Canadian Transportation Accident Investigation and Safety Board Act Review Commission

HE215/.C5
Hyndman, Louis D.
Advancing safety /
Canadian Transportation
AXWJ c. 1 aa PCO

PRIVY COUNCIL OFFICE
BUREAU DU CONSEIL PRIVÉ
LIBRARY
BIBLIOTHÈQUE

ACCESS CODE
CODE D'ACCÈS AXWJ
COPY / ISSUE
EXEMPLAIRE / NUMÉRO C.1

PRIVY COUNCIL OFFICE
BUREAU DU CONSEIL PRIVÉ
LIBRARY
BIBLIOTHÈQUE

Canadian Transportation Accident Investigation and Safety Board Act Review Commission

Advancing Safety

© Minister of Supply and Services, 1994
Printed and bound in Canada
All rights reserved

Catalogue No. CP 32-60/1994E
ISBN 0-660-15406-4

Publié aussi en français sous le titre : *Mission sécurité*

Available in Canada through: Associated Bookstores and other booksellers
or by mail from: Canada Communication Group — Publishing
Ottawa, Canada, K1A 0S9

CANADIAN CATALOGUING IN PUBLICATION DATA

Canadian Transportation Accident Investigation and Safety Board Act Review Commission
Advancing safety

Issued also in French under the title: Mission sécurité
Includes biblographical references.
ISBN 0-660-15406-4

1. Canada. Canadian Transportation Accident Investigation and Safety Board Act.
2. Transportation Safety Board of Canada.
3. Transportation — Canada — Accidents — Investigation. 4. Transportation — Safety regulations — Canada. 5. Transportation and state — Canada. I. Title.

HE215.C5 1994 343.7109'3 C94-900160-0

Care has been taken to trace the ownership of copyright material used in the text, including tables and figures.

The Canadian Transportation Accident Investigation and Safety Board Act Review Commission wishes to acknowledge with gratitude the following:

- Privy Council Office, Corporate Services Branch, with special thanks to Hélène Langlois, Commissions' Coordinator
- Department of the Secretary of State of Canada, Conference Interpretation Service
- Consulting and Audit Canada
- Canada Communication Group, Printing Services

Canadian Transportation
Accident Investigation and
Safety Board Act
Review Commission

CANADA

Commission d'examen de la Loi sur le
Bureau canadien d'enquête sur les
accidents de transport et de la
sécurité des transports

TO THE PRESIDENT
OF THE QUEEN'S PRIVY COUNCIL OF CANADA

Dear Minister:

We, the Commissioners, appointed by Order in Council P.C. 1993-165 dated January 29, 1993, have the honour to submit to you, pursuant to section 63 of the *Canadian Transportation Accident Investigation and Safety Board Act*, the report of the Canadian Transportation Accident Investigation and Safety Board Act Review Commission.

Respectfully submitted,

Louis D. Hyndman, P.C., Q.C.
Chairman,

Johanne Gauthier
Commissioner

Warren E. Everson
Commissioner

January 1994

P.O. Box 1793, Station 'B'
Ottawa, Canada K1P 5R5

C.P. 1793, Succursale 'B'
Ottawa, Canada K1P 5R5

(613) 952-6464 FAX (613) 952-6179

Table of Contents

LEGEND

Throughout this report the following icons are used above recommendations to indicate the required action:

 — action required from the TSBC Chairperson

 — action required from the TSBC Board members

 — action required from the President of the Privy Council/Parliament

TABLES

FIGURES

Commissioners' Message

IT HAS BEEN A PRIVILEGE and a learning experience to conduct this review of the *Canadian Transportation Accident Investigation and Safety Board Act* of 1989.

With this Act, Parliament essentially created a prototype. The legislation brought into being the Canadian Transportation Accident Investigation and Safety Board (CTAISB) which amalgamated, for the first time in Canada, the accident investigation activities of four transportation modes. It also reaffirmed independence in accident investigation in this country.

In our review, we chose not to be special advocates for any specific mode or region or group. Our goal was to gather information carefully, assess research objectively, consider submissions thoroughly and weigh even apparently overwhelming evidence with a dash of healthy scepticism.

In terms of the tone of this Report, we believe that a subject as important as safety must be addressed in a candid and direct way if Canada is to achieve an accident investigation and safety system that is the best in the world.

One or more of the Commissioners travelled to all regions of the country. We heard from dozens of people and organizations with an interest in accident investigation and safety, including businesses both large and small, governments, labour unions, citizens' groups and individual Canadians. They provided us with valuable insights, and they stimulated our thinking.

Our consultations were organized so that we could explore, delve and probe to the maximum. Every point of view was carefully considered. Some of those who made submissions did not persuade us of their case; we hope that at least they feel they had a full and fair opportunity to do so.

In assessing what was and, in many ways still is, a unique experiment, we found that in many areas Parliament made the right decisions in 1989. In some of those areas the application of the Act has not done what we believe Parliament intended, and in other areas the Act itself will need changes if it is to provide Canadian excellence in accident investigation and safety through to and into the next century.

Where the Act has been effective, we say so. Where it needs improving, we note that fact, and we identify those whom we believe should initiate action on each recommendation to remedy the problem. We were pleased to note that the Board recently organized a multimodal catastrophic event response exercise, prepared a discussion paper on public inquiries and initiated contact with a number of stakeholders. We are confident that this demonstrated willingness to reform, change, upgrade and improve will be carried forward in respect to all the recommendations found in this Report.

We could not have completed this task without the benefit of the wide-ranging and, on the whole, balanced submissions made to us both in writing and orally during the consultations. We are grateful for the thousands of hours of consideration that went into the preparation of these briefs.

We appreciate the assistance of the Chairman of the Transportation Safety Board of Canada, Mr. John Stants, and the time which he and his fellow Board members took to meet with us. It is not often that an organization is put under the microscope, but that is what we had to do with the TSBC to fulfil our mandate. We are particularly grateful to the Board, the Executive Director and all TSBC head office management and staff for responding to our constant requests for information from their files. They helped to make our job easier. Our thanks go out as well to the regional staff who met with us in five centres and provided valuable insights. We must express our appreciation to Transport Canada for responding to our inquiries and assisting us in our work over the year. Finally, we also wish to thank the other federal departments and agencies that made useful contributions to our review.

A number of provincial governments provided special assessments of the available public policy options.

Our final Report was possible only through the dedicated efforts of the staff of the Commission. Under the leadership of our Executive Director, Ted Wallace, a team of experts in transportation safety, law, economics, research and administration worked diligently to help us conduct our work. We appreciate their special abilities and their perceptive insights and advice. The recommendations in this Report are, however, those of the Commissioners alone.

Executive Summary

THIS REPORT REPRESENTS a review of the first three years of operation of the *Canadian Transportation Accident Investigation and Safety Board Act (CTAISB Act)* as required by section 63 of that Act. We interpreted our mandate broadly — to assess the impact on safety not only of the *Act* itself, but also of the Agency created to implement it, the Transportation Safety Board of Canada (TSBC).

We approached our task from two perspectives. From an operational standpoint, we reviewed the current organization, processes and products of the TSBC. As well, we undertook a detailed analysis of the legal and philosophical underpinnings of the *Act* itself.

We sought comment and advice from a variety of stakeholders across the country, and listened to their concerns. To follow up, we commissioned a number of technical and legal studies to explore various issues brought to our attention. To ensure impartiality we engaged outside experts to independently review a sample of TSBC occurrence reports.

While we found the TSBC to be quite competent in several areas, we note that individual effectiveness was often constrained by existing structures and processes within the Agency. Essentially, we determined that the TSBC has excellent potential, but it is not well served by its current procedures and culture. It has devised an unnecessarily lengthy process for developing final reports and safety recommendations. This process is characterized by a number of self-imposed barriers, which include virtually no Board contact with persons having a direct interest in a specific accident investigation, and by general isolation from the transportation community.

As well, we learned that the TSBC has inherited, and been unable to move appreciably beyond, the legacy of one of its major predecessors, the Canadian Aviation Safety Board. To the detriment of the implementation of a full multimodal agency as envisaged in the *Act*, we found that the air mode dominates many aspects of the TSBC from personnel to procedures.

We summarize here our thoughts and findings on the key policy concepts embodied in the *Act* and the manner in which they have been interpreted by the Board and TSBC staff.

Independence

Parliament made the TSBC independent so it could challenge the regulator, but we found that the Agency has not yet used this feature to its fullest extent to make strong comments on the effectiveness of the government apparatus. Rather than seeing its statutory independence as a means to avoid conflict of interest, the TSBC has set up barriers between itself and the transportation industry and between Board members and its investigative staff. We see independence not as a constraint but as an opportunity. Reluctance to use industry resources and expertise and to share information has impeded effectiveness.

A remarkable feature of transportation accident investigation is the voluntary contribution to the process by those being investigated. This differs greatly from other kinds of investigations and underscores the distinct objective of accident investigation to prevent further occurrences.

The *CTAISB Act* recognizes the contribution that outsiders can make to an investigation by permitting the Board to designate persons as "observers." To be so recognized, a person must be either an accredited representative of a foreign government, represent a federal department or have a direct interest in the investigation, and be able to contribute to finding causes and safety lessons.

We recommend that the TSBC be less restrictive in granting observer status. We believe the TSBC should make better use of observers' expertise by giving them an enhanced participatory role under the direction and control of the Investigator-in-Charge.

We have concerns with the interpretation of the "exclusive" authority of the TSBC's Directors of Investigations to conduct investigations. Does this exclusivity mean control of the physical site but not control over what information goes to the Board? In our view, the confusion should be eliminated and the Board made more effective simply by removing the word "exclusive" and clarifying the intent of the legislation. Internal lines of authority should be set by the Board and not by statute.

Perhaps no part of the *CTAISB Act* received as much scrutiny and comment as the provisions which deal with sending draft accident investigation reports to persons "with a direct interest in the findings of the Board" — Interested Parties (IP). From all sides, we heard that the IP process was cumbersome. We urge the Board to streamline the whole process by developing a new, more open model with enhanced interaction between the Board and the Interested Parties. This can be done without changing the *Act*.

Confidentiality

The central reason for accident investigation is to find and correct safety deficiencies. Because human failings are often involved, there is tension between the need to get at the truth to avoid future danger and the concern of those involved that they may be held to blame if they reveal facts which point to their own mistakes.

The *Act* tries to reduce this tension by making it clear that the Board's findings are not to assign fault or determine liability. Parliament also chose to create a complex set of rules about how the TSBC and others can use information that the Agency collects.

Rules on privilege and confidentiality in the *CTAISB Act* result from a belief that some degree of confidentiality is needed if investigators are to obtain the entire story. These factors, however, have led to a maze of overlapping rules riddled with exceptions. As a result, in the present context, promising confidentiality of evidence is largely illusory. There are sufficient means to obtain information for law enforcement and regulatory purposes without requiring exceptions to the confidentiality "protection" in the *Act*. Safety will not be advanced if information is contained in a straitjacket of confidentiality.

The important legal protection for witnesses is not to keep their information secret but to prevent the safety information they reveal from being used against them or their employer. The answer is privilege, not confidentiality. We recommend that the *Act*'s confidentiality rules be rewritten. Witnesses should have the comfort that the information they give will not be used for litigation or disciplinary purposes. Nor should TSBC staff expertise be used for the benefit of private litigants.

Multimodalism

Parliament saw modal integration as a way to recognize that all modes deserve equal treatment, and that the efficient sharing of experience and technical resources among the modes would increase the effectiveness of accident investigation and safety analysis.

The ability to apply limited resources where they are most needed is an essential part of a mature TSBC. We propose that the Agency implement and use the basic principles of risk management for this purpose. We believe that the TSBC's Occurrence Classification and Response System can be improved to become a highly effective management tool. The concept of modal integration as intended by Parliament has significant potential, but the TSBC has not yet achieved that potential.

Jurisdiction

The TSBC must have and exercise sufficient geographical and functional authority, while respecting provincial and other jurisdictions and allowing other agencies to investigate accidents for other purposes. We recognize the potential for conflict and in our review, assessed the causes of unclear or disputed jurisdiction. We note that many of these matters could be addressed by the increased use of Memoranda of Understanding, only one of which the TSBC had signed as of December 1, 1993.

We discuss the dual mandate of the TSBC and the National Energy Board to investigate pipeline safety, and conclude that the TSBC's jurisdiction over pipeline accident investigation should be maintained. Given Parliament's intent to bolster confidence in the safety of the entire transportation system, it is surprising that the TSBC lacks the power to investigate highway accidents and has chosen not to investigate boating accidents — both areas of high relative risk and significant interest to Canadians.

We are concerned that the *Act* defines the geographical reach of the TSBC too narrowly. For example, the TSBC lacks full statutory power to investigate accidents on board foreign flag ships not involved in the offshore oil industry unless they occur within a restricted 12-mile limit.

Parliament has urged the Agency to harmonize its procedures with international standards. In some cases the *CTAISB Act* contains rules which are unique to Canada. Generally, however, we urge the TSBC to ensure that its data base systems and report format convey findings and information in ways that are compatible with international standards.

Expanding the Role of the Board

We suggest several areas where the Board can take action to increase its public profile, interact more with the transportation community and generally be more confident in doing what Parliament intended. We call for more aggressive leadership from the Board. Greater public visibility will be a catalyst to the Agency's further evolution. The Board should make more comprehensive policies and ensure that they are truly accessible to the public.

Board members should make every effort to become an effective force in directing the organization and in participating in public discussions of transportation safety. The Board's independence is fully established in the *Act* and will be enhanced by interaction with both its staff and the outside transportation community.

Our review of the TSBC's report production process convinced us that the Board has been overly cautious in writing reports because of a fear that outsiders will impute blame from its findings. Many members of the transportation community told us that this has led to reports which are sometimes too general or vague. This caution is misplaced because the *Act* gives the Board all the power it needs to expose relevant findings and recommendations without having to concern itself about what outsiders may speculate regarding fault.

Further, we conclude that there is a vital need to streamline radically the TSBC's report development process. Reports must be released more rapidly.

Because the timing of transportation accidents cannot be predicted, we realize that the five-member Board could at times become overworked. We thus support the appointment of temporary Board members on a case-specific basis.

Canadians have a right to expect that governments will become less inclined to initiate royal commissions or judicial inquiries as a response to catastrophic transportation incidents. We urge the Board to reconsider its regulations, which at present preclude the effective use of public inquiries. By using several types of public hearings, the Board will both bolster its credibility and assure the public that safety lessons are being learned. Using its flexibility and acting with more confidence, a more effective TSBC should supplant the need for independent inquiries.

We believe the TSBC's culture of "quiet professionalism" has outlived its usefulness. We conclude that it is time for the TSBC to expand its mission from being a good technical agency to become also a good public agency. In spite of our Report's criticisms, we urge the TSBC not to respond with more caution. On the contrary, the road to a better organization lies in using the full potential of the *Act* and of Agency personnel to face issues in a forthright and flexible manner, with the ultimate goal of advancing transportation safety in Canada.

Introduction

PARLIAMENT'S CREATION IN 1989 of the Canadian Transportation Accident Investigation and Safety Board (CTAISB) — referred to throughout this Report by its administrative title, the Transportation Safety Board of Canada (TSBC) — was an initiative to introduce multimodality and reaffirm independence in accident investigation in Canada. Because it pulled together the accident investigation functions of four transportation modes for the first time in Canada, the creation of the TSBC was very much an experiment. Consequently, it posed many new challenges. For example, formal marine casualty investigations, which previously could result in the suspension of a master's ticket, now had to take place in a setting where fault was not to be ascertained.

Parliament recognized that the creation of a multimodal accident investigation board might give rise to unintended results. Consequently, it directed that an independent review commission of inquiry be struck after three years' experience with the new regime.[1]

Recognizing that the TSBC was and is a prototype, we saw our review as an opportunity to consider what has worked well and what needed adjustment. In this way, we could contribute to the continuing development of the best structure and the best processes for advancing overall transportation safety in Canada.

What we have learned during our extensive study and what we recommend in this Report should not be taken as criticism of any specific individual or group. Parliament and the Government of the day designed the model from numerous blueprints. While the concept of a multimodal accident investigation agency had been under consideration for some time, the blueprints actually used reflect choices made by legislative drafters and policy makers in response to the pressures of current events of those years. Thus a particular history and a certain philosophy of accident investigation were passed on to the new Board. Specific decisions, such as the inclusion of pipelines in the TSBC's mandate and the merger of several existing organizations, had an important influence on how the new Board was to carry out its responsibilities within the new structure.

Where we recommend change or clarification or a new role, our purpose is to improve upon the initial design. We see ourselves as having a shared mission, along with Parliament and the Board itself, to provide a candid assessment of the overall impact of the *Canadian Transportation Accident Investigation and Safety Board Act* (*CTAISB Act*) on transportation safety and to work constructively with them toward improvements. The Government of the day made decisions in response to

the circumstances it faced. The time has now come to reflect on the appropriateness of those decisions and to suggest remedies where required.

Like the TSBC, we did our work to learn lessons for the future — not to find fault. Our review provides an opportunity to reflect on the circumstances which led to the creation of the TSBC, to assess its record of performance and to recommend improvements.

Throughout this Report, we address the performance of the TSBC from several perspectives. Data were reviewed which indicate that improvements are required in the TSBC's overall approach to ensuring quality. We discuss the need for clearer policy definition and the need to use the talents of appointed Board members in a better fashion. Our analysis in Chapter 2 assesses the adequacy of Board products and the TSBC's state of preparedness to handle potential disasters.

In Chapter 3 we discuss the philosophy behind the legislation and some of the concepts and policy issues involved.

In Chapter 4 we propose a work plan for all parties involved in the implementation of our recommendations.

In summary, we have found that the basic structure is sound, but refinements are in order.

In the following pages, we explore the circumstances which gave rise to the TSBC, and we assess its impact on safety, as measured by its overall performance. We believe that action on the changes we recommend throughout our Report will advance the Canadian safety effort.

Our Mandate and Methodology

By charging this Commission with a broadly expressed mandate "...to carry out a comprehensive review of the operation of this Act for the purpose of assessing its effect on the safety of...transportation,"[2] Parliament gave us much latitude to gather the information we required to discharge our responsibilities.

We adopted a definition of safety advancement as the reduction of the risk of loss of life, injury or environmental damage, where risk is a measurable quantity composed of the product of frequency of occurrence and severity of consequence.

It was obvious from the outset that purely quantitative measures, such as accident statistics and trends, could not tell the whole story. It would be misleading, for example, to conclude that transportation safety has improved simply because fewer accidents were reported in the three years of the TSBC's existence. Other plausible explanations for such an observation include the possibility that activity in particular modes may have declined due to the recession or that some minor incidents

were perhaps not reported. There are so many such factors at play in the transportation marketplace that it would be difficult to establish a causal relationship between the work of the TSBC and statistical trends.

We recognize the limitations in attempting to measure safety enhancements by the number of accidents that did not happen. We believe, however, based on our consultations and on a variety of analytical techniques employed in our research, that we have developed reasonable proxies to measure the impact of the TSBC's work on transportation safety.

To ensure input from all sources, we advertised in major daily newspapers in each province and territory as well as in national business papers. Individual letters were also sent soliciting the views of those more immediately concerned with safety in the transportation sector. These letters were followed up by telephone calls. We received written submissions from more than 90 organizations representing carriers, manufacturers, professional associations, labour unions, provincial governments, industry, citizens' groups and federal agencies, as well as individuals.

In addition to holding extensive meetings in Ottawa, we travelled across the country and, over a period of four months, met with stakeholders in Vancouver, Calgary, Edmonton, Toronto, Montreal, Halifax and St. John's to hear their views and discuss their written submissions. We invited submissions from stakeholders in the Yukon and Northwest Territories. Wrap-up consultations took place in Ottawa where we heard from close to 20 more groups. We took every opportunity to speak with individual Canadians representing themselves or organizations. In all, some 250 individuals brought their views to our attention.

To ensure an appropriate historical perspective, we met with the authors of the principal Canadian accident investigation and safety reports completed over the last decade, most of whom are eminent jurists or acknowledged experts in transportation safety matters. We benefited from their candid insight on key issues and from their assessment of developments since their reports were released. The inquiries which they headed are listed in Table 1, Accident Investigations: Recurrent Themes.

At the same time, and to understand the implementation and management of the *CTAISB Act*, we sought first-hand knowledge from the Board and TSBC staff. We received excellent co-operation and, over the course of our inquiry, held several meetings and conversations with all five Board members. We were continually well briefed on a number of important issues by TSBC staff both at head office and from various regional offices.

We commissioned legal and technical research projects relating to matters within our mandate. Six legal studies were undertaken. Four examined the *CTAISB Act* against the backdrop of recent major transportation inquiries in Canada, its relationship to other relevant legislation, the problems identified in the previous

regime and legal issues arising out of the legislative policy choices the *Act* reflects. The two remaining studies considered prospects for the development of improved processes for marine and aviation accident investigation and safety promotion, within the context of the global transportation systems in which Canada is a player. Appendix 3 provides an overview of these legal studies.

