.gc.ca](mailto:communications@tsb.gc.ca)  
Telephone: (819) 994-3741  
Fax: (819) 997-2239





# Appendices

- A: TSB Participation to Conferences and Technical Meetings Pertinent to Transportation Safety
- B: TSB Participation in Safety Symposiums, International Safety Organizations and International Investigations
- C: Assessment of Responses to Air Recommendations Issued Before 2005-2006
- D: Links to Other Organizations Involved in Transportation Safety
- E: Audited Financial Statements

## **Appendix A**

### **TSB Participation to Conferences and Technical Meetings Pertinent to Transportation Safety**

Members of the Board made presentations to the International Helicopter Safety Symposium 2005 in Montréal, Quebec, the Canadian Maritime Pilots' Association in Québec, Quebec, the Operation Lifesaver annual conference in Gatineau, Quebec, and the Canadian Board of Marine Underwriters annual general meeting in Toronto, Ontario. They also attended the Air Canada Pilots Association flight safety conference in Toronto, the Air Transport Association of Canada annual symposium in Montréal, the Helicopter Association of Canada annual convention in Vancouver, British Columbia, the Administrative Tribunal Members' Forum in Ottawa, Ontario, and the Council of Canadian Administrative Tribunals annual conference also in Ottawa. Members of the Board also visited Canadian Pacific Railway's new infrastructure in Kamloops, British Columbia.

In addition, the Executive Director was a guest speaker at the Chief Coroners and Chief Medical Examiners annual conference and the Canadian Business Aviation Association annual training seminar. The Executive Director also attended the Canadian Transportation Agency and Railway Association of Canada annual workshop, the Canadian Aviation Executives' Safety Network annual meeting, Transport Canada's annual Canadian Aviation Safety Seminar, the Air Transport Association of Canada annual symposium and the annual executive meeting of the Association québécoise des transporteurs aériens.

The Director General, Investigation Operations, attended meetings with individual Canadian railway companies and an industry association to discuss matters of mutual interest, and participated in consultative sessions of the Canadian Maritime Law Association, the Canadian Marine Advisory Council, the Air Transport Association of Canada and the National Research Council Institute for Aerospace Research and Centre for Surface Transportation Technology. He also made presentations to the annual Flightscape Users conference, the 2005 SARSCENE conference (search and rescue issues) and the Transportation of Dangerous Goods Advisory Council annual meeting. He also participated in the International Civil Aviation Organization (ICAO) briefings on results of its audit of Canada's conformance to ICAO obligations.

Marine staff in Vancouver continue to take a leading role in the Marine Action Group activities whereby safety presentations, which include practical displays of vessel stability characteristics, are made to fishing and other interests. Presentations have also been made to Pacific Marine Training Institute students, the BC Seafood Alliance, the Workers' Compensation Board of British Columbia, the Pacific Prawn Fishermen's Association, the Crab Fishermen's Association, the Hupacasath Native Band Fishers and the Pacific Coast Marine Review Panel. In the Central region, staff attended Canadian Marine Advisory Council meetings (both national and regional), gave presentations on

fishing vessel safety and participated in important marine discussions. Other presentations have been given to the Canadian Power and Sail Squadrons, the International Shipmasters' Association convention, the Company of Master Mariners of Canada and the Golden Horseshoe Advisory Group. Quebec staff in the Laurentian region conducted presentations to the biannual meeting on Naval Applications of Materials Technology and attended a monthly meeting of the Constructeurs et navigateurs amateurs (CONAM). In the Maritimes region, a presentation was made to the Marine Medical Seminar for the Medical Examiners of Seafarers.

Pipeline staff gave presentations on the TSB investigation process to industry representatives both in the Atlantic Provinces and in Alberta. Additionally, they participated in a mock pipeline rupture exercise that involved the National Energy Board, industry, local fire and police departments and other governmental organizations.

Rail staff gave presentations on the TSB and its work at conferences in Moncton, New Brunswick, at Transport Canada's Annual Workshop on Highway–Railway Grade Crossing Research, to coroners' offices, to police organizations and to railway companies. Staff also participated in a mock rail accident in Ottawa, along with municipal representatives, emergency response personnel and industry representatives.

Air staff participated in annual meetings with departments and associations within the aviation community. It also provided formal briefings to Canadian airport fire chiefs attending the Canadian Airport Fire Protection Association meeting in Richmond, British Columbia; to the International Helicopter Symposium in Montréal, on lessons learned from TSB investigations into helicopter accidents; to the Canadian Aerospace Institute on basic helicopter aerodynamics and lessons learned from TSB investigations into helicopter accidents (1994–2003); to Air Canada on the interaction between the TSB and the Air Canada emergency response team after an accident; and to the International Confidential Aviation Safety Systems (ICASS) on SECURITAS (the TSB Confidential Safety Reporting System). The Air Branch improved partnerships and working procedures with other departments and agencies (Transport Canada, NAV CANADA, Foreign Affairs Canada, Canada Border Services Agency, Canadian Air Transport Security Authority, Department of National Defence, National Research Council and ICAO). The Air Branch contributed support to seminars conducted by the Air Canada Pilots Association, the Air Line Pilots Association, the Air Transportation Association of Canada, the American Helicopter Society International, the Canadian Aeronautics and Space Institute, the Canadian Aviation Maintenance Council, the Helicopter Association of Canada, the Northwest Territories Government Airports Group and the International Society of Air Safety Investigators.