Twelve technical research studies and four discussion papers were undertaken for the Commission. Specialists conducted interviews and surveys, and assembled and verified data on the TSBC's work and products. In addition, 11 recognized experts reviewed TSBC reports for us. They analyzed and evaluated the quality of the reports and their findings and recommendations from an experienced, impartial viewpoint. Appendix 2 provides an overview of the studies and discussion papers.

Extensive in-house research was conducted by Commission staff on specific topics, including assessments of TSBC investigations and the report development process. As well, interviews were held with TSBC staff and senior government officials who have had extensive contact with the TSBC.

NOTES

1. Section 63 of the *Canadian Transportation Accident Investigation and Safety Board Act*, R.S.C. 1985, c.C-23.4 states that the Governor in Council shall, in January 1993, appoint one or more persons to carry out a comprehensive review of the operation of the *Act* for the purpose of assessing its effect on the safety of air, marine, rail and commodity pipeline transportation. The review shall be completed and a report submitted to the Minister on or before January 31, 1994.
2. See Order-in-Council dated January 29, 1993 reproduced at the back of this Report.

CHAPTER ONE

History and Context

Historical Themes Influencing the Design of the New Agency

THE FIRST POST-CONFEDERATION ROYAL COMMISSION dealt with transportation issues[1] and, since then, themes relating to transportation have been the single most frequently examined subject of federal commissions of inquiry. The first major official inquiry into a Canadian transportation accident arose from the 1914 sinking of the *Empress of Ireland* in which 1,012 persons perished.[2]

The approach to transportation accident investigation and safety promotion which prevailed in the final TSBC design was influenced by the results of two types of reviews. One type involves general examination of specific organizations and their functions.[3] The other represents government's response to single-event catastrophes such as the 1982 sinking of the *Ocean Ranger* drilling platform, the 1989 Air Ontario accident at Dryden, Ontario, or the 1986 Hinton, Alberta train accident.[4]

Our examination of the findings of the earlier reviews revealed key recurrent themes. Table 1, Accident Investigations: Recurrent Themes, summarizes some of the primary findings of these reviews. Two themes in particular have had a major influence in the design of today's TSBC: the extent to which the accident investigator should be independent from the regulator and how the investigatory function should best be organized — separate agencies specializing in each mode or one organization performing duties for all federally regulated modes.

In 1972, Brigadier General H.A. McLearn ended his report on the state of Canadian transportation accident investigation and safety promotion by recommending:

> ...completion of all necessary preliminary steps toward preparation of legislation for the creation of an Independent Accident Investigation and Safety Board, with the goal of establishing the Board for all modes of transport within two years.[5]

It took nearly 20 years to implement this recommendation, as the TSBC was not established as an independent multimodal accident investigation agency until 1989. Such an agency had emerged much earlier in the United States, with the separation of the National Transportation Safety Board from the U.S. Department of Transportation in 1974.

A discussion paper was tabled in the House of Commons in 1977 and was followed by the introduction of legislation in 1979 having as its objective the creation of a body like today's TSBC. This marked the first of three attempts to establish an independent, multimodal Canadian accident investigation and safety

analysis entity. All three died on the Order Paper due to federal elections. Finally, Bill C-2, which brought into being the *Canadian Transportation Accident Investigation and Safety Board Act*, was passed in 1989.

Why the TSBC Became Multimodal

The strengths and weaknesses of the multimodal approach to accident investigation were debated during the period from the McLearn Report to the introduction of the CTAISB legislation. Such an integrated approach was by no means universally accepted as the preferred way to investigate transportation accidents. The professionals working within the different modes tended to regard their respective modes as unique and resisted the idea of integrated accident investigation. To them it implied an unrealistic view of the degree of commonality among the modes.

Nevertheless, as seen from Table 1, two of the more general reviews of the accident investigation function agreed with McLearn's recommendation favouring a multimodal approach. Both Mr. Bernard Deschênes' examination of the marine casualty investigation function in 1984 and an evaluation of the Canadian Aviation Safety Board(CASB) in 1987 suggested the concept of adopting an integrated or multimodal approach to accident investigation and safety promotion.

> Can we expect those who write and enforce regulations to conclude from an accident that they blew it, that the regulations they wrote are wrong or at least inefficient or that they did not enforce them properly? In such situations, some will of course rise to the occasion and admit mistakes. However, human nature being as it is, there is a clear potential at least for conflict of interest when the regulators of safety are also accident investigators.
>
> *Ross Belsher, M.P., Parliamentary Secretary to the Minister of Transport, House of Commons Debates, April 18, 1989.*

Despite the individual histories of the modes and the traditions and vested interests which had grown up around the separate investigation agencies associated with the regulator of each mode, the forces promoting integrated accident investigation prevailed in the final 1989 configuration of the new TSBC. The new body combined the investigatory and related functions for all federally regulated modes (i.e., air, marine, commodity pipeline and rail) except extraprovincial motor transport.

Why the TSBC Became Independent

A fundamental issue in the debate leading up to the creation of the TSBC was the need to avoid actual and/or perceived conflicts of interest. Various experts and inquiries had raised this issue. For instance, marine accidents were investigated by a section of Transport Canada. Even the Canadian Aviation Safety Board (CASB) continued to report to Parliament through the Minister of Transport. The key question

was whether an accident investigator under the administrative or budgetary control of the department responsible for regulation and enforcement could comment fearlessly on the adequacy of that department's regulation and enforcement operations.

Several commissions of inquiry recommended the need for a truly independent accident investigation entity. As indicated in Table 1, the greatest area of consensus among the commissions related to the need for the independence of the accident investigation agency from the regulatory body. The consistency of the inquiries' recommendations ultimately convinced decision makers that independence was essential to the effective operation of the new agency.

> ...where the investigative agency is part of the regulatory authority...
>
> There is thus a potential for conflict of interest for the accident investigator with respect to all these activities, and the very appearance of such a conflict casts a shadow on the credibility of the Aviation Safety Bureau and diminishes the public acceptance of its worth.
>
> *Mr. Justice Charles Dubin (Commission of Inquiry on Aviation Safety, 1982, p. 176).*

Lessons of Gander

On December 12, 1985 a DC-8 operated by Arrow Air crashed while on take-off at Gander, Newfoundland, killing 256 people. The subsequent investigation by the CASB was the largest in the Board's history and certainly the most controversial. A provisional report was issued in December 1987, but the CASB's consideration of the issue lasted 34 months in total. When it was over, the Board's credibility was so seriously compromised by internal disputes that it was effectively destroyed as a public agency.

It was evident during our review that the trauma of the disputes within the CASB and the lessons that various parties "learned" from the experience continued to resonate in the transportation community and in the TSBC.

The problems within the CASB manifested themselves in disputes between Board members and some of the Agency staff, and between certain members of the Board and its Chairman. While these disputes were not unique to the Gander investigation, they were most pronounced in the Board's review of that occurrence. In the end, unable to reach agreement on a final report, the nine-member Board split, and four members issued a report dissenting from the majority view that ice contamination on the aircraft's wings had been the probable cause of the accident.

The controversy persisted when the Board's report was transmitted to the Government. Journalists discovered that some Transport Canada officials had continued to write a "technical review" which cast doubt on the findings after the Minister had formally accepted them.

Table 1

Accident Investigations: Recurrent Themes[6]

	Independence (1)	Modal Integration and Jurisdiction (2)	Board Structure (3)
Mr. Justice Grange (Mississauga Rail Inquiry — 1981)	Not essential		
Mr. Justice Dubin (Aviation Safety Inquiry — 1982)	Essential	Unimodal	3 members (air mode only)
Mr. Bernard Deschênes (Marine Casualty Study — 1984)	Essential	Multimodal (air and marine)	No fewer than 3 members (interim board pending multimodal legislation)
Mr. Justice Hickman (*Ocean Ranger* Inquiry — 1985)			
Mr. Justice Foisy (Hinton Train Collision — 1986)	Essential		
Hickling Consultants (CASB Evaluation — 1987)	Essential	Multimodal	2 to 3 members (air mode only)
Mr. John Sopinka* (Advice to Minister re CASB — 1988)	Essential		Limit to 5 members
Mr. Justice Moshansky (Dryden Air Accident Inquiry —1992)	Essential		

* Mr. Justice Sopinka was appointed to the Supreme Court of Canada on May 24, 1988. His February 3, 1988 letter to the Minister of Transport is reproduced as Appendix 5.

Table 1

Accident Investigations: Recurrent Themes[6]

Powers of Investigators (4)	Occurrence Response-Investigate Everything? (5)	Confidentiality (6)	Role of Observers Participants/ Interested Parties (7)	Finding a Cause vs. Causes/ Contributing Factors (8)
Extensive				Proximate cause identified
Extensive		Protect reporter information	Tending to participant status	Cause
Extensive	No	Protect reporter information	Tending to participant status	Causes
				Proximate cause identified
	Yes	Only Board to use information	Tending to observer/IP status	Causes
			Tending to observer/IP status	
			Tending to participant status	Causes

Recent events have raised concerns about air travel in Canada and the credibility of the Canadian Aviation Safety Board.

Today, I am announcing several measures that will ensure the high aviation safety standards Canadians have come to expect will be maintained.

Firstly, I have asked an eminent outside authority, Mr. Justice Willard Estey, to review the entire record of the Gander accident investigation...

Secondly, I am announcing the appointment of Mr. Justice Virgil P. Moshansky, Justice of the Court of Queen's Bench, Alberta, to conduct an inquiry into the Dryden accident. This action will remove this investigation from the controversy that surrounds the Canadian Aviation Safety Board...

Thirdly, I intend to reintroduce legislation establishing a new multimodal transportation accident investigation board immediately after Parliament reconvenes...

Hon. Benoît Bouchard, Minister of Transport, March 29, 1989.

In the midst of this situation, the Air Ontario crash occurred at Dryden, and it was discovered that a Notice to Airmen warning of the danger of ice contamination, prompted by the Gander inquiry, had not been received by the carrier.

The Minister responded to the ensuing crisis with a range of actions. In reviewing the Gander investigation, Mr. Justice Estey concluded that the record did not support the findings of ice contamination, but there was no evidence to suggest another investigation would be more successful than the first. The Minister then closed the file.

It is clear that Parliament's consideration of the CTAISB legislation was in the context of a larger, highly pressured environment. The words of Transport Minister Benoît Bouchard emphasize that the legislation was introduced as part of an overall solution to a serious problem of political credibility. The CTAISB legislation (Bill C-2) was the first legislation of the new session, suggesting it was an urgent priority for the Government of the day.

In our view, the concept of an independent, multimodal agency, which had developed through the various inquiries ranging back to that of Brigadier General McLearn, was side-tracked by the crisis atmosphere of 1989.

Rather than design a new investigatory board from a blank slate, Parliament was presented with the new Board as a replacement for something which had seriously malfunctioned. In that environment, it should not be surprising that members of Parliament were preoccupied with "solutions" to current problems altering significantly the vision of various earlier experts.[7]

We believe that some aspects of the legislation reflect an attempt to avoid the problems encountered at the CASB. Certainly the administration of the TSBC today is characterized by practices which seem likely to have been instituted in response to the problems of the predecessor agency. Specific measures in the Act

which we consider to have been so motivated would include the exclusive control over investigation by Directors of Investigations and the greatly increased powers of the Chairperson.

Beyond these specifics, the *Act* seems generally preoccupied with an elaborate balance of power between the Board and investigators, a preoccupation which appears to be inconsistent with a body whose mandate involves neither the finding of fault nor judicial rules of procedure.

Many people at our consultations told us that the most important element of a successful agency could not be written in law or administrative structure, because it was simply a desire for all parties to work together professionally. No legislation can solve problems which can develop from an unwillingness to compromise and co-operate.

Did the new legislation successfully address the kind of problems which developed at the CASB? Our conclusion is that it did not, and that new difficulties were created in its attempt to do so.

The Organization Today

THERE ARE SEVERAL GOVERNMENT ORGANIZATIONS and many private enterprises involved in transportation safety. The TSBC's essential task, accomplished mainly through the investigation of occurrences, is to advance safety in the marine, rail, commodity pipeline and air modes. It began operation as an independent departmental corporation on March 29, 1990 and, by agreement with Treasury Board under the Federal Identity Program (FIP), its formal name has been shortened to the more manageable Transportation Safety Board of Canada (TSBC).

The TSBC reports to Parliament through the President of the Queen's Privy Council. The Board's annual report is tabled in the House of Commons and is then referred to the appropriate parliamentary committee for review.

Size

The TSBC is headquartered in the National Capital Region and has 11 regional offices throughout the country from St. John's to Vancouver. Table 4 and the map in Chapter 2 illustrate TSBC's presence across the country.

The 1993-94 Main Estimates allocated to the TSBC a budget of $27.3 million and full-time equivalent staff of 306. Figure 2 in Chapter 2 illustrates the current management structure.

Duties

The *Act* provides for not more than five full-time Board members who are required to be collectively knowledgeable about the four modes of transportation.[8] Board members are appointed for a term not exceeding seven years, which may be renewed. The Governor in Council designates one of them as the Chairperson.

The duties and powers of the Chairperson, Board members and the Directors of Investigations are specified in the *Act*. The Chairperson, with exclusive responsibility for managing personnel, financial and property matters, has the equivalent of a deputy head's powers under the *Financial Administration Act* and the *Public Service Employment Act*. Apportioning and directing the work of both the staff and the members of the Board are part of the duties of the Chairperson. With some exceptions the Chairperson may delegate much of this executive authority to the Executive Director who acts as Chief Operating Officer.

Acting as a group, the Board members are responsible for making the by-laws respecting the conduct of Board meetings. They also have the duty of setting general policies and procedures for the conduct of investigations, concentrating specifically on the classes of occurrences to be investigated. Their main duty is the determination of findings as to the causes of occurrences, the identification of safety deficiencies, and the making of recommendations after a review of comments of all Interested Parties.[9]

Each of the three Directors of Investigations has been given exclusive authority by the *Act* to direct the actual conduct of investigations. That authority must be exercised in accordance with Board-established policies and is subject to the Board's right to request further investigation if it deems necessary.

Powers

The TSBC has exclusive jurisdiction to investigate transportation occurrences, as defined in the *Act* and Regulations, for the purpose of making findings and recommendations regarding contributing factors and causes. Once the TSBC has begun an investigation, no department, other than the Department of National Defence and the RCMP, may launch or continue a similar investigation for these sole purposes. The TSBC has complete discretion, within a wide range of transportation occurrences, to investigate anything from a major disaster to a minor incident, all in the interest of advancing transportation safety. Moreover, the TSBC is free to decide the extent of any investigation and the manner in which different investigations should be conducted. It can also examine any situation or condition which in its view might lead to an accident.

The TSBC's legal mandate is only to investigate and recommend. It is not a quasi-judicial body nor is it a regulatory agency. Therefore, the TSBC is not required to follow the strict rules of evidence.

The Board has been given power to decide whether a public inquiry should be held. Certain search and seizure powers, subject to specific conditions, have been given to the investigators.

We explore the legislation in greater detail in Chapter 3 of our Report.

Products

The products of the TSBC are its reports, its safety studies and analyses and other information on potential safety deficiencies. All are intended to enhance safety. If made, the Board's recommendations are found in its reports. In most instances these recommendations are made to the Minister of Transport or, in the case of pipelines, to the Minister of Energy. A minister who has been notified of Board recommendations must publicly advise the Board within 90 days of any action or proposed action on the recommendations or, in the case of inaction, provide a written explanation.

In other contexts which are reviewed later, particular circumstances are brought to the attention of the regulator by the TSBC through safety advisories, safety information letters and hazard notifications. In those instances where the potential for safety action is deemed to be slight, an occurrence assessment is prepared which simply describes the event and circumstances. In minor cases only data are collected.

In Chapter 2 we examine each of these products in more detail.

The International Framework

THERE ARE SEVERAL INTERNATIONAL practices which influence transportation safety. These range from formal multilateral conventions in the air and marine modes to Canada–United States industry and government co-operation in the pipeline and rail sectors.

Rail

Although Canada's railway industry is not subject to international safety regulation, our railways follow a set of recommended practices governing the design and maintenance of interchange equipment throughout North America. Given the growing integration of the Canadian and U.S. rail systems, and potential market expansion driven by the *North American Free Trade Agreement* (*NAFTA*), it is reasonable to conclude that rail safety standards between Canada and the United States will continue to become more harmonized.

Pipeline

While no formal international safety agreements exist for pipeline transportation, we found that there is a high level of co-operation between Canadian and American companies and their respective provincial, state and federal governments to harmonize standards and practices in order to enhance safe operations.

Marine

Although Transport Canada regulates the safety of domestic shipping, the International Maritime Organization (IMO), through the operation of international conventions, has a great impact on the construction and operation of most vessels using Canadian waters. Enforcement of international operating standards rests generally with the flag state.

The IMO has passed several resolutions and provided various circulars regarding accident investigation. Basically, these provide for the investigation of accidents in Canadian waters involving vessels of all flags, and those flying the Canadian flag or involving Canadian nationals in other waters. They also provide for countries to share information regarding accidents or casualties and for state co-operation when investigating foreign flag vessel incidents in domestic waters.

We have been told that the lack of enforcement of safety standards by some flag states increases the probability of higher safety-risk vessels operating in Canadian waters. Recognizing this potential, Canada has taken many initiatives in port state control of international shipping.[10] Participation in such efforts and the resultant spot checks of foreign vessels are intended to send a message that Canadian waters are not open for unsafe business. However, it is impractical to inspect every ship.

The International Labour Organization (ILO) has various conventions for preventing shipboard accidents and encouraging occupational health and safety. These govern the reporting of accidents to competent authorities as well as the compilation of statistics. The recent Canadian accession to ILO Convention 147 gives some enforcement powers to Transport Canada.

Air

The 1944 Chicago Convention, to which Canada is a signatory, also recognizes the general principle that the regulation of safety is the primary responsibility of the country of registry. In Canada, the *Aeronautics Act* empowers the Minister of Transport to make regulations and orders respecting qualifications of operators and pilots and the operation of aircraft and airports. The current international aircraft accident investigation regime is based on article 26 of the Chicago Convention, which establishes certain obligations on a country where an accident occurs to investigate an accident involving an aircraft not registered in that state.

In 1951, the Council of International Civil Aviation Organization (ICAO) issued Annex 13 to the Chicago Convention. This Annex sets out recommended procedures for investigating multinational aircraft accidents. Annex 13 has found international acceptance and has advanced the effectiveness of multinational air accident investigations.

Accident Investigation in Other Countries

POLICY MAKERS AROUND THE WORLD have grappled with many of the same issues that confront Canada. One of our studies surveyed several countries' approaches to accident investigation.[11] Table 2 summarizes major characteristics of the accident investigation institutions in seven countries.

With regard to its most important structural characteristics, independence and multimodalism, the TSBC is similar to the National Transportation Safety Board in the United States. Canada, the United States and Sweden have single investigative agencies which deal with air and marine, and other modes. The U.S. and Swedish boards also investigate highway safety. Both the Canadian and U.S. institutions submit their reports to bodies other than the transportation regulator, and neither is funded from the transportation regulator's budget.

We found the Canadian and U.S. institutions to be different from the others in terms of multimodalism and independence. Perhaps reflective of its national culture, the American model is characterized by a high degree of openness and transparency. The United Kingdom, Australia, the Netherlands and France have developed mode-specific investigatory institutions that are more closely linked to the transportation regulator. In a reversal of the Canadian situation, it is interesting to note that Australian accident investigators report directly to the transport minister, while the civil aviation authority regulator is autonomous.

As implied in Table 2, the different approaches to vesting authority in bureaucratic officials or political appointees reflect the options considered in deciding the degree to which the investigative authority should be independent and permanent.

A middle ground between the North American concept of independence and exemplified by the less autonomous operations in other countries is the United Kingdom where accident reports for both air and marine modes are submitted to the Secretary of State, who decides whether to make them public. At the same time, decisions relating to funding and appointments are under the administrative control of the Minister of Transport.

During our examination of other countries' experiences, we observed several interesting developments. For example, some countries, such as France, are now studying the Canadian model. And the European Community has taken the first tentative steps to establishing a trans-national accident investigation entity.