The TSB Engineering facilities continued to support occurrence investigations with their core business of timely and quality engineering investigation reports, and provided briefings and support for visits of particular interest to industry groups. This year, the Engineering Branch provided support and was instrumental in the following:

- a briefing to the Department of National Defence Icing Operations Standing Committee;
- worked with Canadian Pacific Railway, DaimlerChrysler Canada and the County of Renfrew following a rail crossing accident;
- during the underwater search and recovery of the Messerschmitt-Bolkow-Blohm BO 105 Canadian Coast Guard helicopter, assisted Canadian Coast Guard ships and helicopters, a Royal Canadian Mounted Police patrol boat, an Irving Oil dive ship and remotely operated vehicles, and the Bedford Institute of Oceanography;
- cooperated with Environment Canada and Canadian National to ensure that the TSB could continue its investigation while Environment Canada and Canadian National were conducting their own independent parallel investigations and is currently negotiating with the National Research Council Chalk River laboratories to use the neutron diffraction method for measuring residual stresses in the rails;
- continued support to the Transport Canada Dangerous Goods Branch, which is looking into tank car failures not being investigated by the TSB.

The Human Performance Division delivered the Human Factors in Investigations course to external participants, including provincial and federal investigative bodies (Canadian Coast Guard, Department of National Defence, Transport Canada and National Energy Board), industry (NAV CANADA, Serco, and WestJet Airlines) and academia (Laurentian University). Human Performance staff also made educational presentations at academic institutions such as the University of Toronto.

The Macro-analysis Division provided support to Transport Canada's multi-disciplinary research project on grade-crossing accidents.

## **Appendix B**

### **TSB Participation in Safety Symposiums, International Safety Organizations and International Investigations**

Over the past year, Board members attended the International Aviation Security Conference in Washington, D.C. and visited the U.S. National Transportation Safety Board in Washington, D.C. The Executive Director also participated in that visit and attended the annual meeting of the International Transportation Safety Association (of which Canada is a founding member). Finally, an investigation information management system development memorandum of understanding was signed with the Australian Transport Safety Bureau.

The Marine Branch continued its important work with International Maritime Organization (IMO) committees and sub-committees, particularly the Human Element and Casualty Analysis working group and correspondence group. Marine staff reviewed several international investigation reports, and lessons learned have been submitted to the IMO for global publication. The IMO *Code for the Investigation of Marine Casualties and Incidents* is under review, and Canada is taking a lead role in the recommendation to have the Code become part of the prestigious International Convention for the Safety of Life at Sea (SOLAS). This will improve international cooperation and standardize procedures. Marine staff made two presentations to the Marine Accident Investigators' International Forum at its annual meeting in Port Vila, Vanuatu, where the Code was also addressed in detail by 45 nations. Partnering is being actively sought with other countries concerning the requirements to download and play back voyage data recorder (VDR) information following marine accidents. Marine staff are taking an active role in assuring technical competence by attending and participating in International Electrotechnical Commission meetings in the United Kingdom.

Rail staff attended the Wheel/Rail Interface Seminar in Chicago, Illinois, in May 2005, and the Advanced Hazmat Technician training at the Transportation Technology Center in Pueblo, Colorado, in October 2005. The Rail Branch sent a full set of investigation procedures and standards to the Republic of South Africa, which has just started a new regulatory regime. Informal discussions ensued on the application of the standards. In November 2005, Rail staff attended the International Rail Safety Conference in Cape Town, South Africa, and presented a paper describing lessons learned from three accident investigations to delegates from five countries.

The Air Branch improved communications and cooperation with the investigation agencies of Australia, China, Denmark, Finland, France, Germany, Iceland, the Netherlands, Norway, Portugal, the Republic of Korea, Sweden, the United Kingdom and the United States, and with industry manufacturers Bombardier, Pratt & Whitney Canada, Bell Helicopter, Airbus and Boeing. The Air Branch hosted the annual Nordic Accident Investigation Group meeting, which was attended by accident investigation authorities

from Denmark, Finland, Iceland, Norway and Sweden. The Air Branch also participated in the European Aviation Safety Conference and the annual Flight Safety Foundation International Air Safety Seminar.