As well, the accident investigation authorities in Canada, Sweden, the Netherlands and the United States have recently concluded an agreement to share and exchange transportation safety information under the aegis of the new International Transportation Safety Association.[12]

Table 2

Accident Investigation in Selected Countries

	Canada	United States	United Kingdom
Agency Title	Transportation Safety Board of Canada (TSBC)	National Transportation Safety Board (NTSB)	M: Marine Accident Investigation Board (MAIB) A: Air Accident Investigation Board (AAIB)
Jurisdiction	Multimodal	Multimodal	Modal
Autonomous	YES	YES	NO
Full-Time Independent Board	YES	YES	NO
Number of Board Members	5 permanent including the Chairperson	5 permanent including the Chairperson	A: ad hoc M: ad hoc
Provision for Public Inquiry at Call of the Board	YES	YES	NO
Public Inquiry Authorized by	Board	Board	Secretary of State
Mandatory Public Report	YES	YES	YES, with exceptions

Table 2

Accident Investigation in Selected Countries

Australia	France	Sweden	Netherlands
M: Marine Accident Investigation Unit (MAIU) A: Bureau of Air Safety Investigation (BASI)	M: Secrétariat d'État de la Mer (SEM) A: Bureau Enquêtes-Accidents (BEA)	Statens Haveri Kommission (SHK)	Accident Inquiry Board Accident Investigation Bureau
Modal	Modal	Multimodal — Air/sea/rail (Road if the nature of the occurrence warrants)	Single mode (Air)
NO	NO	YES	YES
NO	NO	NO	NO
A: ad hoc M: ad hoc	A: ad hoc M: ad hoc	No Board	6 part-time Board members
A: NO M: NO	A: NO M: NO	NO — All investigations and investigation files are open to the public	Can call a public inquiry depending on the severity of the occurrence
Minister	Minister	Not applicable	Chair of the Board
NO	A: NO	YES — no exceptions	Mandatory in all cases

NOTES

1. An Order-in-Council dated November 16, 1870 established a royal commission chaired by Sir Hugh Allan respecting the *Improvement of the Water Communications and the Development of Trade with the Northeastern United States.*
2. The ship went down in the Gulf of St. Lawrence on May 29, 1914 after a collision with the collier *Storstad*, and the inquiry report was released on July 11, 1914.
3. For example, Mr. Justice Dubin, *Report of the Commission of Inquiry on Aviation Safety* (Ottawa: Supply and Services Canada, 1982); Mr. Bernard Deschênes, *Study on Marine Casualty Investigations in Canada* (Ottawa: Supply and Services Canada, 1984); and James F. Hickling Management Consultants Ltd., *Canadian Aviation Safety Board Evaluation, Findings Report*, submitted to the Minister of Transport, Ottawa, October 1987.
4. T.A. Hickman, *Royal Commission on the* Ocean Ranger *Marine Disaster* (Ottawa: Supply and Services Canada, 1985); Virgil P. Moshansky, *Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario* (Ottawa: Supply and Services Canada, 1992); and René P. Foisy, *Commission of Inquiry: Hinton Train Collision* (Ottawa: Supply and Services Canada, 1986).
5. H.A. McLearn, *Report on a Proposed Independent Canadian Transportation Accident Investigation and Safety Board* (Ottawa, December 1973), p.11.
6. Samuel G.M. Grange, *Report of the Mississauga Railway Accident Inquiry* (Ottawa: Supply and Services Canada, December 1981).
   Mr. Justice Dubin, *Report of the Commission of Inquiry on Aviation Safety, op. cit.*
   Bernard M. Deschênes, *Study on Marine Casualty Investigations in Canada, op. cit.*
   T.A. Hickman, *Royal Commission on the* Ocean Ranger *Marine Disaster*, op. cit.
   René P. Foisy, *Commission of Inquiry: Hinton Train Collision, op. cit.*
   James F. Hickling Management Consultants Ltd., *Canadian Aviation Safety Board Evaluation, Findings Report, op. cit.*
   John Sopinka, Letter to the Minister of Transport re Canadian Aviation Safety Board, Ottawa, February 3, 1988.
   Virgil P. Moshansky, *Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario, op. cit.*
7. Many of these appear in Table 1.
8. The actual wording of the statute is "collectively knowledgeable about air, marine, rail and commodity pipeline transportation."
9. Section 24(2) of the Act specifies: "Before making public a report under subsection (1), the Board shall, on a confidential basis, send a copy of the draft report on its findings and any safety deficiencies that it has identified to each Minister and *other person who, in the opinion of the Board, has a direct interest in the findings of the Board...*"[emphasis added]. The Act contains no specific definition of "Interested Party."
10. International safety conventions specify that a ship's country of registry is responsible for enforcing safety standards. The Ship Registration Convention of 1986 recognized the practice of some countries in establishing "open" ship registries in which the owner is not required to employ citizens in the state of registry for crew and may not be required to manage the ship from offices in that state. In many cases, a ship may never have to travel to the country whose flag it flies. Some open ship registry countries have chosen to delegate their international responsibilities

for safety inspections to private contractors or classification societies. Other countries have limited enforcement resources.

The safety enforcement of some ship registers has generated considerable international debate and controversy. As a result, several groups of countries have negotiated multilateral agreements in which the maritime authorities of each state inspect a proportion of foreign flag ships of any state entering these countries. This method of enforcing international safety standards by the countries where ships travel rather than by the flag of registry is known as port state control. Typically, the members of a port state control agreement undertake to inspect 25 percent of the foreign flag ships visiting that country. If a ship is found not to comply with international standards, it can be detained or its country of registry notified.

Canada is a member of the Paris Memorandum of Understanding on Port State Control and a founding member of an agreement recently concluded with Australia and other Pacific Rim countries.

11. Hickling Corporation, *Comparison of National Level, Permanent, Non-Carrier Affiliated Accident Investigation Functions In Canada, Australia, France, Germany, the United Kingdom, and the United States* (Research report prepared for the CTAISB Review Commission, Ottawa, September 1993).

    Additional international research was prepared by:

    Lavery, de Billy, *Aviation Accident Investigation and Safety Promotion in an International Context*, (Research report prepared for CTAISB Review Commission, Montreal, September 1993); and Paterson, MacDougall, *Developing an Enhanced Process for Marine Accident Investigation and Safety Promotion in an Increasingly Global Transportation System*, (Research report prepared for the CTAISB Review Commission, Ottawa, September 1993).

12. On October 22, 1993, an agreement was signed in the Netherlands concerning the establishment of the International Transportation Safety Association (ITSA). Canada, the Netherlands, Sweden and the United States are founding members. The objective is to improve safety in each member country by learning from the experience of others primarily through the exchange and sharing of information. New members are to meet certain criteria such as having a permanent, independent investigative authority covering one or more transport modes and the freedom to publicize reports. The Association welcomes, as associate members, any official government agency that investigates transportation accidents but does not meet the criteria for full membership.

CHAPTER TWO

Assessing the Transportation Safety Board of Canada

Introduction: Assessment Criteria

In reviewing the Transportation Safety Board of Canada (TSBC) we considered several standards, including those set by Parliament, by the TSBC itself and by the international accident investigation community. We did not intend to carry out a management audit according to the strict criteria which are accepted for that purpose. We found, however, that our review benefited from the guidance of these various standards and criteria. Our assessment of the TSBC's impact against expectations and accepted standards gave a good picture of its effectiveness and, in turn, aided us in developing recommendations which we believe will help the TSBC do its job better. Many of the recurring messages we heard throughout the country during our consultations are reflected in our analysis.

Various international bodies, such as the International Civil Aviation Organization (ICAO), have developed guidelines to harmonize the procedures for and products of transport accident investigation. For example, ICAO Annex 13 has increased the effectiveness of international accident investigations by securing international agreement in several areas. It defines "accident," and the difference between "accidents" and "incidents," establishes the purpose of accident investigation as being for prevention purposes only, delegates investigatory responsibilities and deals with the disclosure of information. We have noted Parliament's desire that TSBC procedures be compatible with such international standards.

As well, the International Organization for Standardization, whose ISO 9000 series of quality management standards has been adopted by about 60 countries including Canada, has developed a specific set of guidelines[1] for use by private and public sector service organizations including those offering transport services. These standards address issues which the Canadian transport community has told us are very important. Among these are the need for a service organization such as the TSBC to know who its stakeholders are and what its constituents expect; to do in practice what it states it will do; to meet its own objectives; and to communicate what its services are and how it will perform them.

Finally, we looked at accident investigations of other countries to help us assess how an accident investigation agency can effectively interact with governments and stakeholders. We found both the Australian and American experiences particularly useful given the similarities between the commercial and public environments in these countries and Canada.

Structure and Budget

WE REVIEWED SEVERAL organizational studies carried out at the time of the TSBC's formation and in subsequent years, and we studied the Board's organizational structure, particularly in comparison with its predecessor air agency, the Canadian Aviation Safety Board (CASB). We undertook a study which looked at the TSBC's capital and operating budget by mode and across modes.[2] From these and from comparisons with similar organizations in other countries,[3] we drew a number of conclusions about the structure and the resources at the TSBC. As noted, we have not conducted a management audit of the TSBC's structure nor a comprehensive financial audit.

Structure of the TSBC

The TSBC was formed from three predecessor agencies:

- the Canadian Aviation Safety Board (CASB)
- the Marine Casualty Investigation Unit of Transport Canada (MCI)
- the Railway/Pipeline Investigations Directorate of the National Transportation Agency (RPID)

A case study which reviewed the TSBC organization concluded that the TSBC structure was developed essentially by fitting the MCI and RPID units into the CASB structure.[4]

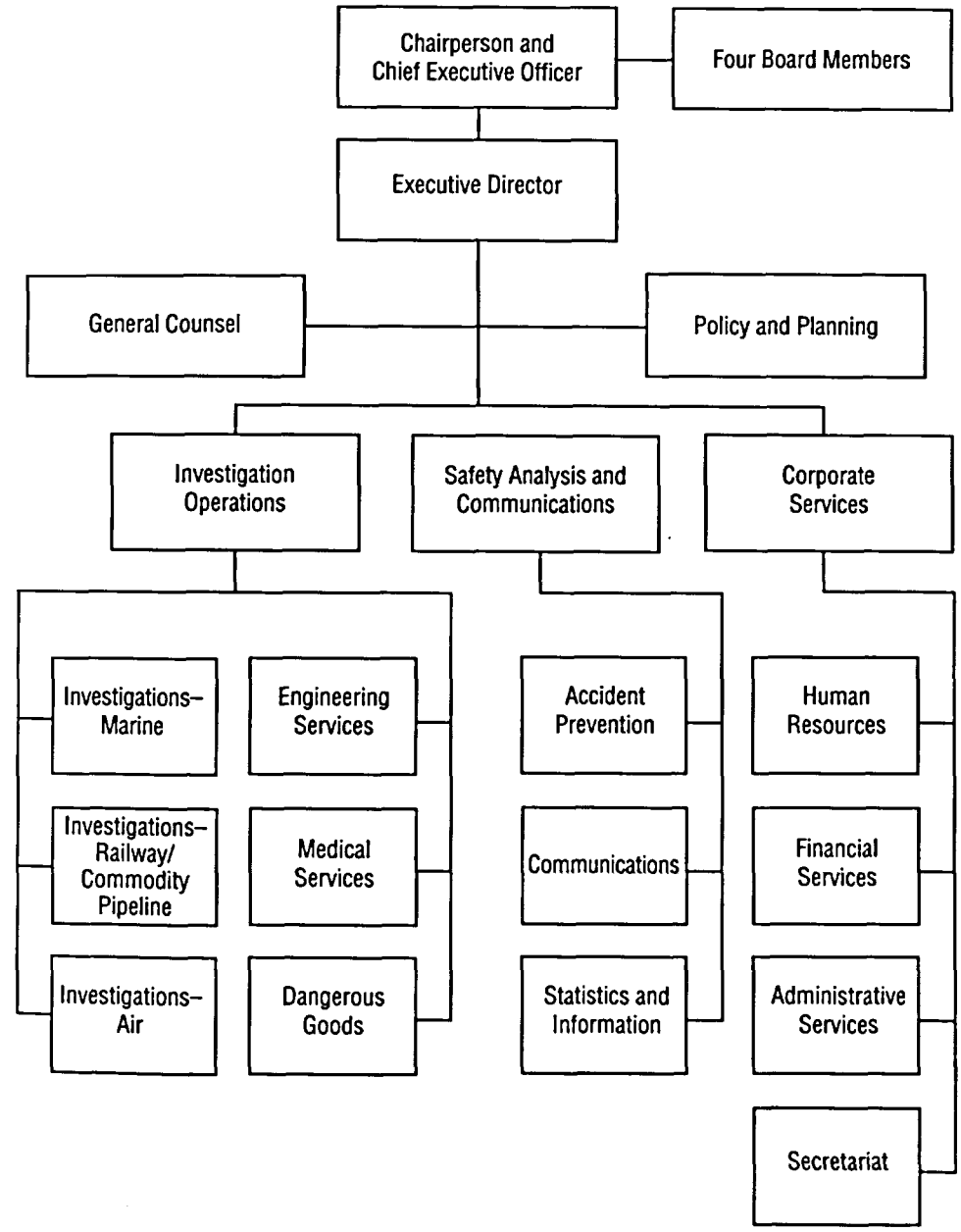
Corporate Structure

As the organizational chart in Figure 1 illustrates, the TSBC includes the following managerial layers: the Chairperson, the Board, the Executive Director's office, the Directors General and various Directors including the Directors of Investigations (DOI). The Board consists of five members, including the Chairperson who also serves as Chief Executive Officer.

The Executive Director's office includes the Executive Director, support staff, general counsel plus policy and planning personnel for a total of eight. Reporting to the Executive Director is a level of senior management comprising the Director General, Investigation Operations (responsible for 188 persons and a budget of $14.3 million), the Director General, Safety Analysis and Communications (directing 55 persons and a budget of $4.8 million) and the Director, Corporate Services (directing 46 persons and a budget of $5.8 million).[5]

Figure 1

TSBC Organizational Structure 1993



Source: TSBC, 1993-94 Estimates, Part III, p.14.

Investigation Operations is responsible for investigations, including some regional office administration, as well as engineering and medical services. Safety Analysis and Communications is responsible for the analysis of safety deficiencies identified through investigations. It also has functional responsibility for informatics systems and for communications including the production and dissemination of investigation reports. Corporate Services is responsible for administrative support and includes a secretariat which processes, controls and tracks occurrence reports.

The division of TSBC personnel between head office and the field appears in Table 3.

Table 3

TSBC Personnel: Head Office and Field (1993-94)

Sub-Component	Number of Staff (Includes Vacant Positions)		
(Budget: $000s)	Head Office	Field	Total
Board and Executive (2,455)	17	0	17
Investigation Operations (14,325)	81	107(96)*	188
Safety Analysis and Communications (4,764)	55	0	55
Corporate Services (5,761)	46	0	46
Total (27,305)	**199**	**107(96)***	**306**

Source: TSBC, 1993-94 Estimates, Part III and TSBC (and see endnote 7).

Note: * As of November 1993, 11 positions were not occupied (nine vacant and two staff on leave without pay).

Regional Structure

In addition to the head office in the National Capital Region, the TSBC maintains field offices across Canada. Since regional divisions differ among modes, it is easiest to list the 11 field offices,[6] their modal responsibilities and their personnel resources. Reporting relationships also vary and are explained separately.

Table 4

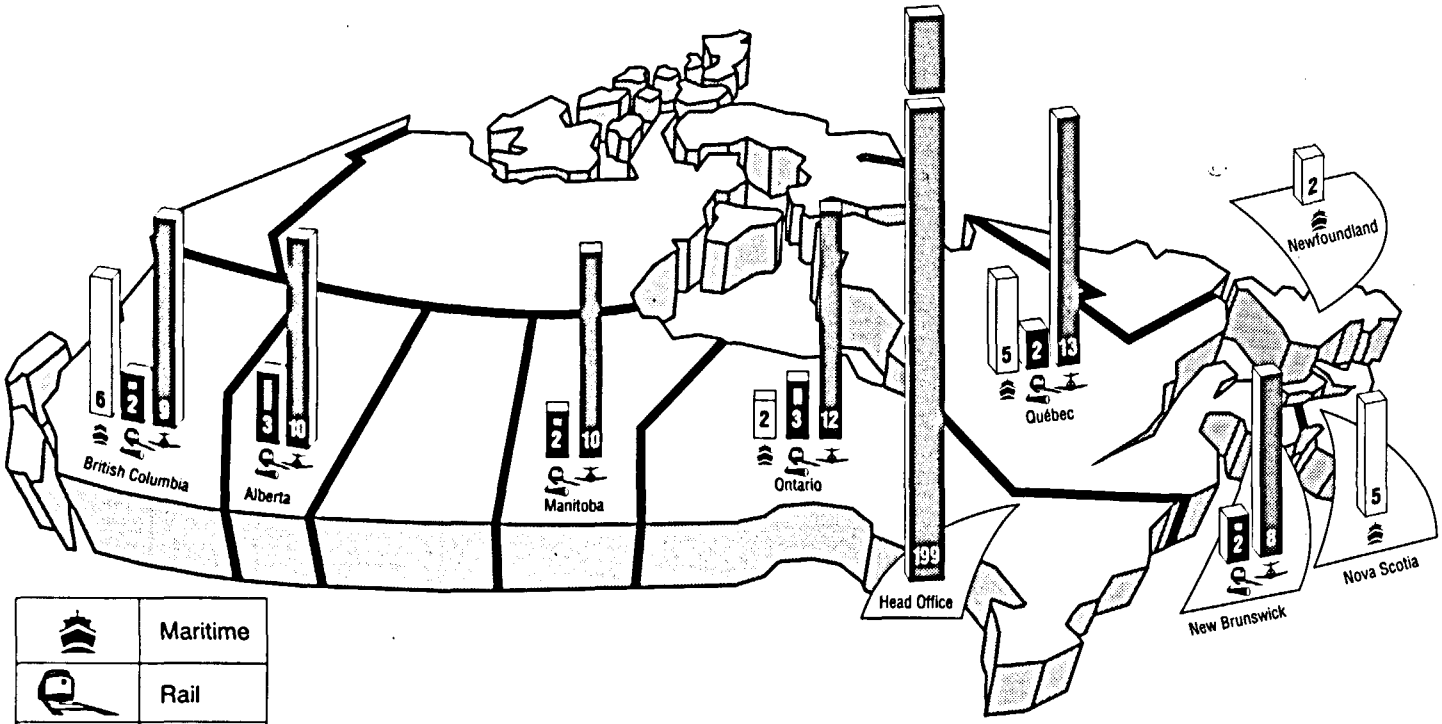
Field Office Staff Numbers

(Excluding Vacant Positions)
(as of November 1993)

	Marine		Rail/Pipeline		Air			Total
Office Location	Inves-tigator	Support Staff	Inves-tigator	Support Staff	Inves-tigator	Regional Manager	Support Staff	
St. John's	1	1	—	—	—	—	—	2
Halifax	4	1	—	—	—	—	—	5
Moncton	—	—	2	—	5	1	2	10
Dorval	—	—	1	—	10	1	2	14
Québec	4	1	1	—	—	—	—	6
Toronto	1	1	2	—	9	1	2	16
Petrolia	—	—	1	—	—	—	—	1
Winnipeg	—	—	2	—	7	1	2	12
Edmonton	—	—	1	—	7	1	2	11
Calgary	—	—	2	—	—	—	—	2
Vancouver	5	1	2	—	6	1	2	17
Total	**15**	**5**	**14**	**—**	**44**	**6**	**12**	**96**

Source: TSBC (see endnote 7).

Regional Office Staff Numbers



	Maritime
	Rail
	Pipeline
	Air

Note: Excludes vacant positions

As Table 4 shows, only two offices, Toronto and Vancouver, cover all modes. The field offices vary in size from a single staff member in Petrolia, Ontario, to a staff of 17 in Vancouver.

Field personnel, except in air, report to the Director of Investigations for their mode. The air mode has regional managers, and air activities are completely decentralized with full investigative and administrative authority delegated to each of the six regional managers. Marine, rail and pipeline investigation activities are directly controlled from head office. Railway field investigators, with support from two pipeline specialists at head office, respond to pipeline accidents.[7]

Comparison of the TSBC and the CASB Corporate Structures

In 1990, when the new TSBC was formed, its organizational structure and underlying philosophy were, in most respects, replicas of the CASB, with marine and rail investigative units from other areas of the federal government transferred into it. While various models had been considered during the transitional meetings of government officials in 1987 and 1988, there was no consensus, and the CASB design was the one eventually adopted.

One option was a structure in which the modes would remain distinct with each mode retaining its own analytical capability and reporting style. This was supported by rail and marine, and some air investigators. Each section would report to the Board for investigations and to the Executive Director for administrative matters. Under this option, the Directors of Investigations (DOI) would retain control of an accident report from the beginning of the investigation until it was presented to the Board for review.

A second option was to place the three modal investigation groups into an operations division with each modal DOI reporting to the Executive Director for investigation operations and for administration. However, the analysis, evaluation and report production functions would be concentrated in Safety Programs, as had been the case in the CASB. Safety Programs would take an investigation report, assess it for safety deficiencies and then move it through the process of getting comments from interested parties and Board approval.

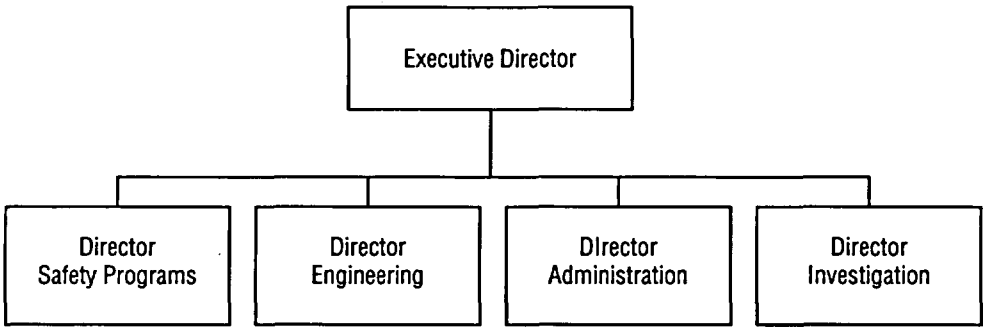
The second option was put into place as an interim measure. This choice was confirmed by the Chief Executive Officer and the Board about one year later, and it has remained in effect since then. An additional layer of senior management between the Directors of Investigations and the Executive Director was subsequently added.

This expansion of senior management is illustrated in Figure 2, Senior Management CASB 1989-90 and Figure 3, Senior Management TSBC 1993-94.

In the change from the CASB to the TSBC, the executive management category increased from five positions to 11. During the same period the total staff increased from 196 to 306 (see Table 3). Proportionately, the executive management category increased significantly more than the staff.

Figure 2

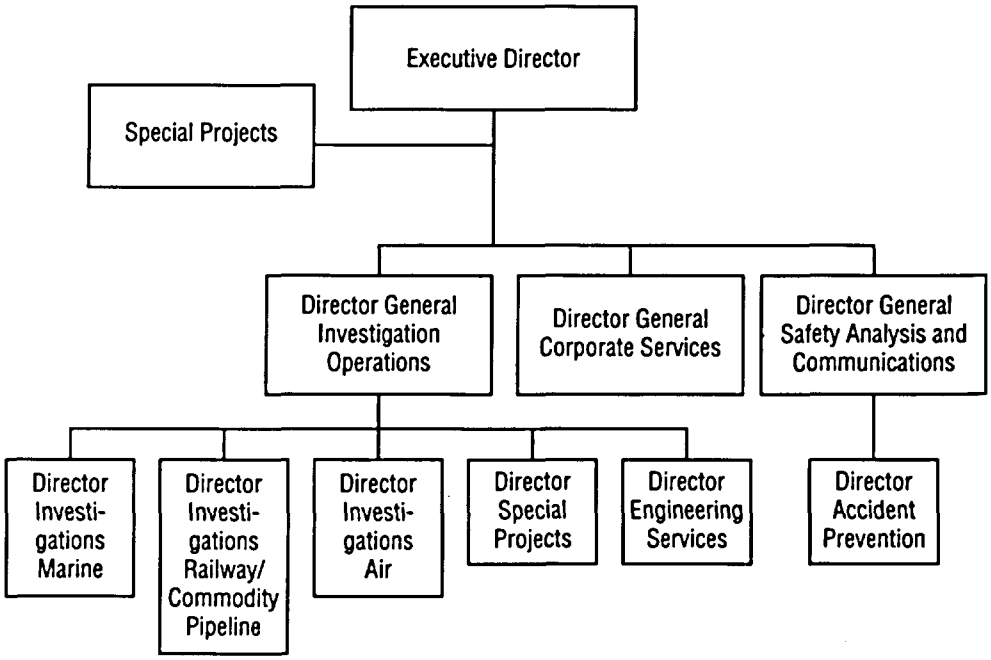
Senior Management CASB 1989-90 (Positions Classified as Executive)



Source: CASB Annual Report 1988.

Figure 3

Senior Management TSBC 1993-94 (Positions Classified as Executive)



Source: Part III Estimates TSBC Organization Chart.

The CASB had operated regional offices in six centres: Moncton, Dorval, Toronto (Willowdale), Winnipeg, Edmonton and Vancouver (Richmond). It appears that the present TSBC regional office location structure is largely based on what existed under the CASB and earlier air investigative units within Transport Canada. Where there has been consolidation, other modes have moved to the air location. For example, inVancouver, the marine and rail investigation units were moved from the port and rail areas of the city to the air office located near the airport.

TSBC Resources

In its almost four years of existence, the TSBC has maintained roughly the same level of employees and annual budget (306 employees and $27 million), and the same organizational structure.

The resources allocated to the TSBC when it started operations in 1990 were based on the combined resources of the CASB and the marine and rail investigative units (MCI and RPID) transferred from Transport Canada and the National Transportation Agency. Additional resources were assigned to make up for those which would no longer be available to the units leaving departmental structures.

When the TSBC became operational on March 29, 1990, its initial budget allocations were as presented in Table 5.[8]

Table 5

TSBC Budget Allocations March 1990

Sector	Source	Person Years	$000*
Air	Canadian Aviation Safety Board	196	17,824
Rail	National Transportation Agency	36	2,637
Marine	Transport Canada	47	2,883
Corporate	New resources	21	4,421
	TOTAL	**300****	**27,765**

Source: Pearmain Partners, *A Review of Resource Allocation in the Transportation Safety Board of Canada*, September 1993, p. 23.

Notes: * Includes employee benefits.

** The 300 person years were those initially allocated in planning documents. This differs slightly from the 306 shown in Part III of the Estimates for 1990-91 and displayed in Table 6.

The legacy of the CASB's initial relatively large share of the multimodal Agency has continued. The air mode has the largest investigations section, and Safety Analysis is staffed predominantly with personnel with an air mode background.

Personnel

The TSBC Budget Allocations (March 1990), contain a further breakdown of personnel (see Table 6). For the years under review, it is possible to compare levels of allocation of personnel to different functions.

Table 6

TSBC Personnel (Person Years)

Year	Investigations			Engineering Medical		Safety Analysis	Board & Executive	Admin.	Total
	Marine	Rail	Air						
	MCI	NTA	CASB						
1989-90	47	36	91	20	13	32	18	29	286
	TSBC								
1990-91	158			35		50	18	44	305
1991-92	158			30		55	18	45	306
1992-93	35	35	86	26 (plus 2)*	3	55	18	46	306
1993-94**	38	37	85	25	3	55	17	46	306

Source: Derived from Annual Part III Estimates for TSBC and CASB. The MCI and NTA figures are from Pearmain Partners, *A Review of Resource Allocation in The Transportation Safety Board of Canada*, September 1993, p. iii.

Notes: * Two PYs represent the Director General responsible for Investigation Operations, Engineering Services and Medical Services, and one support staff.

** Marine, rail, air, engineering and medical figures are as assigned in the TSBC organizational chart rounded to equal the figure of 188 for Investigation Operations as per Part III Estimates.[9]

Of note are the staff allocation shifts between functions during the life of the Board. From 1990 to 1993, the number of marine personnel dropped from 47 to 35, medical personnel from 13 to three while the number of personnel in Safety Analysis increased from 32 to 55. In effect, the medical positions were never filled at the CASB and were transferred to Safety Analysis as human factors positions. It appears that some of the marine positions were similarly reassigned to Safety Analysis, and the 21 new positions (see Table 5), allocated when the multimodal

TSBC began operations in 1990, appear to have been divided between Safety Analysis and Corporate Services.

Although the number of Board members dropped from nine at the CASB[10] to five at the TSBC, the number of persons in the Board and Executive category remained constant at 18.

It is notable that of the 11 people in executive positions at the TSBC, all but three are from the CASB. The three exceptions are: DOI Rail (from the National Transportation Agency), DOI Marine, and Director, Special Projects (both from Transport Canada).

The Commission's Assessment

In our review of the TSBC's structure and the deployment of its human and financial resources, we were struck by several key points.

Structure

The structure of the TSBC appears to remain the result of its history rather than the logical outcome of a conscious decision that considered its mandate and how it might have been the most effective.

One of the TSBC's major directorates, Safety Analysis and Communications, with its own Director General, is separated from the accident investigation function. It is responsible for safety studies, statistics and informatics functions, which may be a logical separation from the investigation function. However, it is also responsible for other aspects of safety analysis which are functionally associated with investigations, including the Accident Prevention Branch, which looks after safety deficiency analysis and human performance, and the editing component of Communications.

Our consultations indicate that there are very different TSBC staff perceptions about whether the safety analysis process begins immediately after an occurrence or whether it begins after the field investigation is complete. This leads to inconsistency and confusion. We believe that TSBC management should be seriously concerned about this lack of clarity.

The communications function within the Safety Analysis and Communications Directorate is involved in editing, translating and report mailing. We note that there is no person assigned exclusively to communications at a senior level.

Corporate Services appears large (46 persons) considering that it supports an organization of only 260 people outside itself. By contrast, Policy and Planning, an area in need of considerable attention, consists of only two persons.

It should be noted that the Secretariat section of Corporate Services (eight persons) exists primarily to track draft reports through Board review and the Interested Parties (IP) process. This tracking system is necessitated by the complexity of the report production and review process.[11]

It is enlightening to compare the TSBC with its American counterpart, the National Transportation Safety Board (NTSB), the only other transportation safety agency in the world with a full-time board. We note that the TSBC has financial and human resources roughly comparable to those of the NTSB, in spite of the much higher level of transportation activity and the number of major accident investigations in the United States, as well as the NTSB's broader jurisdiction.[12]

The difference between the two organizations is mainly in the method of operation and the procedures for focusing on occurrences which provide the greatest potential for deriving safety lessons.

Resources

Our review of resource allocations at the TSBC revealed that it has few formal guidelines or policies and procedures for determining either the objectives or the parameters of resource allocation.[13] Decisions on resource allocation appear to be made on an historical budget basis which has the effect of sustaining existing personnel and activities. As a result, it is difficult to draw conclusions with regard to efficiency or effectiveness on the basis of the relationship of planned resource inputs to planned outputs.

The federal government's administrative policies have led to what the TSBC Board and senior executives consider to be serious constraints on their ability to manage their staffing and compensation. Public service requirements often involve extensive procedures which are not appropriate in staffing a specialist organization such as the TSBC. In a recent instance, we were told that broad government directives have unnecessarily stymied the Board in its effort to staff the critical Director of Investigations, Marine position, apparently in spite of provisions in the public service legislation which allow the heads of federal agencies to hire for positions with distinct needs.

A public service salary is often determined by, among other things, the number of persons managed. To justify higher salaries for management positions under current public service procedures, it appears that, sometimes, artificial organizational structures have to be created to demonstrate larger spans of control or responsibility, including the number of reporting staff.

Two specific human resource issues need to be addressed: the requirement for pilot certification for air accident investigators and discrepancies in job classifications for investigators in different modes.

The majority of air accident investigators are classified as civil aviation inspectors (CAIs). This union classification is a carry-over from the time the Agency was part of the civil aviation component of Transport Canada. Like their Transport Canada counterparts, these investigators are required to maintain valid airline transport pilot licences. It costs the TSBC nearly $1 million[14] annually to provide flight time, mainly in the form of aircraft rentals, so CAIs can continue to qualify

for their licences. We noted that, in other countries, air investigator competency requirements vary widely. For example, in the United Kingdom, air inspectors maintain competency by flying as flight crew with British air carriers. Alternatively, in the United States, air accident investigators are not required to maintain valid pilot licences.

It is not our intent to make specific recommendations with respect to the precise nature of flight training required by the TSBC. Investigator training and competencies, in our view, are issues that warrant detailed examination not only in the air mode but across all modes to ensure that training dollars are effectively allocated and provide competencies consistent with the types of occurrences that TSBC investigators are most likely to face. We are, however, seriously concerned that present TSBC training policies and resource allocation decisions reflect historical precedent rather than current needs.

A second important issue, with respect to air accident investigators, is one of public service job classification and remuneration. In keeping with what had been the practice at the CASB, air accident investigators at the TSBC are classified in either the CAI sub-group, or the Technical Inspection Group (TI). All rail, pipeline and marine investigators are classified as TIs.

CAIs at the TSBC are members of a public service-wide classification. All CAIs have a significantly higher salary than TIs (another public service-wide classification) even when members of these two groups perform essentially the same functions. This discrepancy could be solved. For example, Australia's aviation accident investigation group, the Bureau of Air Safety Investigation, has created a single accident investigator classification. The new classification system resulted in greater collegiality, and an improvement in staff morale. In our consultations, we heard from TSBC officials and others of morale problems, especially among the investigative staff.

Our views on the TSBC's structure and resources can be summarized as follows.

- The structure is top heavy for an organization of its size with two levels of senior management between the CEO and the Directors of Investigations.
- The TSBC's organizational structure, which splits investigations and safety analysis, is unnecessarily complicated and renders responsibility lines unclear.
- There are no formal guidelines for resource allocation based on desired results, and resources are heavily allocated to the air mode and to administration.
- There is a shortage of skills, outside of field investigations, in modes other than air.

The organizational structure chosen for the TSBC was largely a variation on the CASB model, rather than a new organizational framework unencumbered by bias toward any one mode. This fact, in addition to the predominance of air mode

activity within the organization, may have undermined its capability to become truly multimodal. While the TSBC brief told us that the "multimodal approach adopted in the Act is currently being implemented quite successfully,"[15] we are not satisfied that the organizational structure is conducive to achieving an appropriate degree of multimodality.

■ ■ ■

RECOMMENDATIONS

1. 

The Chairperson should conduct a review of the TSBC internal structure and administrative processes. This review should analyze the ability of TSBC human and administrative resources to meet the following fundamental administrative goals:

a) **the number of management layers between the CEO and the Directors of Investigations be reduced, in order to increase internal accountability and simplify processes;**
b) **the safety analysis function be restructured to meet the distinct responsibilities of:**
   i) **providing integrated support to the investigative process; and**
   ii) **monitoring accident trends and performing non-occurrence related studies;**
c) **employees be hired based on forecast modal demand for their skills rather than on historical patterns;**
d) **human resource processes achieve cohesiveness by providing for similar advancement opportunities for all staff; and**
e) **job classifications and pay scales be harmonized for accident investigation positions in all modes.**

The Chairperson should take all measures to ensure that any existing TSBC structure or process found incompatible with such goals be replaced or restructured within two years.

Accident Investigations — Numbers and Costs

IT IS IMPORTANT TO HAVE a basic picture of the extent and distribution of Canadian transportation accidents when assessing the allocation of resources to the modes. Historic accident statistics in rail, pipeline, marine and air modes are highlighted below, based on data from the TSBC annual statistical summaries.[16]

Rail

During the last 10 years there has been an annual average of 1,600 railway occurrences reported to and investigated by the TSBC. The number of railway accidents, which include collisions, derailments, accidents at highway/railway crossings and persons being hit by rolling stock,[17] declined from over 1,400 in 1983 to approximately 950 in 1992. Most collisions and crossing incidents were the result of human factors. The numbers of railway accidents depend on railcar movements, work conditions and investment in safety devices at crossings. As a rule, derailments cause the most property damage and pose the greatest potential hazard to the public, particularly when passengers and hazardous goods are involved. Railway/highway crossing accidents, however, result in the most fatalities. While rail accidents pose a higher public risk for human safety when passenger trains are involved, these trains are only involved in about 10 percent of all accidents.

In the decade between 1982 and 1992, there were approximately 125 railway-related fatalities a year. The vast majority occurred at highway crossings involving automobile passengers, or occurred because of unauthorized persons on railway property. Very few employee-related fatalities occurred as the result of rail operations.

The number of injuries has fallen significantly during the last 10 years. The majority of injuries are sustained at railway crossings, and most involve motor vehicle occupants. Employee injuries are generally workplace-related, as opposed to those involving transport operations.

Pipeline

Currently, the TSBC does not publish the total number of pipeline occurrences. However, there has been an average of 45 pipeline accidents annually during the last five years, compared with 35 in the previous five-year period.[18] These accidents resulted in very few fatalities — less than one per year — with the number of injuries averaging five per year. The most prevalent types of accidents — uncontrolled spillage usually of liquid oil products, and uncontrolled escape of natural gas and high-vapour-pressure products — account for 57 percent of all commodity pipeline accidents. Structural failure has been the primary contributing factor in almost one third of pipeline accidents during the last five years. Whereas corrosion and

structural fatigue are features of an aging pipeline infrastructure, human error plays a significant role in most pipeline accidents. Most injuries are a result of leaks occurring during pipeline testing and maintenance.

Marine

There has been an average of 1,500 marine occurrences (excluding pleasure craft) annually during the last 10 years, with the number of accidents declining from a peak of 1,531 in 1988 to 1,122 in 1991. Fishing vessels accounted for approximately half of all shipping accidents, while cargo ships, tugs and barges accounted for a further 25 percent. Foreign flag vessels accounted for approximately 20 percent of total accidents.

More than 33 percent of shipping accidents occur in harbours and ports, and 20 percent in rivers and lakes. Human factors contribute to more than 70 percent of all marine accidents. Over 85 percent of accidents aboard ships are attributable to human error and an overwhelmingly number are work-related.

The annual number of fatalities in marine accidents has decreased markedly from a peak of 90 in 1988 to 26 in 1991. The number of injuries follows a similar profile.

However, pleasure boat accidents, which the TSBC has chosen not to include in its reporting system, result in more lives lost than in any other marine transportation sector.

Air

The number of air-related occurrences has averaged 1,200 per year for the last five years. Aviation accidents, which averaged 550 annually for the same period, consisted of occurrences resulting from the operation of an aircraft that involved fatal or serious injuries, structural failure or damage affecting airworthiness, and missing aircraft.[19] Over 90 percent of accidents involved Canadian-registered aircraft, with private owners involved in 50 percent of all accidents and level III and IV air carriers involved in another 45 percent.[20]

Most aircraft accidents were the result of several interrelated factors. At least 80 percent of all accidents involved human error, relating to personnel in the aircraft or on the ground. Fatalities occurred in between 10 percent and 15 percent of all the accidents, over the last five years; 60 percent of the fatalities were passengers.

There has been an average of 180 fatalities annually over the last 10 years, including the Gander incident in 1985 which claimed 256 lives and the 1991 Nationair accident in Jeddah which killed 261 persons.[21] While such major accidents receive a lot of media attention, the great majority of accidents involve recreational and small commercial aircraft.

Highway Accidents

Highway accidents, currently not under the jurisdiction of the TSBC, result in more injuries and deaths than any other transport mode.[22] Highway fatalities have declined from 4,436 in 1985 to 3,684 in 1991, largely due to the increased use of seat belts and the decrease in alcohol consumption by drivers.[23]

Investigations and Costs

Research carried out by the Commission attempted to determine the allocation of the total TSBC budget to the various transport modes and quantified, where possible, the controllable expenditures for accident investigation.

As indicated in Table 7, air investigations are allocated the largest component of the budget at 44 percent of the total. The next biggest item is Common Services which exceeds the funds available to either of the other two major investigation units.

Table 7

TSBC Estimated Resource Allocation

Cost Centre	1992-93 $000	%	1992-93 PYs	%
Air	10,672	44	123	42
Common Services	3,864	16	45	15
Multimodal	2,993	12	35	12
Marine	2,903	12	44	15
Rail	2,727	11	36	12
Executive	615	3	8	3
Pipeline	372	2	4	1
Total	**24,146**	**100**	**295**	**100**

Source: Pearmain Partners, *A Review of Resource Allocation in The Transportation Safety Board of Canada*, September 1993, p.iii.

Table 8

Average Investigation Cost per Occurrence by Mode

	1990-91 $	1991-92 $	1992-93 $	Forecast 1993-94 $
Air	4,533	5,718	6,227	5,217
Pipeline	4,482	663	9,084	2,760
Marine	1,769	2,335	2,494	2,255
Rail	1,816	1,496	1,647	1,506

Source: Pearmain Partners, *A Review of Resource Allocation in The Transportation Safety Board of Canada*, September 1993, p. v.