The Engineering Branch has an excellent working relationship with worldwide investigative agencies and assists, when requested, to complement the capabilities of those agencies with:

- flight data recorder (FDR) analysis and animation to assist in the investigation of the China Eastern CRJ aircraft accident;
- FDR and cockpit voice recorder (CVR) download, analysis and animation in support of the Sky Services Boeing 767 accident in Punta Cana, Dominican Republic;
- recorder download and technical support in the landing gear analysis for the Dash 8 accident in Trinidad and Tobago;
- FDR data analysis, flight animation and photogrammetric analysis of aircraft height above terrain and metallurgical work in Toulouse, France, following a CL-415 aircraft accident;
- CVR download for a DHC-6 aircraft accident in Costa Rica;
- as a member of the International Civil Aviation Organization (ICAO) Accident Investigation Recorders (AIR) Working Group, took part in ICAO's international meeting;
- for the Air France Airbus accident, worked with the U.S. National Transportation Safety Board (NTSB), France's Bureau d'Enquêtes et d'Analyse pour la Sécurité de l'Aviation Civile (BEA), the United Kingdom Air Accidents Investigation Branch, the U.S. Federal Aviation Administration (FAA) Technical Center, Messier-Bugatti and Goodrich (brake systems), Michelin (tires), Zodiac (aircraft oxygen systems), Airbus, Team (solid state CVR) and Air France;
- technical non-disclosure arrangements were implemented to allow the access to Garmin International's schematics and layout diagrams to examine and retrieve stored data in global positioning system receivers recovered from accident vehicles;
- worked in cooperation with Dukane Seacom in the analysis of underwater acoustic locator beacons and established a working relationship to obtain schematics for future investigation purposes;

- carried out digital flight data recorder (DFDR) and CVR download, analysis and flight animation work, as well as direct access recorder (DAR) analysis and synchronization with DFDR data;
- worked with the aircraft manufacturer (Airbus), as well as with the BEA, the Federal Bureau of Aircraft Accidents Investigation (BFU) of Germany and the NTSB;
- developed the scope of the testing program undertaken by Airbus and partnered with the National Research Council for the composites aspect of the testing and analyses, and made a significant contribution in the publication of the safety advisories that affected the Airbus fleet worldwide;
- following a CL-415 accident in Europe, ensured continued support as the accredited representative from the state of manufacture; and
- ensured continued investigation support into a Pratt & Whitney PT6-20 engine failure on take-off in Australia on a King Air, which then crashed and was consumed by fire.

Human Performance staff participated in human factors working groups at international meetings, including the meeting of the International Maritime Organization in London, England, and chaired a panel session on human factors in helicopter safety and presented a research paper at the International Helicopter Safety Symposium in Montréal.

Macro-analysis staff participated in the ICAO Safety Indicators Study Group. The Macro-analysis Division also provided several statistical reports to international agencies and industries.

## Appendix C

### Assessment of Responses to Air Recommendations Issued Before 2005-2006

Timmins, Ontario, 40 nm W – October 20, 2002  
 Engine Power Loss in Flight – Cathay Pacific Airways  
 Airbus A340-300

Report No. A02P0261

Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>A04-03            The Direction Générale de l'Aviation Civile and the Federal Aviation Administration issue airworthiness directives to require the implementation of all CFM56-5 series jet engine service bulletins whose purpose is to incorporate software updates designed to ensure that, in the event of a permanent magnet alternator failure, the electronic control unit will revert to aircraft power.</p>	<p>On August 29, 2005, the TSB received a letter dated May 25, 2005 in which the Federal Aviation Administration (FAA) responded to recommendation A04-03. The response stated that the C.3.J version software has been incorporated by over 90 per cent of the affected worldwide operators; the remaining CFM56-5C operators are complying voluntarily. The software has been provided to all operators. All other engine models with the same alternator design have similar software logic in place.</p> <p>The FAA also reported that there has not been an alternator failure due to the identified cause (bearing failure) in over 20 months. In total, there have been 29 alternator failures due to this cause. CFM International is currently pursuing root cause and corrective action for this failure, and intends to report its progress to the FAA.</p> <p>The FAA determined that an Airworthiness Directive is not necessary due to the absence of an unsafe condition.</p>	<p>Satisfactory in Part</p>	<p>The C.3.J version software has been incorporated by over 90 per cent of the affected worldwide operators; the remaining CFM56-5C operators are complying voluntarily.</p> <p>CFM International is currently pursuing root cause and corrective action for this failure.</p>



Recommendation	Response	Board Assessment of Response	Safety Action Taken
<p>A04-04                      The Department of Transport ensure the continued airworthiness of Canadian-registered aircraft fitted with the CFM56-5 series engine by developing an appropriate safety assurance strategy to make certain that, in the event of a permanent magnet alternator failure, the electronic control unit will revert to aircraft power.</p>	<p>On March 11, 2005, Transport Canada (TC) responded to recommendation A04-04. TC stated that it confirmed, through communication with the Canadian aviation industry, “that all Canadian aircraft presently affected by CFM Service Bulletin 73-0126 will have their ECU [electronic control unit] software upgraded to version C.3.J by March 2005.” The response indicated that TC was not planning to take any further action.</p> <p>On October 7, 2005, a second response was received. This response amplified TC’s course of action, which includes the monitoring of Canadian operators until all the applicable CFM56-5 series service bulletins have been incorporated, and the publication, on August 3, 2005, of a Service Difficulty Alert to both Canadian operators and foreign civil aviation authorities to highlight the applicable service bulletins.</p>	<p>Fully Satisfactory</p>	<p>TC is committed to the monitoring of Canadian operators until all the applicable CFM56-5 series service bulletins have been incorporated; and published, on August 3, 2005, a Service Difficulty Alert sent to both Canadian operators and foreign civil aviation authorities to highlight the applicable service bulletins.</p>

## **Appendix D**

### **Links to Other Organizations Involved in Transportation Safety**

More information on transportation safety in Canada is available from other federal government agencies who play a role in this area. The Internet addresses for the main organizations are as follows:

Transport Canada .....	<a href="http://www.tc.gc.ca">www.tc.gc.ca</a>
National Energy Board .....	<a href="http://www.neb.gc.ca">www.neb.gc.ca</a>
Canadian Coast Guard .....	<a href="http://www.ccg-gcc.gc.ca">www.ccg-gcc.gc.ca</a>
Canadian Transportation Agency .....	<a href="http://www.cta-otc.gc.ca">www.cta-otc.gc.ca</a>
Royal Canadian Mounted Police .....	<a href="http://www.rcmp-grc.gc.ca">www.rcmp-grc.gc.ca</a>
Human Resources and Social Development Canada .....	<a href="http://www.hrsdc.gc.ca">www.hrsdc.gc.ca</a>
National Defence .....	<a href="http://www.dnd.ca">www.dnd.ca</a>

Information on transportation safety in selected countries is available on the following Internet sites:

#### United States

National Transportation Safety Board .....	<a href="http://www.nts.gov">www.nts.gov</a>
Federal Aviation Administration .....	<a href="http://www.faa.gov">www.faa.gov</a>

#### Australia

Australian Transport Safety Bureau .....	<a href="http://www.atsb.gov.au">www.atsb.gov.au</a>
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#### France

Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile.....	<a href="http://www.bea-fr.org">www.bea-fr.org</a>
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#### United Kingdom

Air Accidents Investigation Branch.....	<a href="http://www.aaib.dft.gov.uk">www.aaib.dft.gov.uk</a>
Marine Accident Investigation Branch.....	<a href="http://www.maib.dft.gov.uk">www.maib.dft.gov.uk</a>

#### International

International Civil Aviation Organization .....	<a href="http://www.icao.int">www.icao.int</a>
International Maritime Organization .....	<a href="http://www.imo.org">www.imo.org</a>
International Transportation Safety Association .....	<a href="http://www.itsasafety.org">www.itsasafety.org</a>

## Appendix E

### Audited Financial Statements


#### Transportation Safety Board of Canada Statement of Management Responsibility

Responsibility for the integrity and objectivity of the accompanying financial statements for the year ended March 31, 2006 and all information contained in these statements rests with management of the Transportation Safety Board of Canada (TSB). These financial statements have been prepared by management in accordance with Treasury Board accounting policies which are consistent with Canadian generally accepted accounting principles for the public sector and year-end instructions issued by the Office of the Comptroller General.

Management is responsible for the integrity and objectivity of the information in these financial statements. Some of the information in the financial statements is based on management's best estimates and judgement and gives due consideration to materiality. To fulfil its accounting and reporting responsibilities, management maintains a set of accounts that provides a centralized record of the TSB's financial transactions. Financial information submitted to the *Public Accounts of Canada* and included in the TSB's *Departmental Performance Report* is consistent with these financial statements.

Management maintains a system of financial management and internal control designed to provide reasonable assurance that financial information is reliable, that assets are safeguarded and that transactions are in accordance with the *Financial Administration Act*, are executed in accordance with prescribed regulations, within Parliamentary authorities, and are properly recorded to maintain accountability of Government funds. Management also seeks to ensure the objectivity and integrity of data in its financial statements by careful selection, training and development of qualified staff, by organizational arrangements that provide appropriate divisions of responsibility, and by communication programs aimed at ensuring that regulations, policies, standards and managerial authorities are understood throughout the TSB.

The financial statements of the TSB have been audited by the Auditor General of Canada, the independent auditor for the Government of Canada.

  
\_\_\_\_\_  
Wendy A. Tadros  
Acting Chair

  
\_\_\_\_\_  
Jean L. Laporte, CGA  
Senior Financial Officer

Gatineau, Canada  
June 9, 2006



## AUDITOR'S REPORT

To the Chair of the Transportation Safety Board of Canada  
and to the President of the Queen's Privy Council for Canada

I have audited the statement of financial position of the Transportation Safety Board of Canada as at March 31, 2006 and the statements of operations, of equity of Canada and cash flow for the year then ended. These financial statements are the responsibility of the Board's management. My responsibility is to express an opinion on these financial statements based on my audit.