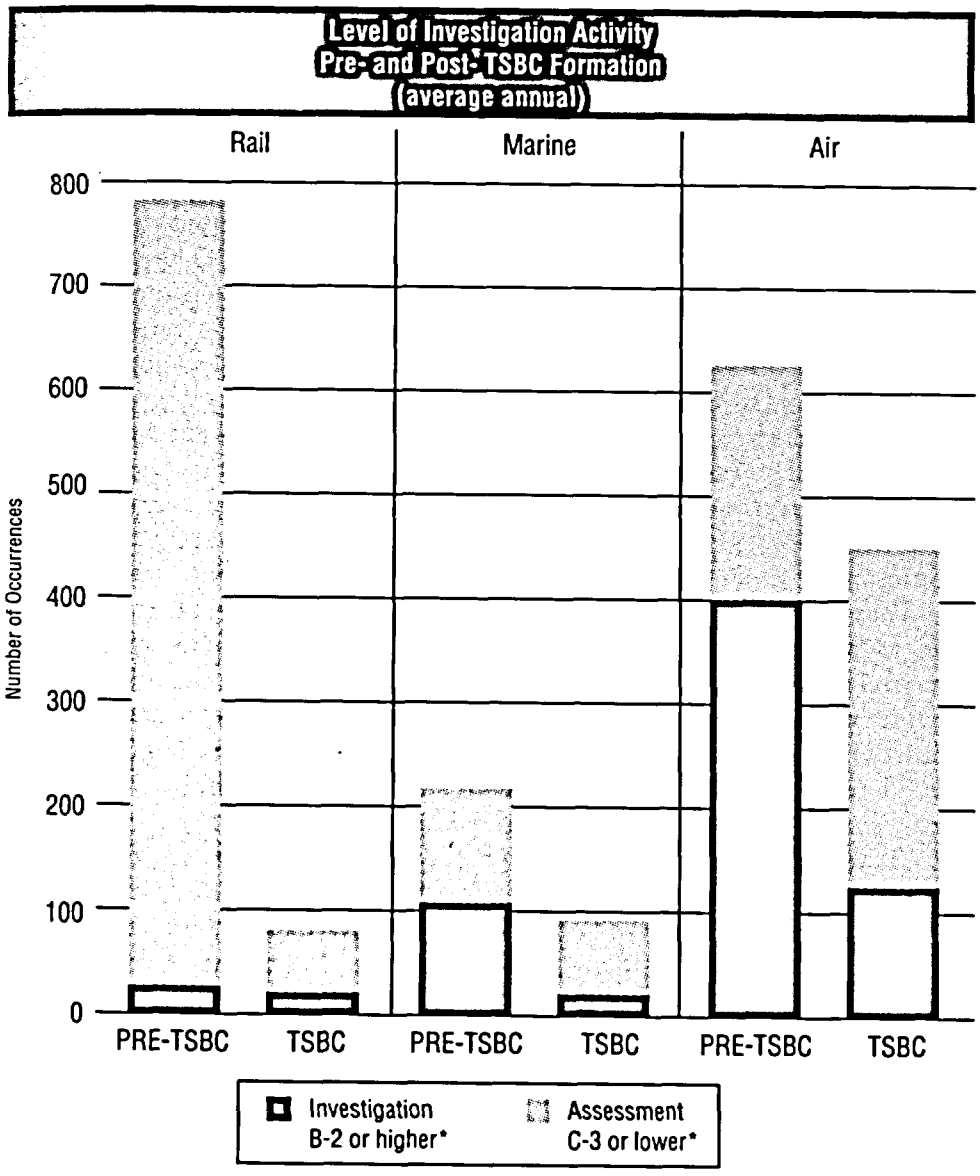
Note: Above costs per occurrence are the costs of PYs and other expenditures, but exclude multimodal activities, Executive Services and Common Services.

Table 8 indicates the average cost per reportable occurrence in each mode. Similar to the modal allocation of funds, the air mode dominates with twice the cost per occurrence of marine and over three times the cost per occurrence of rail for the fiscal year 1993-94. From 1990-91 to 1992-93, the cost per occurrence in marine and air increased due to the declining number of incidents investigated, while the costs for rail remained relatively steady.

Figure 4 indicates the level of investigation activity for three modes. (Pipeline activity was not available for pre-TSBC). As noted elsewhere and as evident from Figure 4, the current use of the TSBC's Occurrence Classification and Response System (OCRS) has significantly reduced the number of B-2 or higher investigations conducted in the air mode. (The OCRS classifications, such as B-2, are explained in greater detail in the following section.)

Even though the level of activity in air investigations has been significantly reduced, the total available resources have not been adjusted. In fact, the additional authorized-but-unallocated person years that the TSBC had at its discretion recently led to the creation of five additional air CAI positions in the regions (three now filled) to cover all aspects of human factors related to occurrences.

Figure 4



Source: Based on data provided by TSBC.

Note: Pre-TSBC (1988-1990), TSBC (1990-1992) pipeline activity was not availble for pre-TSBC.

* B-2 and C-3 are specific designators in the TSBC's Occurrence Classification and Response System (OCRS) which is explained in greater detail in the next section of this chapter.

Risk Management

The TSBC has no formal guidelines or policies and procedures for the determination of objectives or parameters for resource allocation on a multimodal basis. We believe that to fulfil its mandate for the advancement of transportation safety, the TSBC should employ formal risk management practices when classifying and investigating accidents. The use of risk management techniques is well recognized in many industrial sectors, including transportation.

Risk can be defined as the probability of an event happening multiplied by its consequences. Risk management, in the context of the TSBC, should be a set of formal methods and procedures to advance safety by the systematic analysis of occurrences, and their cause and effect relationships. Risk management provides a framework for assessing large amounts of data and facilitates allocation of limited resources for data review.

Three major activities are contained in risk management: risk analysis (what are the risks and the probabilities of them occurring?), risk evaluation (what are their impacts?) and risk control (how can their impact be reduced?). The overall objective is to reduce the risks of an activity, or to increase safety, to a level that is practical and reasonable given the resources and constraints of the Agency.

To appreciate the concept of risk, it is necessary to realize that there is no such thing as "absolute safety." Risk is inherent in all transport systems, and the only successful method of dealing with it is to identify, assess and choose risk reduction activities wisely. Excessive concern over wrong risks does not lead to greater safety; it actually increases overall risk by leading to neglect and exacerbation of other risks. The absolute elimination of risk in one area is not necessarily the safest course either, since it may lead to increased risk taking in other sectors.

There appear to be no plans at the TSBC to change the current method of allocating resources, except to the extent that more investigative data are being collected, and the data base will provide more baseline data for future operational procedures. There is little, if any, information available on the amount of time required per category of occurrence or the expected results from any particular investigation. The TSBC should employ risk management practices to ensure a consistent resource allocation framework that will permit a logical flow of resources among the modes and activity levels.

RECOMMENDATIONS

2. 

a) The TSBC should adopt risk management as a fundamental organizational principle.

b) In developing its strategic plan, the TSBC Board should use risk management principles which take into account the anticipated benefit in reducing general public risk exposure.

c) The TSBC strategic plan should take into account the general public's relative exposure to transportation risks among modes and not historical budgetary allocations.

d) The TSBC Chairperson should direct senior staff to acquire expertise in, and use, risk management techniques in revising the Agency structure and in allocating resources.

The Occurrence Classification and Response System

THE TSBC HAS ESTABLISHED the Occurrence Classification and Response System (OCRS) which sets out the Board's classification criteria for occurrences and identifies appropriate levels of response to ensure the optimum investigation of each occurrence. We strongly support this system in theory as a significant management tool. However, we have major concerns with how the OCRS operates in practice.

The OCRS Classification/Response Matrix

Occurrence classification assigns alphabetical categories to individual events according to three primary criteria stated by the Board:

- potential threat to the public;
- potential safety action; and
- degree of public interest.

Based on these criteria, occurrences are classified as A, B or C, in descending order of importance.

Response levels are determined by the TSBC staff by numbering from 1 to 5, also in descending order of intensity. Criteria used to determine responses include:

- comprehensiveness of the investigation and report;
- extent of information to be gathered;
- amount of time needed to investigate; and
- number of TSBC personnel required.

Together, the alpha occurrence classification (A, B or C) and the numeric response level (1, 2, 3, 4 or 5) form the OCRS designator. The matrix currently in use is depicted in Table 9.

Current Application of the OCRS Designation System

As the system is currently applied, the TSBC will produce an occurrence report only if an occurrence is classified A or B, at level 1 or 2. Assessments are made of C-3 events, usually on site. For C-4 and C-5 events, facts are usually gathered by phone by investigators who will not visit the site but merely record the information in the data bank.

In 1992, there were 2,520 accidents and 1,675 incidents, totalling 4,195 transportation occurrences, reported to the TSBC as required by the *CTAISB Act* Regulations.[24] In terms of the severity of accidents, it is notable that the TSBC has chosen to classify only two occurrences as Class A (A-2) since its inception.[25]

Table 9

Current Matrix of Occurrence Classification and Response Levels

	• Serious threat to public safety, or • Strong potential for Board safety action, or • Significant public interest	• Concern for public safety, or • Reasonable potential for Board safety action, or • Some public interest	• No reasonable concern for public safety, or • No reasonable need for Board safety action, or • Little public interest
	Class A	**Class B**	**Class C**
Level 1	• Full investigation with public inquiry • Comprehensive report • No investigation time limit	–	–
Level 2	• Full investigation • Comprehensive report • 180 days to investigate	• Full investigation • Intermediate report • 120 days to investigate	–
Level 3	–	–	• Preliminary examination • Information gathered on site or by telephone interview • Occurrence assessment produced in 90 days
Level 4	–	–	• Notification and data gathering • Data gathering by phone or mail • Occurrence brief in 60 days
Level 5	–	–	• Occurrence noted for data base • Additional data may be gathered by phone or mail • No report

Source: Transportation Safety Board of Canada, Document entitled *TSB Occurrence Classification and Response System* (as amended June 1991).

As currently operating, this designation system allows the Board to set out its broad occurrence classification principles. It leaves wide discretion to the staff at either the regional or national levels to interpret these principles for each occurrence and to assign the appropriate level of resources. Nowhere are definitions provided for key concepts, such as public safety, public interest or 'concerns' as opposed to 'threats,' or for identifying the means of assessing those very general concepts. Board members are sent a daily list of occurrences and how they have been classified.

Revising Initial Decisions on Levels of Response

In explaining occurrence classification, the TSBC submission to this Commission stated: "The Board...can change the occurrence classification or level of response any time it chooses."[26] In our view, that statement accurately applies to decisions about OCRS principles. The Board members may restate or define the elements of the OCRS policy. However, our legal research concluded that the Board may not have the authority to downgrade or upgrade the response to a specific occurrence.

There have been no instances of the Board seeking to reduce an assigned OCRS level, although there have been some cases of investigations in the Class C category being reduced in scope by decisions of the Directors of Investigations.[27]

Board members have, however, occasionally requested that the classification and response levels assigned to some occurrences be upgraded to more intense investigations.

We are concerned that because exercising the section 26 power to re-investigate may come too late for practical purposes, it would be desirable that the Board have explicit statutory power to upgrade as well as downgrade the initial OCRS classification at any stage during an investigation.

The issue of whether the TSBC has explicit authority to downgrade initial classification decisions was consistently raised in consultations. We believe that there is no reason to expend resources when it has become readily apparent that anticipated safety lessons are unlikely to be found. It should not be necessary to bind the TSBC to continue an investigation.

If given the authority to terminate an investigation or reduce a particular OCRS level, the TSBC would have to use it carefully. In exercising this power and in the interests of public confidence, the Board should be required to release a factual summary of the occurrence, the reasons for selection of the initial OCRS level and the reasons for the conclusion that continuing the investigation at that classification and response level would not benefit transportation safety. We believe that allowing the Board to re-allocate resources, given those requirements, would not imperil its credibility.

Inconsistencies in Application

The TSBC submission also stated:

> The Board members' and chief executive officer's duties are blended to produce guidelines on resource allocation. This happens in several and sometimes subtle ways. The policies of the Board are not set out in the kind of detail that unduly constrains the activities of staff. Rather, the policies give broad direction and they are reinforced through consistent application.[28]

The system used previously by the Canadian Aviation Safety Board (CASB) was not always applied effectively for resource allocation. For instance, it included an overriding policy directive to investigate *all* aviation accidents. The TSBC's decision to eliminate this precondition in the use of its OCRS demonstrates a positive effort to make better use of its resources.

An example of inefficiency was given to us in consultations. The CASB investigated the crash of a Northrop fighter prototype at Goose Bay, Labrador which, because it had not yet been purchased by the military, was classified as a civilian

aircraft. Only one other aircraft of this design existed at the time, and the considerable time and expense of the investigation was therefore of limited value to Canadian civil aviation. While an obligation may have existed under international protocols to investigate that event, the cost of the investigation, nonetheless, exceeded any potential safety lesson benefits.

While the Board has made some refinements to its original OCRS, the adequacy of its broad direction and the degree of consistent application have not, in our view, been readily apparent.

The Commission's research suggests that the OCRS does not yet ensure that similar events are treated consistently within each mode, and among modes. The considerable number of air mode investigations and reports, and the relatively few recommendations resulting from them, when compared with the other modes, suggest an imbalance between resources and results. The TSBC's own data demonstrate that fewer recommendations for safety action come from the air mode than from the others,[29] even though the air mode spends the largest share of the TSBC's investigation budget and has more than half of the investigation personnel.[30] Given these facts, we are concerned that the Board's own criteria in the allocation of resources to investigations are not being followed.

Our review of a large number of air occurrences failed to indicate a clear and consistent pattern to the practice of how occurrences are classified. For example, in cases described as "loss of control" incidents, nine were classified as B-2, and 29 were classified as C-3. In "loss of separation" incidents, five were classified as B-2, and 10 were classified as C-3. This could be either a question of classification or of the description of the occurrence.

Moreover, our discussions with the TSBC Board and staff revealed a number of different interpretations of the OCRS, its components and how they applied in different modes. Even the TSBC's own investigation manuals differ in their explanations of criteria for classifications for each mode. Our review of a number of aviation files uncovered classifcation inconsistencies. For example, there were instances in which occurrences classified as C-3 or C-4, should have been classified as B-2.

One possible explanation of such inconsistencies is the difference in how OCRS decisions are made in each mode. In the air mode, managers in each region determine the response levels. In the other modes, the Directors of Investigations in Ottawa make those decisions and can, in theory and practice, apply more uniformity. In this system though, the DOI is removed from the scene and may have difficulties assessing the degree of public concern.

The subjectivity of the system also presents a danger that classifications of new investigations might be adjusted to accommodate other factors unrelated to the stated OCRS criteria, such as workload. Our research identified some indicators of this correlation. In some instances, new investigations were assigned higher classifications and more resources at times when workloads were lighter. And the

same kinds of accidents, when assigned at busy times, were assigned lower priorities than the OCRS criteria seemed to suggest. Although resource limitations are real and must be managed in some way, this inconsistency in applying the OCRS should be eliminated, since it reduces the system's basic value and the credibility of the TSBC's data base.

Given the Board's role and its doubtful power to influence the classification of actual occurrences, establishing more precise definitions of the OCRS criteria would permit Board members, by a clear exercise of authority, to ensure more appropriate and consistent response levels and resource allocations.

Publicizing Classification and Response

We found that there is little public understanding about how the TSBC's resource allocation decisions are made and how the system is used, even by people who know that the OCRS exists. The complexity of the matrix, coupled with the general view within the TSBC that the OCRS is just an internal decision-making process, has contributed to this situation. This lack of understanding of the OCRS process leads some outsiders to be apprehensive about what the TSBC is doing and to be suspicious about its activities. The transportation community should be made more aware of this aspect of the TSBC's operations. This is also a mandatory requirement under the *CTAISB Act*.

The OCRS should be a management tool for the TSBC and a visible indicator of safety priorities for the transportation industry. It would be healthy for the TSBC to consult every second year with the transportation community on occurrence classification, particularly to establish consensus on the definition of such elements as accident severity and efficiency standards for the conduct of investigations. To better measure public interest in an accident, discussion with transportation operators and carriers should be essential. In the instance of the two B.C. Ferries occurrences in 1992, a better appreciation of public concern might have led to more decisive and immediate action by the TSBC.

In conclusion, we strongly support the Occurrence Classification and Response System (OCRS) as an important tool to improve the TSBC's efficiency and effectiveness. We are, at the same time, concerned that the system is not being applied consistently among and within the modal investigations and that it is not flexible enough to permit appropriate reconsideration of initial classification decisions.

RECOMMENDATIONS

3. 

The Board should consult with the transportation community and then develop a revised policy respecting the classes of transportation occurrences to be investigated and the levels of response. Essential elements should include the following:

a) clearer and more precise criteria be employed for selection of incidents and level of effort to be applied;
b) the priority-setting role of the OCRS be communicated to staff and made visible to the transportation community; and
c) a biennial review of the relevance and effectiveness of the OCRS be conducted with the transportation community, and appropriate changes made.

4. 

The President of the Privy Council should introduce an amendment to the *CTAISB Act*:

a) permitting the Board to direct that the classification of an occurrence be upgraded or that greater resources be allocated to an investigation;
b) permitting the Board to end an occurrence investigation or reduce the resources assigned to it, whenever the Board is satisfied that continuing the investigation at the initial level of response would not provide sufficient results in terms of safety enhancement; and
c) requiring the Board to issue a factual statement summarizing the occurrence and the Board's reasons for ending or downgrading the investigation.

Products and Processes

THE ROLE OF THE TSBC in advancing transportation safety is to provide information and advice to those who can take safety action. Two important dimensions of this role are the quality of the product and the timeliness of its dissemination. In this section, we assess the quality of the TSBC's investigation reports and the effectiveness of the processes it employs to produce them. To a large extent, these two dimensions determine whether or not the TSBC has an impact on transportation safety.

This portion of our review relied on three key sources of opinion and data: our consultations with stakeholders, outside expert opinion and Commission staff review of TSBC files. We did not feel that our task required us to make definitive findings on particular investigations or reports. Instead, we drew on our sources as a whole to analyze TSBC processes, identify areas for improvement and make recommendations. We understand that any review based on a sample of operational files cannot take all investigations into account. However, our confidence in our conclusions and recommendations was reinforced because each of the sources identified similar areas of concern.

Report Description

Accident reports are the product of TSBC investigations undertaken at an A or B response level. The TSBC has so far only produced reports from B-class investigations. These are targeted to be 10 pages to 20 pages in length. Reports at the B level are more discretionary than those at the A level, but usually contain the following four sections:

- Factual Information — the facts of the occurrence;
- Analysis — the development of hypotheses (or accident theories) which explain the occurrence in consideration of the facts;
- Conclusions — the findings as to causes and contributing factors; and
- Safety Action — action taken or proposed to address identified safety concerns.

Those occurrences responded to at a C-3 level lead to an assessment (previously called a brief) which, at the time of our review, was one page to four pages in length and contained only a presentation of the facts. Our assessment of the quality of aviation reports focused on the available B-2 reports but included some C-3 "briefs" as they were more plentiful.

Process Description

During the life of our Commission, the TSBC was taking several steps to improve timeliness. As a result, the procedures involved in the development of a TSBC investigation report were in an evolutionary state. Since the procedures vary somewhat by mode and because the air mode was the first to adopt new procedures, its procedures are the reference for our description of the process. However, it should be noted that the differences in the other modes' procedures are restricted to the way the investigator and other DOI staff develop their draft report.

The activities involved in report development are summarized below. Draft reports were assessed at five stages by our staff for a review of contributions made within each stage. Many of the stages we selected incorporate multiple steps used by the TSBC as is illustrated in Table 10 which describes the principal steps and milestones associated with TSBC air reports.

Stage 1 — Investigation/Draft IIC Report

An Investigator-in-Charge (IIC) conducts or manages an investigation, under the direction of the Director of Investigations (DOI) for the mode involved. There is possible head office support for the investigation, including laboratory tests and analysis by staff specialists.

Stage 2 — Head Office DOI Review/Draft DOI Report

The DOI's head office staff review and edit (and in some cases add analysis to) the IIC's draft report. There is significant variation in the level of contribution from head office analysis across the modes. For instance, air reports coming from the regions have been reviewed by the regional manager and have been developed with support of regional specialists. The rail and marine reports, on the other hand, are usually the product of smaller district offices. In the rail mode, in particular, the focus in the region is on the factual evidence gathered, while much of the analysis and report development are undertaken by the DOI's head office analysts. Marine reports undergo more extensive drafting at the regional level, but the DOI's head office staff make a substantial contribution.

Stage 3 — Safety and Communications Review/TSBC Staff Report

After the completion of the investigation report by the DOI's section, the report is sent to Safety Analysis and Communications for the addition of safety action text by the Accident Prevention group, and editing by the Communications group.

Stage 4 — Initial Review Committee of the Board/Draft Board Report

The draft report is considered by the Initial Review Committee (IRC) of the Board, followed by full Board approval of the draft report.

Table 10

TSBC Report Production Process

(Air Mode)

OUR STAGES		TSBC	
Stage	**Stage Description**	**Activity**	**Days**
1	Investigations and IIC report	Investigation Report preparation Submission to head office	125
2	DOI's head office staff	Receipt and preparation of report	7
	Audit and review	Review of report	18
3	Safety deficiency analysis and communications	Prepare safety action Edit report	23
4	Initial Review Committee of the Board	Prepare report for Initial Review Committee	12
		Initial Review Committee approval	25
		Collate minutes and report	5
		Incorporate Board changes	7
5	Interested Parties Process	Release conditional draft to IPs	4
		Process IP comments Disseminate IP comments	35
		IIC assesses IP comments	15
		Head office assesses IP comments	5
	Safety deficiency analysis and communications	Safety action to Board Editing report changes	5
	Final Review Committee of the Board	Prepare package for Board	5
		Final Review Committee approval and Board approval	30
		Collate minutes and reports	5
		Incorporate Board changes	25
	Report production	Prepare and release final report to public	15
		Total	**366**

Stage 5 — IP Comment and Final Review Committee/Final Board Report
The Board draft report is circulated to Interested Parties (IP). It should be noted that, while the *Act* refers to these parties as "Parties with a Direct Interest," we found that stakeholders and the TSBC more often referred to the process as "IP," and this became our preferred choice.

The TSBC staff comment on IP comments. Then, the Final Review Committee (FRC) of the Board considers IP comments and the draft report. This is followed by full Board approval of the final report.