I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In my opinion, these financial statements present fairly, in all material respects, the financial position of the Board as at March 31, 2006 and the results of its operations and its cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

Alain Boucher, CA  
Principal  
for the Auditor General of Canada

Ottawa, Canada  
June 9, 2006

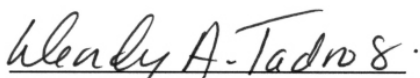
**Transportation Safety Board of Canada**  
**Statement of Financial Position**  
**At March 31**

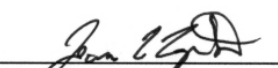
(in thousands of dollars)

	<u>2006</u>	<u>2005</u>
<b>ASSETS</b>		
<b>Financial assets</b>		
Due from the Consolidated Revenue Fund	\$ 2,290	\$ 2,374
Accounts receivable and advances (Note 4)	59	637
<b>Total financial assets</b>	<u>2,349</u>	<u>3,011</u>
<b>Non-financial assets</b>		
Prepaid expenses	52	39
Inventory	130	118
Tangible capital assets (Note 5)	5,225	4,683
<b>Total non-financial assets</b>	<u>5,407</u>	<u>4,840</u>
<b>Total assets</b>	<u><u>\$ 7,756</u></u>	<u><u>\$ 7,851</u></u>
<b>Liabilities</b>		
Accounts payable and accrued liabilities	\$ 2,296	\$ 2,819
Vacation pay and compensatory leave	1,125	981
Employee severance benefits (Note 6)	3,860	3,766
<b>Total liabilities</b>	<u>7,281</u>	<u>7,566</u>
<b>Equity of Canada</b>	475	285
<b>Total liabilities and equity of Canada</b>	<u><u>\$ 7,756</u></u>	<u><u>\$ 7,851</u></u>

Contingent liabilities and contractual obligations (Notes 7 and 8 respectively)

The accompanying notes form an integral part of these financial statements.

  
Wendy A. Tadros  
Acting Chair

  
Jean L. Laporte, CGA  
Senior Financial Officer

Gatineau, Canada  
June 9, 2006

**Transportation Safety Board of Canada**  
**Statement of Operations**  
**For the Year Ended March 31**  
(in thousands of dollars)

	<u>2006</u>	<u>2005</u>
<b>Expenses</b>		
Salaries and wages	\$ 19,890	\$ 20,349
Employee benefits	5,119	5,437
Professional and special services	2,814	3,028
Transportation and communications	2,179	2,181
Accommodation	1,821	1,800
Amortization	995	1,118
Repairs and maintenance	532	565
Utilities, materials, supplies and equipment	523	699
Information	232	222
Rentals	118	135
Other expenses	13	12
<b>Total Expenses</b>	<b><u>34,236</u></b>	<b><u>35,546</u></b>
<b>Revenues</b>		
Other non-tax revenues	66	8
Sales of goods and services	9	156
<b>Total Revenues</b>	<b><u>75</u></b>	<b><u>164</u></b>
<b>Net Cost of Operations</b>	<b><u>34,161</u></b>	<b><u>35,382</u></b>
Other Expenses (Note 9b)	279	225
Other Income (Note 9b)	279	225
<b>Net Cost of Operations</b>	<b><u><u>\$ 34,161</u></u></b>	<b><u><u>\$ 35,382</u></u></b>

The accompanying notes form an integral part of these financial statements.

**Transportation Safety Board of Canada**  
**Statement of Equity of Canada**  
**For the Year Ended March 31**  
(in thousands of dollars)

	<u>2006</u>	<u>2005</u>
<b>Equity of Canada, beginning of year</b>	<b>\$ 285</b>	<b>\$ 182</b>
Net cost of operations	(34,161)	(35,382)
Net cash provided by Government	31,132	32,535
Change in due from the Consolidated Revenue Fund	(84)	(401)
Services received without charge by other government departments (Note 9)	<u>3,303</u>	<u>3,351</u>
<b>Equity of Canada, end of year</b>	<b><u>\$ 475</u></b>	<b><u>\$ 285</u></b>

The accompanying notes form an integral part of these financial statements.