Timeliness and Dissemination of Reports

A major concern of stakeholders in every mode was the time it took the TSBC to produce reports, even on minor occurrences. As one marine stakeholder put it:

> While no one requires CTAISB to leap to hasty or unverified conclusions, it surely does not take 12 months to produce a two-page recital of the facts of a simple incident.[31]

Air industry representatives also frequently raised the issue of timeliness. One carrier told us:

> We find that probably it's anywhere from two to three years for a report. I know the process and again it depends on the complexity. This one was quite complex from a human factors perspective but when we get the report, we find that the human factors aspect is not really explored. So I'm looking and saying: "Well, what took so long?"[32]

The TSBC has demonstrated that it can produce rapid turnaround of certain information when it detects safety-critical situations. Some of its safety advisories and interim recommendations (for example, those involving VIA Rail's axle failures and those on post-crash evacuation of a wide-body helicopter) are proof of this ability.

But timeliness goes beyond rapid communication of safety concerns. It also encompasses the prompt dissemination of both factual information and reports to appropriate groups and individuals enabling them to draw their own conclusions and to seek immediate remedies. We were also told that too long a delay in reporting facts and findings diminishes the value of the product to the public.

In an early workshop we held with stakeholders, we heard that the Board should attempt to communicate its findings more forcefully both to equipment operators and to carrier management, and not simply to Transport Canada.

Many submissions and briefings from unions and operating personnel indicated that they were unaware of the TSBC processes and its principal products. We were told that most marine people never find out what the TSBC has learned from an accident and that reports should be distributed more widely.

A particular concern was that:

> If a repetition of dangerous situations is to be avoided, the people involved must be informed soon after the occurrence. They are the ones who need the lesson in the interest of accident prevention; if accidents are repeated, lives may be lost...[33]

Stakeholders said they feared similar accidents would occur before the TSBC provided information to the industry. The importance of timely reporting was underscored when, five days before the release of Mr. Justice Moshansky's report on the Air Ontario crash at Dryden, another Fokker F-28 crashed at New York's La Guardia airport — also as a result of ice contamination. However, the most emphatic lesson from this incident relates to the dissemination of information. Mr. Justice Moshansky's key findings regarding ice contamination were included in his second interim report — issued 1½ years earlier — but this information had not lead to action by American regulators.[34]

Safety information is useless if it is not transmitted to people who can act on it. We were told of the loss of the fishing vessel *Nadine* in December 1990, which the TSBC, while issuing an interim recommendation to the Canadian Coast Guard, had not reported on by the summer of 1993. At that time, marine stakeholders told us: "It may be that subsequent losses like the *Cape Aspy* might have been prevented...if they had received timely notice."[35] While an accident investigation report may not necessarily provide the stimulus to prevent similar accidents, the lack of a report reduces the possibility that safety action will be taken.

The TSBC's performance was compared with that of industry for an occurrence which involved a component failure and subsequent lab tests and a report by the operator. The milestones of the investigation report development for this occurrence are highlighted in Table 11. The key information in this investigation was available to the operator through its own lab test report in 2½ months, but other operators and the public had to wait for more than two years before they would learn about the occurrence.

Table 11

Comparison of TSBC and Operator Response to 1990 Derailment

Elapsed Time (Month)	TSBC Time Line	OPERATOR Time Line
1		Lab tests with TSBC observers
2		
2.5		Lab report produced with cause and contributing factors evident from the content
3		
4		
5		
6		
7		
8		
9		
10		
11		
12	Draft report (drawing heavily from the	
12.5	operator's lab report) and draft recommen-	
13	dation written	
13.5	Draft report approved by Initial Review	
14	Committee with amendments	
15		
16	Sent to IPs	
16.5		Operator receives draft TSBC report for review
17	IP response received	
18		
19		
20		
21	Interim recommendation released	
22		
23	Final Review Committee approval of report	
24		
25		
26		
27		
28		
29		
30	Final report released	

Source: Commission review of TSBC files.

Some of the TSBC's timeliness problems may have resulted from unique circumstances. For instance, the air mode inherited a large backlog of reports in process. The CASB had a policy that every accident would produce a report (in either brief or full format) and the Board would review every one of them. The CASB also initiated full investigations into a large proportion of accidents. As a consequence, it developed a backlog of over 1,000 reports. The problem was recognized, and steps were taken to classify minor investigative reports as briefs which would be released by the CASB staff.

At the time of transition to the TSBC, 550 reports were still unfinished and passed along to the new Agency. In the first year of operation, the TSBC implemented its occurrence classification system to reduce the number of investigations initiated under the new TSBC. The number of full-scale (Class B) air mode investigations initiated was reduced to 74 in 1992, compared with 377 the last year of the CASB (1989) and 263 in the first year of the TSBC (1990). The TSBC's annual output of air reports has been more than double the number of new investigations. Late in the life of our Commission, the TSBC told us its air backlog had been cleared.

The transition period also created pressures for the rail and marine modes which were essentially brought into the CASB organizational framework. The TSBC's marine, rail and pipeline investigation operations were staffed with investigators from the Coast Guard and the National Transportation Agency. They typically conducted investigations with a focus on regulatory compliance rather than on the identification of safety deficiencies and safety action. When the TSBC adopted the CASB organizational model and its procedures, marine, rail and pipeline functions were simply grafted onto them. The surface modes were unfamiliar with the aviation-based report format, IP processes and reporting to a board. As a consequence, while the CASB backlog of reports was being reduced, a backlog was being built up in the other modes.

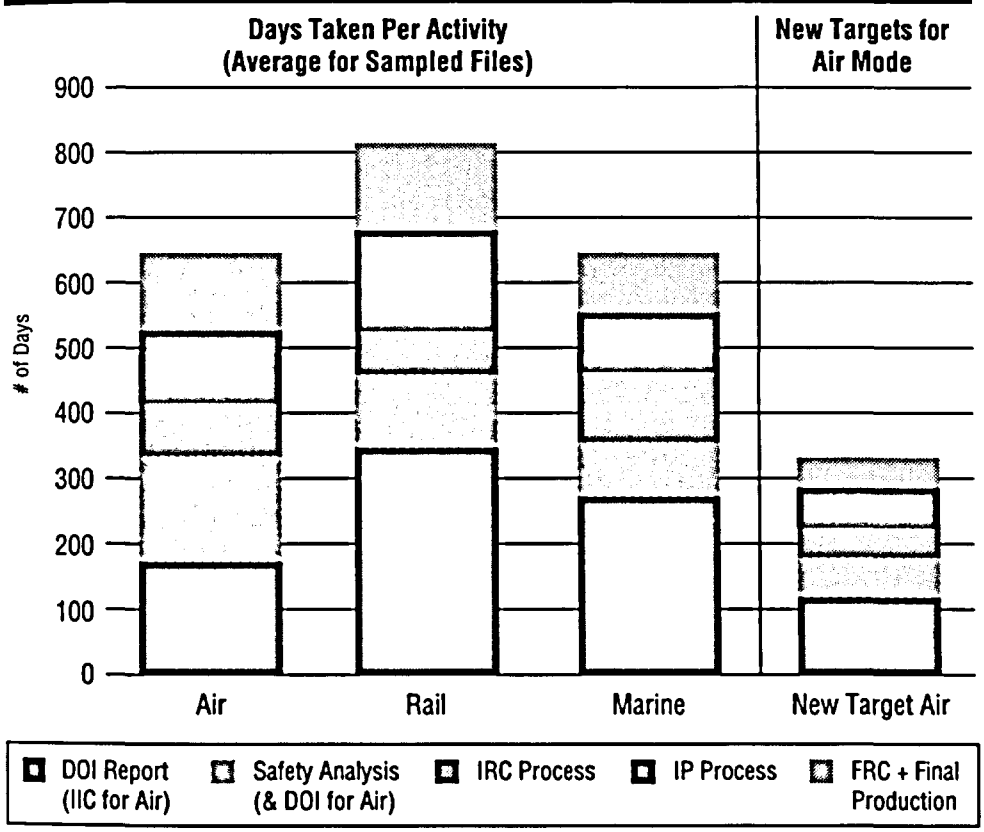
In response to the unsatisfactory pace of production, "in mid-1992, the Board identified timeliness as a major focus."[36] In June 1992, the Chairperson imposed a 365-day target for investigation reports. As of October 1993, only the air mode could provide us with a new set of milestones for report development under the new directive. Its milestones and the actual performance, for the five stages of report development for the sample of reports we obtained, are illustrated in Figure 5.

In 1992, the TSBC hired a consultant to assess its report process. While the TSBC did not adopt the consultant's recommendations, we were told that improvements have been made in monitoring report progress against milestones and in the electronic sharing of files among different staff involved in an investigation.

The new targets would represent a reduction of 45 percent to 57 percent of the average time taken in our sample of reports. This applies equally to the investigation stage and, therefore, will allow only one third of the overall time for the IIC to conduct the investigation and submit a report.

Figure 5

Timeliness — Our Sample and the TSBC's New Targets



Source: Based on data provided by the TSBC.

Note: The average situation depicted in the chart for marine is somewhat misleading as it only includes released reports; the large number of reports in progress would distort the sample average.

Steps to tighten up the existing process have achieved improvements in timeliness, particularly for air reports. The rail mode has improved but is not meeting the imposed report release milestone. (We were told that a Treasury Board hiring freeze has prevented the filling of a key vacant position and has produced a bottleneck in the rail mode's system). The marine mode has encountered more problems in conforming to the Board's report-writing expectations and has encountered procedural delays with a large number of west coast reports held up by the Board's decision to seek the Federal Court of Canada's guidance on witnesses' right to counsel.[37]

We believe that timeliness can be improved in all modes. We also find that the improvement measures adopted focus only on managing the existing system, rather than on reviewing the rationale and merits of the system itself. The proportion of time allocated to investigations in relation to subsequent review activities is a particular concern which we will address in the review of process effectiveness.

Quality of Occurrence Reports

Our safety impact assessment included a review of the quality of accident reports. The assessment was undertaken at three levels:

- input from stakeholders with varying levels of contact with the TSBC;
- a critical review by industry experts of investigation report content; and
- staff review of selected investigation files.

Stakeholders' Opinions

A wide array of opinion was furnished to this Commission by stakeholders — a diverse group of transportation operators, equipment manufacturers, government regulators and many others directly involved with transportation safety. Their views, among others, helped to define and shape the key issues considered in our Report.

The perceptions and opinions of stakeholders varied with the level and extent of their knowledge of the TSBC. Across all modes, TSBC reports tended to be rated more critically by those who had been associated with an investigation than by those who had not. However, this was not necessarily due to these stakeholders reacting to criticism in TSBC reports. In at least three instances, draft TSBC reports were corrected by operators themselves to make it clear that the operators' own procedures were deficient.

There were also variations in opinions in the different modes.

The overall quality of TSBC reports tended to be viewed positively by the marine stakeholders who responded to our survey. Most rated the reports as "adequate" or higher for clarity, comprehensiveness, objectivity, quality of analysis, technical content and the practicality of recommendations. (Practicality of recommendations received fewer "good" or "excellent" ratings than any other category.)

Most marine stakeholders felt that reports were written in a way which would stimulate implementation by those responsible for marine safety, and marine respondents who had been Interested Parties in a TSBC investigation felt that reports tended to describe clearly *what* happened and *how*. Readers of reports tended to be less impressed with the information and analysis on *why* an occurrence took place.

The major railway stakeholders commented on the factual errors frequently identified in draft rail reports during the IP process. These errors tended to be

relatively trivial such as an incorrect train number. What is striking is that they occurred in spite of the apparently close co-operation of the railways with TSBC investigators over the course of an investigation.

Of the aviation industry stakeholders responding to our research surveys, most who had been IPs considered the quality of TSBC reports to be equal or superior to those of the CASB, and equal to those of foreign agencies. More than half felt that significant *what*, *how* and *why* questions were left unanswered and many IPs would have added, modified or deleted findings strictly on the basis of the information contained in the report.

Representatives of Level I and Level II air carriers[38] — which carry about 80 percent of Canadian air travellers — said that their own organizations' safety procedures had not been significantly affected by TSBC reports, but they still believed, as did most other carriers, that TSBC reports had contributed, in a general way, to aviation safety.

Obtaining Expert Opinion

While stakeholders' opinions made a valuable contribution to our assessment, we supplemented this information by focusing on outside expert opinion and on reviews by Commission staff.[39]

The air reports received somewhat more attention than those of the other modes, not only because more reports had been produced for that mode, but because the TSBC's air investigative staff had previously operated under the similar CASB investigation and report format and could be expected to be more familiar with it.

The sample of 23 air reports and briefs, including four reports proposed by TSBC staff, represented a cross section of occurrences throughout Canada. They included occurrences involving large and small airplanes, helicopters and float planes, and covered major, medium and small carriers, in addition to specialty operations.[40] The files chosen, spanning 1989 to 1993, covered all TSBC regions and head office investigations. Occurrences dating from 1989 were included because the TSBC took over these investigations when it was formed.

The eight rail reports represented a 22 percent sample of rail reports released up to June 1, 1993 and covered occurrences which involved track, equipment and operations factors.

Effectiveness Review

Air: (of 347 reports provided)
6 experts reviewed 23 reports;
staff reviewed 23 files.

Rail: (of 35 reports issued)
3 experts reviewed 8 reports;
staff reviewed 7 files.

Marine: (of 8 reports issued)
3 experts reviewed 8 reports;
staff reviewed 3 files.

Pipeline: (of 2 reports issued)
1 expert reviewed the 2 reports.

The eight marine reports and two pipeline reports represented the complete output of the TSBC at the time that the assessments were made in mid-1993. The staff noted that the marine reports might not be representative of the 60 or more investigation reports which the TSBC had initiated but not yet completed in that mode. It was also noted that two pipeline reports were not a sufficient quantity on which to base conclusions.

A standardized evaluation questionnaire was used so results could be presented on a comparable basis.(See Appendix 4) Evaluations were deliberately duplicated in a few cases to compare approaches. The questionnaire was designed to determine the quality of investigation reports with respect to:

- thoroughness and objectivity;
- logic and consistency in the analysis;
- reasonableness of recommendations;
- overall quality assessment; and
- noteworthy aspects of the report.

Findings of the Experts

Thoroughness and Objectivity:—The experts tended to be critical of this aspect in all modes, although to differing extents.

Fourteen of the air reports did not answer all the reviewers' questions about the occurrence. In the case of both marine and rail, half the reports reviewed did not answer all questions. In one rail reviewer's opinion, "...my major concern is that TSB investigators do not view an accident as an opportunity to review and audit the effectiveness of *all* operating systems which are or should play a role in preventing or minimizing an accident."

In half the marine and three quarters of the rail reports where behavioural factors[41] were relevant, reviewers felt that controllable elements of this behaviour were not adequately examined. In 17 of the 20 air reports where it was applicable, reviewers found an absence of reporting on controllable human behavioural factors. As one air reviewer stated, "this essential part of a determination of accident causation is almost totally lacking in any of the reviewed reports." One noteworthy exception to this was a 1990 air occurrence report, released in the summer of 1993, which received an excellent review with respect to the ergonomic aspect of behavioural factors.

Expert reviewers compared the content of draft and final reports. Five marine reports did not examine all reasonable hypotheses (accident theories). Similarly, 15 of 21 applicable air reports did not address all reasonable hypotheses. As one reviewer states: "It appeared that once a hypothesis was

formed, all effort was channelled to confirm its validity, at times omitting information which did not provide directly (sic) support the TSB hypothesis." Even though a single hypothesis was presented in each rail report, it was accepted as being the only reasonable one and, therefore, well rated by the experts.

In more than half of the marine reports, and two thirds of the air reports, the causal statement was considered incomplete in that it did not address all correctable elements of the occurrence. Rail reports fared better with only one quarter considered deficient in this area.

Crash injury and survival data were a factor in only a few of the occurrences. However, in the two rail reports, two of six marine reports and 10 of 12 air reports where it was a factor, our experts found insufficient coverage.

Logic and Consistency:—In all eight marine and six rail reports, reviewers had no problems with logic and consistency in terms of the factual evidence presented or its analysis. However, over half of the applicable air reports were found deficient in this regard.

Similarly, reviewers said that the balance of the report could have been improved in only three marine reports and two rail reports. However, 15 air reports could have been improved through more balanced coverage.

In all eight rail reports, five marine reports and 14 of the 19 applicable air reports, the findings were found to be inadequate. While the marine and rail concerns in this area were largely of a minor nature which would not alter the overall conclusions, in many air reports, our reviewers fundamentally disagreed with the findings (for example, machine malfunction as opposed to "pilot error" being the more likely cause; or failure to report on crew fatigue).

A concern to several reviewers in the air mode was a lack of adequate treatment of issues related to Transport Canada. As one reviewer summarized: "One gets the impression that there is reluctance to call a spade a spade, especially with regard to Transport Canada's shortcomings in the discharge of its regulatory and surveillance responsibilities." While this criticism was directed at the TSBC's treatment of Transport Canada, there was a more general concern in all modes with respect to the treatment of operators as well, although not specifically stated as such. The lack of follow-up on human factors is, in many cases, a lack of follow-up on the operating companies' role.

Reasonableness of Recommendations:—In general, this area received a more positive review when recommendations were present. (They were present in all the rail reports, in six of the marine reports, but only in three of the air reports reviewed.)

All three air reports with recommendations received a positive response to questions of whether they were supported by the evidence and addressed a controllable problem; and whether they were worded in such a way as to provide latitude to the action agency, while being specific enough to permit monitoring of progress. On the other hand, reviewers felt that recommendations could have been made in six of the air reports which did not contain any.

Marine and rail reviewers felt that the recommendations were either not supported by the evidence or did not address a controllable problem in three reports in each mode. However, in a majority of the applicable marine and rail reports the wording of the recommendation provided sufficient latitude for the action agency to achieve the objectives most efficiently. Nonetheless, in two thirds of the applicable marine and one quarter of the rail reports, the recommendations were thought to be so broad as to hamper monitoring of their implementation.

Overall Quality:—In addition to the thematic areas discussed above, reviewers were also asked about the overall quality of the reports. Reviewers gave overall ratings of adequate or better to about 85 percent of the marine reports, about 60 percent of the rail reports and about 25 percent of the air reports. Of the 75 percent of the air reports found lacking, most comments related to previously identified deficiencies in thoroughness; one was described to be little more than "a procedural formality."

Noteworthy Aspects:—Reviewers were also asked whether specific aspects of the reports were dealt with in a noteworthy way — be it extremely well or poorly handled. They felt that specific sub-elements were extremely well handled in 25 percent of marine reports, about 20 percent of air reports and one of the rail reports. Specific aspects were considered to be poorly handled in about 35 percent of the marine reports and about 60 percent of the rail and air mode reports. The most frequent comment was that the investigations failed to cover all subject areas related to the event.

Lab Reports:—A few of the reports reviewed made reference to associated lab reports. While lab reports are not released along with occurrence reports, the few that we had reviewed generally received positive ratings, even when the full report was rated negatively. In the case of one of the air briefs reviewed, the reviewer noted that, "...reference to [the lab report] was essential to clearly understand the Brief as written. It was only then it became evident that the

Brief pertained to *two* successive occurrences." The reviewer added, "...the what, how and why are covered in [the lab report]."

International Investigations:—There have been several international investigations undertaken with Canadian assistance (mainly, but not exclusively, by individual TSBC investigators). These have involved large aircraft accidents that occurred abroad in which Canadians played key investigative roles (under ICAO or foreign auspices). These reports, some of them written in part by TSBC investigators, tend to be of high quality. We refer to the reports on the following accidents, among others: Nationair (investigation conducted by the Kingdom of Saudi Arabia), Thai Airways — Katmandu(investigation conducted by the Kingdom of Nepal) and Air India — Bangalore (investigation conducted by the Government of India).

As these reports were not officially TSBC reports, we did not incorporate them with the set of 23 reports used in the expert opinion tabulation. However, since the TSBC has not undertaken a major domestic investigation, we thought it important to gauge the effectiveness of its personnel in major investigations in which they had participated.

We had one of the experts do an assessment, under the same framework, of one of these investigative reports (the investigative team was about 80 percent Canadian, working under Saudi Arabian auspices, with a Canadian IIC). The assessment also included the Canadian group leader's reports. The conclusion, in the view of a leading international authority on aviation accident investigation, was that "to the extent that thoroughness of the TSBC's investigation is a prerequisite for its safety effectiveness, this [international] investigation met the highest standards in practically every respect."[42]

It should be noted that this praise comes from a reviewer who had significant critical comments on all but two of the domestic air reports reviewed.

Observations from the Expert Evaluations

We acknowledge that any review of a subset of an agency's output is not necessarily representative of its overall product. Both the air and marine reviews involved a relatively small sample of investigations. Despite this, it does offer a good indication of the various aspects of report quality.

In this light, we note that our experts had frequent concerns about the thoroughness of TSBC reports in all modes, particularly behavioural aspects. While the logic and consistency of reports fared better, we are somewhat surprised that there were cases in the air mode where experts, on the basis of the information within the report, would have made findings which were fundamentally different from

those made by the Board. We are encouraged by the more positive responses with respect to recommendations made. But we are unsettled that our air reviewers considered that recommendations could have been made by the TSBC in three times the number of reports.