**Transportation Safety Board of Canada**  
**Statement of Cash Flow**  
**For the Year Ended March 31**

(in thousands of dollars)

	<u>2006</u>	<u>2005</u>
<b>Operating activities</b>		
<b>Net cost of operations</b>	<b>\$ 34,161</b>	<b>\$ 35,382</b>
Non-cash items:		
Services provided without charge by other government departments	(3,303)	(3,351)
Amortization of tangible capital assets	(995)	(1,118)
Loss on disposal and write-down of tangible capital assets	(24)	(3)
	<u>(4,322)</u>	<u>(4,472)</u>
Variations in Statement of Financial Position:		
Increase (decrease) in accounts receivable and advances, prepaid expenses and inventory	(553)	551
Decrease (increase) in liabilities	285	(418)
<b>Cash used by operating activities</b>	<b><u>29,571</u></b>	<b><u>31,043</u></b>
<b>Capital investment activities</b>		
Acquisitions of tangible capital assets	1,590	1,498
Proceeds from disposal of tangible capital assets	(29)	(6)
<b>Cash used by capital investment activities</b>	<b><u>1,561</u></b>	<b><u>1,492</u></b>
<b>Financing activities</b>		
<b>Net cash provided by Government of Canada</b>	<b><u>(\$ 31,132)</u></b>	<b><u>(\$ 32,535)</u></b>

The accompanying notes form an integral part of these financial statements.



## Transportation Safety Board of Canada Notes to the Financial Statements

### 1. Authority and Objectives

The Canadian Transportation Accident Investigation and Safety Board (CTAISB) was established in 1990 under the *Canadian Transportation Accident Investigation and Safety Board Act* and is a departmental corporation named in Schedule II to the *Financial Administration Act*. In its day-to-day activities the CTAISB is also known by the name Transportation Safety Board of Canada, or simply the TSB. The objective of the TSB is to advance transportation safety. It seeks to identify safety deficiencies in transportation occurrences and to make recommendations designed to eliminate or reduce any such safety deficiencies. In addition to investigations, including where necessary public inquiries into selected occurrences, the TSB may conduct studies into more general matters pertaining to transportation safety. The TSB has the exclusive authority to make findings as to causes and contributing factors when it investigates a transportation occurrence. The TSB's operating expenditures are funded by a budgetary lapsing authority whereas contributions to employee benefit plans are funded by statutory authorities.

### 2. Summary of Significant Accounting Policies

The financial statements have been prepared in accordance with Treasury Board accounting policies which are consistent with Canadian generally accepted accounting principles for the public sector and year-end instructions issued by the Office of the Comptroller General.

Significant accounting policies are as follows:

(a) Parliamentary appropriations - the TSB is financed by the Government of Canada through Parliamentary appropriations. Appropriations provided to the TSB do not parallel financial reporting according to Canadian generally accepted accounting principles since appropriations are primarily based on cash flow requirements. Consequently, items recognized in the statement of operations and the statement of financial position are not necessarily the same as those provided through appropriations from Parliament. Note 3 provides a high-level reconciliation between the two bases of reporting.

(b) Net Cash Provided by Government - The TSB operates within the Consolidated Revenue Fund (CRF), which is administered by the Receiver General for Canada. All cash received by the TSB is deposited to the CRF and all cash disbursements made by the TSB are paid from the CRF. The net cash provided by Government is the difference between all cash receipts and all cash disbursements including transactions between departments of the federal government.

(c) Due from the Consolidated Revenue Fund – represents the amount of cash that the TSB is entitled to draw from the CRF, without further appropriations, in order to discharge its liabilities.

(d) Revenues - Revenues are accounted for in the period in which the underlying transaction or event occurred that gave rise to the revenues.

(e) Expenses - Expenses are recorded on an accrual basis:

Vacation pay and compensatory leave are expensed as the benefits accrue to employees under their respective terms of employment.

Services provided without charge by other government departments are recorded as operating expenses at their estimated cost.

(f) Employee future benefits

Pension benefits: Eligible employees participate in the Public Service Pension Plan, a multiemployer plan administered by the Government of Canada. The TSB's contributions to the Plan are charged to expenses in the year incurred and represent the total TSB obligation to the Plan. Current legislation does not require the TSB to make contributions for any actuarial deficiencies of the Plan.

Severance benefits: Employees are entitled to severance benefits under labour contracts or conditions of employment. These benefits are accrued as employees render the services necessary to earn them. The obligation relating to the benefits earned by employees is calculated using information derived from the results of the actuarially determined liability for employee severance benefits for the Government as a whole.

(g) Accounts receivables are stated at amounts expected to be ultimately realized; a provision is made for receivables where recovery is considered uncertain.

(h) Inventories – Inventories consists of parts, material and supplies held for future program delivery and not intended for re-sale. They are valued at cost. If they no longer have service potential, they are valued at the lower of cost or net realizable value.

(i) Tangible capital assets - All tangible capital assets and leasehold improvements having an initial cost of \$2,000 or more are recorded at their acquisition cost.

Amortization of tangible capital assets is done on a straight-line basis over the estimated useful life of the asset as follows:

<b>Asset class</b>	<b>Amortization period</b>
Buildings	30 years
Furniture	10 years
Office equipment	5 years
Laboratory equipment	10 years
Informatics hardware	4 years
Informatics software (purchased)	3 years
Informatics software (in house developed)	10 years
Motor vehicles	7 years
Other vehicles	15 years
Leasehold improvements	Lesser of the remaining term of the lease or useful life of the improvement

(j) Measurement uncertainty - The preparation of these financial statements in accordance with Treasury Board accounting policies which are consistent with Canadian generally accepted accounting principles for the public sector and year-end instructions issued by the Office of the Comptroller General, requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenues and expenses reported in the financial statements. At the time of preparation of these statements, management believes the estimates and assumptions to be reasonable. The most significant items where estimates are used are the useful lives of capital assets, the assumptions underlying the employee severance benefits liability and the assessment of contingent liabilities. Actual results could significantly differ from those estimated. Management's estimates are reviewed periodically and, as adjustments become necessary, they are recorded in the financial statements in the year they become known.

### 3. Parliamentary Appropriations

The TSB receives its funding through annual Parliamentary appropriations. Items recognized in the Statement of Operations and the Statement of Financial Position in one year may be funded through Parliamentary appropriations in prior, current or future years. Accordingly, the TSB has different net results of operations for the year on a government funding basis than on an accrual accounting basis. The differences are reconciled in the following tables:

#### (a) Reconciliation of net cost of operations to current year appropriations used:

	<u>2006</u>	<u>2005</u>
	(in thousands of dollars)	
<b>Net cost of operations</b>	<b>\$ 34,161</b>	<b>\$ 35,382</b>
Adjustments for items affecting net cost of operations but not affecting appropriations:		
Less:		
Services provided without charge	3,303	3,351
Amortization of tangible capital assets	995	1,118
Vacation pay and compensatory leave	144	22
Employee severance benefits	94	364
Other	24	22
	<u>4,560</u>	<u>4,877</u>
Add:		
Non-tax revenue	53	160
Refund of previous years expenses	30	24
	<u>83</u>	<u>184</u>
Adjustments for items not affecting net cost of operations but affecting appropriations:		
Add:		
Acquisition of tangible capital assets	1,590	1,498
Prepaid expenses	13	9
Inventory purchased	12	3
	<u>1,615</u>	<u>1,510</u>
<b>Current year appropriations used</b>	<b>\$ 31,299</b>	<b>\$ 32,199</b>

**(b) Appropriations provided and used**

	<b>2006</b>	<b>2005</b>
	(in thousands of dollars)	
Vote 10 - CTAISB Operating expenditures	\$ 24,039	\$ -
Vote 20 - CTAISB Operating expenditures	-	26,017
Governor General's special warrants #2	1,288	-
Governor General's special warrants #3	2,015	-
Supplementary Vote 20a	-	1,115
Supplementary Vote 20b	-	782
Transfer from Treasury Board -Vote 15	-	381
Transfer from Treasury Board -Vote 5	-	130
Spending of revenues as per FAA section 29.1	6	152
Statutory amounts:		
Contribution to employee benefit plans	3,707	3,600
Spending of proceeds from disposal of surplus Crown assets	30	34
Plus or minus:		
Over-expended or (lapsed) appropriations: Operating	214	(12)
<b>Current year appropriations used</b>	<b>\$ 31,299</b>	<b>\$ 32,199</b>

During the year, the TSB over-expended approved authorities by \$214,000. The overspent authorities for the 2005-06 fiscal year will reduce the TSB's appropriations for the 2006-07 fiscal year.

**c) Reconciliation of net cash provided by Government to current year appropriations used**

	<b>2006</b>	<b>2005</b>
	(in thousands of dollars)	
Net cash provided by Government	\$ 31,132	\$ 32,535
Non-tax revenue	53	164
Change in net position in the Consolidated Revenue Fund		
Variation in accounts receivable and advances	553	(551)
Variation in accounts payable and accrued liabilities and accrued vacation pay and compensatory leave	(379)	54
Other adjustments	( 60)	(3)
<b>Current year appropriations used</b>	<b>\$ 31,299</b>	<b>\$ 32,199</b>

#### 4. Accounts Receivable and Advances

	2006	2005
	(in thousands of dollars)	
Receivables from other Federal Government departments and agencies	\$ 42	\$ 477
Receivables from external parties	9	152
Employee advances	8	8
<b>Total</b>	<b>\$ 59</b>	<b>\$ 637</b>

#### 5. Tangible Capital Assets

(in thousands of dollars)

Capital Asset Class	Historical Cost March 31, 2005	Acquisitions	Disposals and write-offs	Accumulated Amortization March 31, 2006	Net Book Value March 31, 2006	Net Book Value March 31, 2005
Buildings	\$ 2,791	\$ 63	\$ -	\$ 2,048	\$ 806	\$ 859
Furniture	1,079	140	102	702	415	350
Office equipment	305	-	5	272	28	40
Laboratory equipment	2,340	41	26	1,715	640	705
Informatics hardware	3,251	224	124	2,515	836	1,140
Informatics software (purchased)	533	56	9	470	110	162
Informatics software (in development)	867	1,051	-	-	1,918	867
Motor vehicles	837	-	-	449	388	465
Other vehicles	117	15	29	21	82	91
Leasehold improvements	34	-	-	32	2	4
<b>Total</b>	<b>\$ 12,154</b>	<b>\$ 1,590</b>	<b>\$ 295</b>	<b>\$ 8,224</b>	<b>\$ 5,225</b>	<b>\$ 4,683</b>