The overall quality of the aviation reports reviewed was assessed as less favourable than the reports of the other modes. While the international air investigations demonstrated a capability for excellence in a major occurrence investigation, and aspects of domestic air investigations demonstrated a capability for excellence in specific areas, many of the domestic air occurrence investigations were found lacking. We note that the international investigations were conducted independently of the TSBC and its processes.

The findings of our experts were unanticipated, particularly with respect to air reports where investigation and reporting procedures were not only well established but used as the example for the other modes to follow. The marine mode fared better with our expert examination. However, the marine sample was quite small and, in light of the growing backlog, the TSBC should not exempt this mode from scrutiny in the future.

Insofar as the rail and marine modes are concerned, the units came to the TSBC from departments which seemed to have the confidence of their respective communities of stakeholders and the public. The TSBC provided many checks and balances in the report development and review process to help these units make the transition in report format and content. Despite this, we heard frequent criticism, from stakeholders in these modes, of the performance of the rail and marine modes.

These factors call into question the effectiveness of the TSBC's processes and culture.

Effectiveness of the TSBC's Processes

To address process issues, and, in light of the opinions of our experts, Commission staff undertook a detailed review of several accident investigation files. The file assessments and interviews with TSBC staff were directed at understanding both the report development process and the development of quality standards for reports. The Commission's objectives were twofold: to determine if the TSBC is extracting the maximum potential information for safety advancement from occurrence investigations and to determine the relative contribution of each step in the report development process in relation to the time consumed. Each aspect is commented on as appropriate in the various stages of report development.

Stage 1 — Investigation/IIC Report

As noted previously, investigations can be conducted at different levels depending on the assessed potential for safety action as well as public interest in the occurrence. In a "comprehensive investigation," the process differs by mode, with a team of

investigators dispatched with an IIC responsible for the overall management of the investigation. In the marine, rail and pipeline modes, individual specialists report to the designated IIC. In the air mode, teams of specialists are directed by group chairpersons who in turn report to the IIC.

Since only two occurrences have been classified by the TSBC as "comprehensive" and neither has resulted in a report to date, all the domestic reports we reviewed and the associated files were based on "intermediate" investigations. In these investigations there are no group chairpersons; the IIC conducts the investigation with support as needed, often with only one or two people, including the IIC, on site.

The operator's role was not, in our opinion, adequately addressed in any of the files reviewed. Hiring and training practices, operating procedures and the effect of compensation schemes seldom were addressed by TSBC investigations. Operations and other relevant manuals seldom were analyzed (though on occasion copies of selected pages were included in the file). In the sample files we looked at, the TSBC reports never documented the corporate culture in any mode. Review of one marine file showed that, although there was substantial information in the file that contributing factors included non-compliance with internationally accepted operating practices, such information did not appear in the TSBC report. While the findings of an official investigation by the country of registry of the shipowner had been available to the TSBC during the review process the report did not address that information.

Similarly, Transport Canada's role was only investigated in two of the 16 applicable air files but was included in the one applicable marine file. In the marine file, the Board commented that Transport Canada Vessel Traffic Services was unaware that the Ship Safety Branch of Transport Canada had inspected and found deficiencies in a ship later granted clearance to enter Canada.[43] The seven rail files did not have a Transport Canada dimension. Occurrences considered by Commission staff to be applicable were those where Transport Canada had an interest as either a regulator or a provider of services, and staff believed further investigation was warranted.

The air investigation files we reviewed showed instances where the facts on the files appear not to have been pursued fully. For example, in one case the marginal performance of a pilot in an instrument flight rules (IFR) proficiency check could have led to reviewing the adequacy of Transport Canada testing criteria. It went unmentioned. In other cases, possible involvement of Air Traffic Services (ATS) training and operational procedures were neither pursued nor followed up completely. In these files, there was no apparent consideration, by the TSBC, of the adequacy of Transport Canada's internal assessments of ATS. (Such occurrences provided a good opportunity to monitor the recommendations previously made by the CASB in its 1990 ATS safety study.)

Of the 36 files reviewed, the factual content of 17 suggested that the role of Transport Canada may have warranted mention in the report. We were concerned

that in 14 of these 17 cases, the files did not pursue any consideration of Transport Canada's involvement. Given that Parliament gave the TSBC independence to monitor the actions of regulators as they affect transportation safety, we would have expected to find more instances of attention being paid to Transport Canada's functions.

This lack of attention to operators' and Transport Canada's roles in occurrences is an element of the frequent concerns raised by our experts about single-hypothesis investigations and a lack of explanation of why an occurrence happened. The depth of the initial investigation of an occurrence is critical to the quality of the final report. The facts and evidence gathered in the investigation are the basis of the analysis, hypothesis development and identification of safety deficiencies. Thus, it is important for the investigator to consider all reasonable hypotheses, and gather the information required to address and comment on each in the investigation report. The ICAO *Manual of Aircraft Accident Investigation* in fact states, "...it is important for the investigator to state why a particular hypothesis has been rejected. The Investigator-in-Charge should then justify his reasons for sustaining the validity of the remaining hypothesis or hypotheses."[44]

Commission staff also encountered a lack of focus on human factors. This was disconcerting, since the TSBC's 1990 annual report noted the importance of this issue. In many of the files reviewed, human factors were not dealt with in the initial investigation. Investigators appeared unclear on the policy or standards of the Board.

In the air mode, the ICAO manual calls for the inclusion, at the end of the analysis section, of "any matter that came to light during the investigation which, while indicating an unsatisfactory state of affairs, did not in itself contribute directly to the cause of the accident."[45]

The TSBC's air report-writing manual[46] also makes many of the points raised in the ICAO manual. However, there was no indication in the files that the accident reports were reviewed for conformance with the TSBC manual. The quality control during the review process appears to have focused on what was already in the report rather than what was not. Thus, while specific standards have been developed, especially in the air mode, in practice they appear to be treated only as discretionary.

Our file review identified some additional areas which need to be addressed by the TSBC.

The file sample suggests the TSBC did not always take full advantage of outside information. In one file, a letter from the operator identified a clear cause and a preventive solution; in another, a flight attendant's letter outlined several useful remedial steps; in a third, the operations manager volunteered his own organization's omission. The files do not indicate that any of these sources was followed up during either the investigation or review stages.

Similarly, internal sources of information were not always fully utilized. There were many instances where the IIC included useful information in the file (although

not in his/her report), yet it was overlooked later in the process. In several occurrences, lab reports were not used to the best advantage in analyzing the occurrence or determining the cause and contributing factors.

In at least two instances, doctors who had not performed the autopsy were asked for their opinions on survivability issues. In both cases, there is no indication that the opinions of the doctors who had performed the autopsies were sought.

Our research concluded that interviews conducted by TSBC investigators in the marine mode were well prepared and executed, although we thought more interviews were necessary. (This judgment is, however, based on a small sample of files.) Commission staff felt, on the other hand, that within the sample group, some air interviews conducted by the TSBC contained leading questions and digressed onto other subjects at the initiation of the interviewer. There were no interviews conducted in the rail files. The rail DOI confirmed that formal interviews are only held when operator error is a factor. We note that Mr. Justice Moshansky was critical of the CASB staff's interviewing skills and made specific recommendations for training.[47] Training courses have been held, but there are indications that interviewing skills are in need of improvement.

The credibility of the TSBC has not been tested by a high-profile major domestic occurrence. To assess better whether the TSBC could produce a high-quality product from a comprehensive domestic investigation, our staff reviewed the TSBC's investigation manuals and its Major Occurrence Investigation Checklist for the air mode. In light of the frequent criticism of single-hypothesis investigations and the indications of a reluctance to address the opinions of others in the domestic investigation reports, the focus was on the policies in place to deal with alternate hypotheses and differences of opinion.

We found that, while the air mode has developed an extensive procedures manual and has the mechanism in place to mobilize and conduct a comprehensive investigation, there is one aspect critical to thoroughness which is neither clearly nor appropriately dealt with — the IIC's relationship with group chairpersons. The ICAO *Manual of Aircraft Accident Investigation* deals with site relationships and indicates that " ...the activities of various groups cease when their group reports are completed and submitted to the Investigator-in-Charge... . The Investigator-in-Charge supervises the collection of all group reports and is responsible for the composite report."[48] The TSBC manual gives the IIC full authority to combine or eliminate groups and makes all on-site personnel responsible to the IIC. While these TSBC provisions may be desirable in some situations, they may also create problems on site.

In our opinion, an IIC should not overrule a group chairperson's on-site decisions with respect to responsibilities assigned in the Major Occurrence Investigation Checklist duties. This needs to be clear in the TSBC's manual. If fundamental differences as to the course of a group's investigation activities arise, they should be brought to the attention of the DOI and the Board. Also, as with rejected

hypotheses, we believe the IIC should not omit portions of a group chairperson's report from the IIC report without noting the discarded portions.

We believe these clarifications would help prevent the problems evident in the B-2investigation reports, which we had reviewed, from arising in major investigations and would enhance the public's confidence in the TSBC's ability to conduct a major domestic investigation.

Stage 2 — DOI Analysis and Review

The stages following the investigation and IIC report focus on review of the IIC's report. In their review of these stages, Commission staff commented on the effectiveness of the process rather than on the quality of the final product.

While the initial investigation was the source of many of our experts' concerns about quality, the review process is intended to be the quality control mechanism.

Due to the differences in operating procedure adopted by the different modes, there is a significant variation in the level of contribution by the DOI's analyses, ranging from little being added in the air mode to a significant contribution in the rail and pipeline modes. The marine mode falls between these two extremes. As a result, the time allocated to head office activity is largest in rail and pipeline and smallest in air. In the marine mode, the completed report is passed back to the investigator for comment before going to the next stage.

In the reports reviewed by our staff, the marine and rail DOI's staff improved the factual content, expanded on relevant findings and augmented the initial safety analysis. In most cases, the logic of the sequence of events was improved, enabling a better appreciation of the entire scope of the occurrence.

Stage 3 — Safety Analysis

The safety action section is added to reports by the Accident Prevention (AP) office of the Safety Analysis and Communications group. AP is responsible for identifying systemic safety deficiencies and drafting recommendations for the Board's consideration. The AP office is presently staffed with one analyst for rail and pipeline, one for marine and eight for air. (We previously noted our concern about the shortage of skilled personnel in the non-air modes in this function.)

In the marine, rail and pipeline modes, most of the safety action section was drafted by the DOI's group before being passed on to the AP section for review. In general, the AP review seldom added new content to non-air reports.

The AP office is more involved throughout the development of air mode reports. The extent of AP's involvement with the investigation and influence on the draft contents before it leaves the DOI's section is not clear from the files. Through interviews with TSBC staff, we learned that they do get involved early on in some cases, particularly in the air mode. In fact, recommendations emanating from one of the reports which we reviewed, were referred to in the TSBC's 1991

annual report as coming from a safety study. The survivability aspects of this report, which were presumably contributed by the Safety Analysis group, received high praise by one of our experts.

The Safety Analysis group does not appear to have a specialist in risk analysis, and at least one report demonstrated a lack of understanding of risk concepts. This weakness has contributed to railway and pipeline industry opposition to some specific TSBC recommendations. An important aspect of this group's role is its responsibility for the assessment and inclusion of any trends relevant to the occurrences. However while its reports sometimes make reference to other occurrences of the same nature, we seldom found a treatment of trends. Nor could we find evidence in the files we reviewed that investigations or the classification of occurrences were much influenced by statistical analysis.

Our conclusion is that the Safety Analysis group makes a more significant contribution to air reports than to those of other modes, but it may not have made the most effective use of its data and statistical capacity.

Stage 4 — Initial Review Committee (IRC) of the Board

The Board has established the two-member Initial Review Committee (IRC) to review the DOI's draft report before parts of the report are released to IPs for comment. The draft recommendations sometimes prepared at the DOI level are not included in the copies of the draft reports sent to IPs.

The Board maintains that the *CTAISB Act* requires the Board members themselves to approve such draft reports before they are sent to IPs. The Board feels that it should not finalize its recommendations before seeing IP comments and, therefore, has decided not to circulate draft recommendations outside the Agency. Nonetheless, it has accepted the procedure of adopting the DOI draft report, as edited by the Board. This leaves the Board in the awkward situation of adjudicating its own report against IP comments. This is entirely inconsistent with the intention of the *Act*.[49]

In terms of the procedures adopted by the Board in its initial review, the IRC (as with the FRC) does not discuss the report with the IIC and seldom with the DOI. This is a consequence of the Board's policy decision to be no closer to its investigative staff than to Interested Parties.[50] Edits are made and reports are released as amended.

If there are questions or concerns, the DOI is queried via the minutes of the meeting. The DOI's staff then respond in writing to the question in time for the next meeting of the Committee. In the files reviewed by our Commission staff, the IRC process (from submission to IRC, to release to IPs) ranged from a minimum of 25 days to a maximum of 240 days.

Our Commission staff's file review found that, while many of the reports dealt with subject matter which required more than an operating or general knowledge of the mode, there was no indication that the IRC sought technical advice. The committee seldom requested laboratory and other file contents associated with the investigation.

Since it does not always have a detailed knowledge of the subject area or of the associated documents, does not discuss the draft report with the staff and does not seek outside advice, it is not surprising that the IRC operates primarily as an editing board. We have found that the IRC comments and editing usually aided the readability of reports, but the changes it made to synopses, findings and causes were often the source of the quality concerns expressed by our expert reviewers.

The exclusive use of minutes to communicate the IRC's response to draft reports appears to have led investigators to infer that human factors ought not to be emphasized in investigations or report analysis. As noted previously, the ICAO manual calls for inclusion in the report (in the analysis section but not in the findings) of any areas of safety concern whether they contribute directly to the occurrence or not. Yet, the Board not only edits out some clearly irrelevant material from the report, but also takes a very conservative interpretation of what should be stated as contributing factors in making its findings.

However, we note that the Board's annual reports have indicated a need for more focus on human factors, and action has been taken in building up a team of individuals trained in this area. An April 1993 air report received high praise for its treatment of the ergonomic aspects of human factors. It appears that the Board's hesitance is with the operational (training, operating procedures, company policy), behavioural (life events and patterns) and work condition aspects of human performance rather than with the person-machine interface aspects. However, this is difficult for us to assess, since neither the minutes we reviewed nor interviews with staff provided a clear explanation of the edits made in the area of contributing factors.

Stage 5 — IP Process

IP comments were considered to be of value to both the TSBC and the stakeholders. The TSBC provided information on IP responses as shown in Table 12.

The IP process leads to a significant level of error detection in factual content, particularly in the marine and rail modes. On the other hand, the process consumed a significant amount of time in the occurrence files reviewed by our staff. Much of the time was associated with the TSBC's activity. In general, more time was consumed in review, consideration and response to IP comments than was allocated to the IPs in making their comments.

Initially, the TSBC simply acknowledged receipt of IP comments which then were considered by the Board. The Board now has directed TSBC staff to prepare written responses in reply to IP comments. We consider that neither the *Act* nor principles of administrative fairness require a response to IP comments other than the final report. The exchange of written responses could lead to an open-ended process and offset some, if not all, of the gains made through steps taken to improve timeliness. Countries, such as Australia and the United Kingdom which have IP comments on draft reports, do not make formal responses but may meet with IPs to discuss significant issues.

Table 12

Impact of Comments of Interested Parties

Mode	Responding (% – IPS)	Comments Leading to Changes	
		of Facts (% – Reports)	Findings (% – Reports)
Marine	46	85	38
Rail	39	82	32
Air	17	30	20

Even if detailed staff commentary on IP comments could assist the Board in evaluating the comments, the written process is cumbersome. The Board has the authority to hold a hearing process to discuss comments with Interested Parties and with staff but has never, to our knowledge, used this mechanism. Neither has it met with staff to discuss IP input. In fact, as detailed elsewhere, the procedure implemented for investigative staff to comment on the edited report is the same as for Interested Parties. As a result, the IIC is required to offer comments on the changes which were made to the original investigation report, and then has to comment on IP comments on the Board's issued draft report.

The final Board review usually is made by another two-person Board committee who again have exercised this role since 1990. Without rotation among members, a sub-committee of two, whether at the IRC or FRC stage, cannot be expected to be "collectively knowledgeable" as indicated in the *Act*.

FRC assessment of the IP package and consideration of any drafted safety action appears to take less time than the initial review, although there were still cases of additional edits to the reports. This committee seems to function much like the IRC — without the presence of investigators, without outside advice and without looking at the full file. Communication is by edits to the report or through the minutes of the meeting.

In conclusion, we find that the processes under which the TSBC is operating are dysfunctional. Some aspects of the processes are a direct consequence of the wording of the *Act*, while others are by choice.

Summary of Findings

In light of the information gathered from all sources, we make the following overall conclusions with respect to the TSBC's products and processes.

Professional Competence: There is evidence that the capability and capacity to do excellent work exists within the TSBC. In many areas where criticism arose, there were also demonstrated cases where treatment of these same areas was excellent. We believe the processes adopted by the TSBC and the culture which has evolved are hampering its ability to perform consistently to its capacity.

Product Quality: In the cases we reviewed, the quality of TSBC products falls short of the maximum safety advancement potential that existed in the occurrences investigated by the TSBC. Shortcomings exist in the thoroughness of investigations and are compounded by an apparent reluctance to address Transport Canada issues or operator practices and procedures. Further, focusing on instances of a single hypothesis has detracted from a full examination of all possible or reasonable causes of an occurrence. In addition, we note that the Board's practice of reviewing reports without all the necessary background material reduces the opportunity to assess the thoroughness of a report.

Timeliness: The TSBC does not issue its reports in a satisfactory time frame. The improvement measures implemented in response to the Chairperson's directive have, in our opinion, focused on managing within the existing process rather than on fixing processes which are faulty. The TSBC should again address this issue, with a focus on the value added at each of the various stages.

Processes: We found that many of the concerns about the quality of TSBC reports, as identified by our experts, originate with the investigation and remain throughout the review process. In all modes, review efforts are focused on editing and expanding on the material provided rather than on assessing its sufficiency and intrinsic quality. Little safety-critical value is added to draft reports after the DOI signs off. Without direct interaction with the Board, it is difficult for TSBC staff to craft content and wording that is acceptable to the Board — a process which has led to inefficient use of analysts' time and confusion among investigators. Inefficient communication between Board and staff is a significant contributor to the deficiencies identified by our experts in TSBC reports. And because the report is passed from hand to hand, from group to group, there is no single point of control or responsibility for content. The cumulative effect of all these factors has tended to decrease the quality of reports.

We make further comments on the TSBC's processes and offer an alternative model in Appendix 1.

RECOMMENDATIONS

5. 

The Chairperson and the Board should develop comprehensive policies and standards for the conduct of investigations. These should include investigating and analyzing the effects of government department and agency regulatory and operating programs, operator management practices and corporate culture, and human factors and should foster co-ordinated use of Agency and external specialists. The Chairperson should direct that TSBC field staff receive increased training in investigative techniques to acquire information relating to these factors.

6. 

The Chairperson and the Board should restructure the TSBC's investigation and report production processes with the goal that quality assurance will be achieved through programs based on the principle of avoiding the need to rework investigations and reports.

7. 

The Chairperson and Board should restructure the report development process. Elements of restructuring should include that:

a) one individual, preferably an investigator, be assigned responsibility for driving the production of each draft report from the time of the occurrence to the presentation to the Board;
b) the Board Initial Review Committee process be abolished;
c) draft reports be developed through simultaneous involvement of field investigators, safety analysts and specialized laboratory and other services;
d) for those draft reports where the Board has questions related to either draft findings or report standards, the IIC and, where appropriate, other staff contributors, present the draft report to the Board; and
e) the entire investigation file and physical evidence be considered by the Board in its review.

8. 

The Chairperson should act promptly to increase the safety analysis resources available to modes other than air. Mode-specific human and technical analysis resources should be matched with anticipated demand for such services, based on risk and trend analysis.

The Recommendation Process

The Current Process

SECTION 7 OF THE *CTAISB ACT* establishes the making of recommendations as an overall TSBC objective. The Board has the mandate to "advance transportation safety...by making recommendations designed to eliminate or reduce [such] safety deficiencies."

It is the duty of the members of the Board to determine findings as to causes and contributing factors as well as to identify safety deficiencies. In addition to making findings Board members are to "make such recommendations as they see fit" (para. 8 (1)(g)) subsection 24(1) states that "wherever possible, [the Board] shall, in the interests of transportation safety, include in its report recommendations based on [these] findings."

The recommendations are drafted by the TSBC staff and officially approved by the Board and sent to the appropriate minister. They are usually conveyed as part of a final report. However, should any of the Board's findings or recommendations require urgent action, interim recommendations can be made to the appropriate minister or party before the issuance of the final report.

The Minister has 90 days to respond officially to the recommendations, either by advising the Board in writing of any action taken or proposed to be taken in response to the findings, or by providing written reasons why no action is being taken. In all cases, the recommendations and official replies are to be made available to the public. During our consultations, certain stakeholders indicated that they were unaware of the Minister's responses to recommendations. To date, neither Transport Canada nor theTSBC publishes the Minister's responses to recommendations, but Transport Canada makes them available to the public on demand.