#### 6. Employee Benefits

(a) Pension benefits: The TSB's employees participate in the Public Service Pension Plan which is sponsored and administered by the Government of Canada. Pension benefits accrue up to a maximum period of 35 years at a rate of 2 percent per year of pensionable service, times the average of the best five consecutive years of earnings. The benefits are integrated with Canada/Quebec Pension Plans benefits and they are indexed to inflation.

Both the employees and the TSB contribute to the cost of the Plan. The 2005-06 expense amounts to \$2,743,000 (\$2,639,000 in 2004-05), which represents approximately 2.6 times the contributions by employees.

The TSB's responsibility with regard to the Plan is limited to its contributions. Actuarial surpluses or deficiencies are recognized in the financial statements of the Government of Canada, as the Plan's sponsor.

(b) Severance benefits: The TSB provides severance benefits to its employees based on eligibility, years of service and final salary. These severance benefits are not pre-funded. Benefits will be paid from future appropriations. Information about the severance benefits, measured as at March 31, is as follows:

	<u>2006</u>	<u>2005</u>
	(in thousands of dollars)	
Accrued benefit obligation, beginning of year	\$ 3,766	\$ 3,402
Expense for the year	241	506
Benefits paid during the year	(147)	(142)
Accrued benefit obligation, end of year	<u>\$ 3,860</u>	<u>\$ 3,766</u>

## 7. Contingent Liabilities

In the normal course of its operations, the TSB becomes involved in various legal actions. Some of these potential liabilities may become actual liabilities when one or more future events occur or fail to occur. To the extent that the future event is likely to occur or fail to occur, and a reasonable estimate of the loss can be made, an estimated liability is accrued and an expense recorded on the TSB's financial statements.

As at March 31, 2006, there are various outstanding legal actions against the TSB. No liability has been recorded in the financial statements since management of the TSB considers them unlikely to be successful.

## 8. Contractual Obligations

The nature of the TSB's activities can result in some large multi-year contracts and obligations whereby the TSB will be obligated to make future payments when the services/goods are received.

Significant contractual obligations that can be reasonably estimated are summarized as follows:

(in thousands of dollars)	<u>2007</u>	<u>2008</u>	<u>2009 and thereafter</u>	<u>Total</u>
Acquisition of goods and services	\$ 1,552	\$ 214	\$ 214	\$ 1,980

## 9. Related Party Transactions

The TSB is related as a result of common ownership to all Government of Canada departments, agencies and Crown corporations. The TSB enters into transactions with these entities in the normal course of business and on normal trade terms. Also, during the year, the TSB received services which were obtained without charge from other Government departments as presented in part (a).

(a) Services provided without charge:

During the year the TSB received without charge from other departments, accommodation, administration of worker's compensation, the employer's contribution to health and dental insurance plans, and external audit services. These services without charge have been recognized in the TSB's Statement of Operations as follows:

	<u>2006</u>	<u>2005</u>
	(in thousands of dollars)	
Accommodation	\$ 1,821	\$ 1,800
Employer's contribution to health and dental insurance plans	1,425	1,502
External audit services	40	31
Administration of worker's compensation	16	18
<b>Total</b>	<b><u>\$ 3,303</u></b>	<b><u>\$ 3,351</u></b>

The Government has structured some of its administrative activities for efficiency and cost-effectiveness purposes so that one department performs these on behalf of all without charge. The costs of these services, which include payroll and cheque issuance services provided by Public Works and Government Services Canada, are not included as an expense in the TSB's Statement of Operations given that a reasonable amount for those types of services cannot be determined.

(b) Administration of costs-shared activities:

The TSB is responsible for coordinating the financial management of funds for the networks of small federal agencies. The revenues consist of contributions from all agencies to the cost sharing. The expenses are the disbursements made on behalf of the group. Each government department will report its respective portion of expenses in its financial statements. During the year, TSB administered \$283,000 in revenues (\$225,000 in 2004-05) and disbursed \$279,000 in expenses (\$225,000 in 2004-05). This year revenues exceeded expenditures by approximately \$4,000. Due to the low value of this balance the excess revenues were not returned to contributing agencies, but were simply credited to TSB non-tax revenues.

**10. Comparative information**

This year the TSB has implemented the revised Treasury Board accounting policies in the preparation of its financial statements. As a result, comparative figures have been reclassified to conform to the current year's presentation.