No time frame is set for implementing recommendations which have been accepted, nor is there any requirement that the Board determine whether its recommendations are implemented in any instance.

Since its inception, the TSBC has issued 151 recommendations including 37 interim recommendations.[51] All recommendations have been responded to by the appropriate minister within 90 days as set out in the Act. While 98 recommendations were made in 1990, 48 were a result of the ATC Special Investigation, and 25 were from an air safety study. All recommendations made in 1990 were for the air mode only and were based on the work of the CASB.

Effectiveness of TSBC Recommendations

The Commission investigated the content of the ministerial responses to the Board's recommendations, in all the modes, to determine their overall quality and effectiveness. For each of the recommendations, we reviewed whether Transport Canada agreed or disagreed with the definition of the safety problem; whether it accepted or rejected the proposed safety action or proposed an alternative action; and finally, whether the safety action had been completed by Transport Canada. We believe that the acceptance ratio of recommendations by Transport Canada serves as an important indicator of the overall quality of the recommendations.

Our investigations revealed that, overall, Transport Canada usually agreed with the TSBC's definition of the safety problem and often with the safety action proposed.

While we were told by Transport Canada and the TSBC that the acceptance rate for recommendations was approximately 80 percent, our results varied with this as our definition of acceptance was much more stringent and tended to vary among the modes. In air, the Minister agreed with the identification of the safety problem in approximately 70 percent of the recommendations. This compares to a 62 percent agreement rate for rail and 80 percent for marine. In most cases, however, Transport Canada had not completed the recommended action nor had the TSBC taken any steps to monitor this process. The actual acceptance rate, with action completed for the proposed recommendation, fell to 35 percent for air, 17 percent for rail and 47 percent for marine. It must be stressed that any attempt to evaluate the acceptance rate is inherently imprecise as it involves a subjective assessment. Likewise, recently proposed actions may not have been completed due to the nature of the recommendation.[52]

We found the regulators' response to the TSBC's recommendations to be revealing. In our interviews with them, some problematic aspects of TSBC procedures and actions were identified, particularly in the air and rail modes. In many cases, the regulators claimed that the recommendations themselves were issued too late, were impractical and/or inappropriate. In the marine mode, the acceptance and completion rate was the highest, although fewer reports were generated.

Transport Canada appears to have accepted many recommendations despite having some reservations as to their overall quality. This is exemplified in the ministerial response to recommendations stemming from a near collision incident at Smiths Falls in 1991. In this case, the TSBC recommended the installation of an improved signalling system at the incident site even though the railway's corrective safety actions had been approved by Transport Canada. The Minister's reply: "...although the current safeguards at Smiths Falls are appropriate, the fact that this

is the only location where this type of operation exists and that an approach signal would provide a level of protection equivalent to the current operation, my department will proceed to ensure that the recommended signal is installed,"[53] does not reflect an acceptance based on risk management principles.

In contrast to the regulator's ambivalence in the air, rail and marine modes, both the National Energy Board (NEB) and the pipeline industry have been publicly critical of the practicality of recommendations issued for its consideration. As an example, there was particular emphasis on the cost implications of the TSBC's recommendation to reduce the operating pressure in natural gas pipelines with evidence of stress corrosion. The TSBC is aware of the criticisms but nonetheless expressed satisfaction that the pipeline industry recognized the general problem and had undertaken alternative action.

Since the regulator has the dual responsibility for safety and efficiency, one would expect to see regulators reject a number of recommendations for cost-benefit reasons. For example, to aid in the distinction between the safety agency and the regulator, the Australian Bureau of Air Safety Investigation (BASI) focuses its recommendations on achieving adequate safety levels and leaves the cost-benefit question to the regulator. BASI reports state specifically:

> When the Bureau makes recommendations as a result of its investigations or research, safety is our primary consideration. However, the Bureau fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry. Consequently, the Bureau always attempts to ensure that common sense applies whenever recommendations are formulated.
>
> BASI does not have the resources to carry out full cost-benefit analysis of every recommendation. The cost of any recommendation must always be balanced against its benefits to safety, and aviation safety involves the whole community. Such analysis is a matter for the Civil Aviation Authority.[54]

This serves as a useful reminder to readers that the regulator has its own criteria to apply and that some recommendations may be rejected with cause. We believe that recognition of such an approach in Canada would produce a more frank and healthy exchange of views on recommendations.

The key element for an effective recommendation is the proper identification of the relevant safety deficiency. But the value of a recommendation goes beyond its specific content to include the fact that it stimulates discussion and study of an identified deficiency.

Currently, recommendations are only directed to the regulator. This implies that the only remedies are regulatory. A wider audience, including industry and the public, would benefit from receiving them.

The timeliness of recommendations again draws heavy criticism from industry and stakeholders, with delays of up to two years causing the most concern. We believe that the issuance of interim recommendations by the Board should be encouraged because delays have a negative impact on the credibility of the TSBC and the implementation of safety procedures.

In our consultations with Transport Canada, we heard that the 90-day time frame for a ministerial response may be inadequate. We agree that, while the time is short to develop a full analysis of recommendations, some form of early response is necessary.

The current intent of Board recommendations is to enable the correction of systemic safety deficiencies which have been identified in a particular occurrence. However, it is only through the implementation of the recommended or alternate action that change takes place.

The recommendations can range from being very narrow in scope and prescriptive to being very broad and setting performance standards. The prescriptive type appeals to stakeholders in industry sectors with minimal resources, such as fishing or general aviation, as it provides a specific course of action. However, prescriptive recommendations could lead to the TSBC having to assess, in the future, whether implementation of recommendations was a contributing factor to an accident.

Recommendations which set general performance standards appeal to industry sectors with larger players who have the internal resources to address problems presented in a more general way. In their view, the problem or safety deficiency should be identified by the TSBC, but the regulator and/or the industry should be responsible for selecting and implementing a solution.

We are concerned that the TSBC staff are currently unaware of what happens to their recommendations because no follow-up procedures exist for monitoring ministerial responses. Some past recommendations received a ministerial response that action would take place. However, no formal TSBC monitoring takes place, and no specific actions are necessarily taken by the recipients of recommendations. The Board does not currently keep track of the implementation of recommendations, and we recognize it has no express duty to do so. However, it is our view that it should ensure that a monitoring process is developed and implemented.

Both the Dryden Air Accident Inquiry by Mr. Justice Moshansky and the Marine Casualty Study by Mr. Deschênes recommended that a Canadian transportation accident investigation agency report on all recommendations made each year, including the comments on actions taken by the Minister.[55] Nothing in the Act inhibits the adoption of such actions, and we agree with this approach.

RECOMMENDATIONS

9. 

The Board should develop a policy concerning ministerial reaction to its recommendations. This policy should include publicizing the initial ministerial response, monitoring whether actions were taken, reviewing any actions taken and publicizing the results of such monitoring and analysis.

10. 

Except where it is technically appropriate to recommend specific corrective action, the Board should issue recommendations stressing the objectives to be achieved from safety actions rather than the means by which such results are to be obtained.

11. 

Recognizing that the correction of safety deficiencies does not always require regulatory action, the Board should be prepared to make recommendations addressed to any other person directly interested in an occurrence, rather than solely a minister of a federal department.

Other Products

OUR CONSULTATIONS REVEALED that the TSBC has, in addition to the issuance of reports and safety analyses, developed other means of informing the regulatory authorities of potential safety deficiencies. Not specifically addressed in the *CTAISB Act*, these take the form of safety advisories, safety information letters and, sometimes, hazard notifications. They involve communications between TSBC staff and regulatory officials, primarily in Transport Canada. We are describing here our view of these products, but even after extensive study, we are still not clear on the distinctions among them and their uses.

Safety advisories are, typically, short letters which, in the words of the TSBC's *1992 Annual Report*, are to be "...used to communicate directly to responsible government officials those safety deficiencies which do not warrant ministerial attention."[56] In 1993, they treated topics such as:

- damaged concrete rail ties and a misaligned switch on the main track;
- air traffic control deviations from established procedures or poor communication practices, and voice/data recorder deficiencies; and
- weakness in the Coast Guard's tracking system for ship safety inspections and improved means for identification of small vessels in distress.

All such products are issued on behalf of the TSBC primarily by the Director of Accident Prevention. They receive a response from units of Transport Canada, usually indicating that some action has been taken.

While somewhat similar to safety advisories, safety information letters "...do not validate a new safety deficiency; rather they contain isolated evidence of a potential safety problem or information suitable for use in Transport Canada's many safety promotion programs."[57] Among the information letters issued in 1993 were topics such as soil stability of a railway embankment, which led to a derailment; obscured sight lines at level crossings; and side discharge doors on a gypsum ore carrier which were possibly unsecured.

Safety information letters contain no guidance about what might be done about the potential safety problem. No response is requested, though one is often forthcoming.

Hazard notifications are internal forms initiated by anyone in the investigation or report development process who believes a safety hazard is evident. The forms are sent to the TSBC's Accident Prevention office to assess the nature of the hazard, to determine whether it warrants a formal recommendation and to decide if it comes under the definition of a safety advisory or a safety information letter or, in their opinion, needs no attention at all. To ensure there is no unnecessary delay

in making the relevant safety action authorities aware of the perceived deficiency, copies of the hazard notification forms are sometimes sent to Transport Canada safety officials by the initiator.

Analysis

Examination of the data on safety action products issued since the Board was established is displayed by mode and year in Table 13, and suggests that these products constitute a considerable amount of the TSBC's effort.

Table 13

TSBC Safety Advisories and Safety Information Letters 1991-1993*

Mode / Year	Rail		Marine		Pipeline		Air		Total		Total Actions
	SA	SI	SA	SI	SA	SI	SA	SI	SA	SI	SA & SI
1991	44	7	35	55	0	0	40	22	119	84	203
1992	31	32	28	28	0	1	30	65	89	126	215
1993 (to 25 Oct.)	11	17	3	9	1	0	30	27	45	53	98
TOTAL	86	56	66	92	1	1	100	114	253	263	516

Sources TSBC annual reports, 1991 and 1992; Monthly reports to Board, 1993.

Note: * 1990 data are not comparable.

Our research on the timeliness of safety advisories in 1993 showed a very wide range. It varied from two days to 94 days after the occurrence for rail advisories and from 112 days to 719 days in the air mode. In fiscal year 1992-93, the average was 3.4 months for rail, 5.1 months for marine and 11.2 months for air.[58]

In late 1992, the Board officially delegated responsibility to TSBC staff to write and send safety advisories. The Board members receive copies of the advisories after they are sent out. It is clear from the Board minutes on this issue that such authority was conditional on the fact that safety advisories would not contain specific suggestions which could be construed later as a recommendation.[59]

The Board has the authority to delegate its power to identify safety deficiencies, but it cannot delegate the power to make recommendations. The Board's specific assignment of this responsibility of identifying deficiencies was the correct way to validate its use by TSBC staff.

Responsibility for undertaking safety letters and hazard notifications does not appear to have been delegated to TSBC staff by the Board, as it has for safety advisories. The Board would be well advised to document such delegation of these functions. Since we could not identify a clear distinction between these two products, the Board might wish to establish clearer definitions for them or combine them into a single comprehensive product.

Legal uncertainty may exist with respect to one aspect of existing hazard notifications. In contrast with the Board's direction on safety advisories, hazard notifications appear, in some instances, to include specific suggestions or proposals which resemble recommendations. In our review of the marine mode's hazard notification forms, for instance, we noted that they have the appearance of inspection forms and include a section entitled "proposed corrective action." Information in this section should not be released outside the Agency by Board staff, and the Board should more pointedly reiterate its policy guideline that recommendations are not to be made nor implied in any of these informal reports.

We understand the objectives associated with these products, and we are supportive of an active role for the TSBC in safety advancement. However, we are concerned that these exchanges between the TSBC and the regulators outside of the view and scrutiny of the Canadian public, could have a negative impact on the TSBC's perceived independence. Despite the convenience of these products, the Board must ensure that all such products are properly recorded along with any responses received from the regulators. Consistency is needed in how copies of hazard notifications are sent to the regulators.

We also note that the rationale behind these products is the need to bring some matters to the attention of the regulators without delay. For this reason, there is a need for improvement in timeliness. Information which identifies a safety hazard should not take many months to be brought to the attention of the regulator.

RECOMMENDATIONS

12.

The Board should develop a policy derived from TSB Decision 39 that:

a) safety advisories, safety information letters and hazard notifications should serve only the purpose of immediate warning of potential safety deficiencies;
b) specifically delegated TSBC staff can release immediate warnings of potential safety deficiencies through these methods without reference to any proposed corrective action;
c) whenever proposed corrective actions are to be released outside the Agency, they shall only be in the form of recommendations or safety studies developed by the Board; and
d) a uniform practice be adopted for the issuance of safety advisories, safety information letters and hazard notifications that all will be released to the public with appropriate safeguards to protect the anonymity of the Confidential Aviation Safety Reporting Program (CASRP).

13.

In addition to the existing authority to issue safety advisories, the Board should approve specific instruments of delegation for issuing safety information letters and hazard notifications.

Safety Studies and Safety Analysis

ALMOST ALL LESSONS vital to future transportation safety originate in analysis of the mistakes of others. But not all lessons come from investigation of individual accidents and incidents. In fact, many of the most useful ones derive from studies and special investigations by safety enhancement organizations such as the TSBC. These studies, based on occurrence trend analysis and targeted research, result in many recommendations that can have a beneficial impact on system safety in a transportation mode, and even across modes. Not coincidentally, the TSBC is mandated, among its other responsibilities, to conduct "special studies and special investigations on matters pertaining to safety in transportation."[60]

This element of the mandate was added to the Bill that created the TSBC because members of the Standing Committee on Transport felt the TSBC should be explicitly empowered to "...anticipate occurrences or...be preventive."[61] We agree. Any well-conducted and properly reported investigation can have a significant preventive impact, but systemic studies are more specifically designed to produce such an effect.

The TSBC defines a safety study as a public document, not an occurrence report, containing recommendations.[62] The TSBC has allocated adequate resources to safety studies: five staff members (a manager and one person per mode) work in this area full-time. In addition, 10 more staff are assigned to statistical analysis. Despite these substantial resources, safety study output has been comparatively limited. Only one study has emerged to date: *VFR Flight into Adverse Weather*. This useful 1990 study was initiated under the CASB and virtually completed before the creation of the TSBC. It resulted in more than a third of the TSBC's total air mode recommendations output that year.[63]

Though not a safety study, the TSBC also surveyed pilots who fly for Level III to Level VI air carriers to obtain operational, social, financial and other data about pilots employed in smaller commercial operations. The survey results were published in 1991 and included much valuable information. For instance, 48 percent of pilots said they "sometimes" (35 percent), "often'" (11 percent) or "always" (two percent) felt pressure from their employers to fly in illegal circumstances. Given this finding, we question why information on the role of operators' management in occurrences involving smaller carriers is only rarely sought by TSBC investigators.[64] This issue was examined in "Products and Processes."

The TSBC indicated in the Main Estimates (1993-94) that it would produce a total of nine studies by the end of the present fiscal year March 31, 1994. But only four are expected to be completed. They are:

- *VFR Flight into Adverse Weather* (1990);

- Accidents involving float planes and amphibious aircraft (there will be two separate studies);[65] and
- *Main Track Derailments*.[66]

Apart from these, only one other study is under way (Ship's Master-Pilot Relationship); no others are planned. Although the Board and senior staff have discussed topics for safety studies, it is unclear to us whether the choice of topics is proceeding through to publication.

The U.S. National Transportation Safety Board (NTSB) policy on these matters strikes us as an excellent model for the TSBC. The Board of the NTSB approves an annual safety studies plan, selecting seven or eight topics from among those submitted to them for consideration by the NTSB's small Safety Studies unit.[67] The latter canvasses all modal units for suggestions and informally seeks industry input. Although the NTSB Board is not asked to approve the initiation of special investigations, it does approve all reports before publication.

Unlike the TSBC, the NTSB encourages the direct participation of investigators in the design and conduct of the study, including the analytical phase. This is regarded by NTSB Safety Studies as indispensable to a successful study.[68] The NTSB brings in academics to discuss and to help identify issues (a recent topic was "fatigue," for a study of truck-driver behaviour that is now under way).

Transport Canada (Aviation System Safety) also involves outside experts or officials, as well as its own regulatory or operational personnel, in most of its study teams. We note that for the marine study now under way — Ship's Master-Pilot Relationship — the TSBC has engaged outside expertise to assist.

Some of the people we met during our consultations suggested topics for study. To us, this indicates that consulting the transportation community would be helpful in the TSBC's planning for safety studies. One example was an expressed need for a study of the effectiveness of safety training and procedures at flying schools.

Data Needs and Safety Analysis

Availability and accessibility of data are crucial to the production of useful studies and to occurrence investigations that are of a high quality. Thus, we assessed the Board's major data base, the Transportation Safety Information System (TSIS), through both contract research and interviews with users. While marine data is not yet in the data base, air is and rail has recently been added. Both the air and rail consultants engaged to review this matter gave very positive assessments of the data base content. The rail data, in particular, provides a significant advance over previous systems from the viewpoint of analytic support. In our Commission staff interviews, Transport Canada recipients of data output were positive about the data they received, as were Board members themselves.

There were some negative comments on the TSIS system. One was that, while the data base provided extensive detail on accidents, it was not well-suited to trend analysis. The other was that the system is not easily accessible to a range of users. In its present state of development, it is seen as more of a storage place for data than an interactive data base. As a result, it is used less by investigators than it should be, both to categorize occurrences and to assist in investigations. It may also be that usage and trend analysis limitations of TSIS are a contributing factor to the TSBC's low output of safety studies. We understand that the user interface aspects of TSIS are being addressed by TSBC's Australian counterpart, the Bureau of Air Safety Investigation (BASI), through a development agreement. We were encouraged to hear of this form of international co-operation but hope the users' needs are soon met by an upgraded interface.

We envisage that the TSBC data base, once it is improved, could furnish important inputs, through trend analysis, to the planning of safety studies, to the classification of occurrences and to the optimization of resource use. The TSBC needs to reassess the parameters of its data collection activities in response to the needs of end users and in line with technological changes. Actual or potential users include TSBC staff in head office, regions and at the Engineering laboratory; transportation companies (including operators and equipment manufacturers); Canadian and international industry associations; foreign transport accident investigation agencies; transportation regulators (mainly Transport Canada);[69] international transportation organizations; and academics concerned with research on safety.

Apart from basic accessibility standards, TSIS should be assessed against the criteria associated with a system that serves as the repository for transportation safety data in Canada. In this connection, we recognize and support the important role of the TSBC in data collection and storage. These are essential resources for trend and risk analyses. The data can make an indispensable contribution both to the quality of occurrence investigations and to the respect safety studies receive.

We also recognize that the data must be available, and in a form that is both accessible and useful, to other users in Canada and abroad. To achieve this, there must be an ability to harmonize the TSBC's occurrence data with established data bases in other countries.

TSIS data derive from the TSBC's own accident and incident reports and from notifications the Agency receives of occurrences. The TSBC's occurrence reporting requirements are more demanding than in most other jurisdictions. The TSBC goal is to improve safety by capturing more occurrences, the investigation of which may bring to light systemic safety deficiencies and generate richer data for safety analysis.

The increased data generated by Canada's more demanding reporting requirements could pose problems in use. Unless TSBC systems are able to generate data that are organized compatibly with internationally accepted standards, the results

may have the reverse effect of overrepresenting Canadian occurrence frequencies compared to other countries.[70] This could also restrict the use of data for trend analyses because they would be limited to the unique Canadian data. Most reported occurrences are classified under the TSBC's Occurrence Classification and Response System as data base entries only, with no TSBC report. We make several recommendations concerning the data base and steps to harmonize data with other countries and among modes.

Confidential Safety Reporting

Voluntary confidential safety reporting programs are or soon will be in effect for all modes. The most mature of these programs, the Confidential Aviation Safety Reporting Program (CASRP) is in serious need of attention. It produces about 300 confidential incident reports a year; the comparable American reporting system, NASA's Aviation Safety Reporting System (operated on its behalf by the Bettelle Institute) yields over 30,000 reports each year. It may well be that some people in aviation do not know about CASRP or, more likely, based on our staff interviews, that potential CASRP users are not convinced that the confidentiality of sources will be ensured or that immunity for those reporting will be assured as in the United States.

In the United Kingdom, the Marine Accident Reporting Scheme (MARS) is managed by the Nautical Institute, which represents master mariners around the world. The Institute was selected so the reporting scheme would be isolated from the British marine regulatory authorities and the Marine Accident Investigation Board (MAIB). This encourages participation by seafarers who want to ensure that reports cannot be attributed to sources. MARS, which we were told is working well, collects data on near collisions and dangerous operating conditions. The MAIB, a government agency, also operates a confidential reporting system.

Canada's confidential transportation reporting systems should be used to generate data for public information bulletins and other safety action products and for trend analysis. However, before applying the concept of voluntary reporting to other modes, there should be an objective determination that such an approach would work with rail, pipeline and marine industries, and that it would be cost effective, especially in relation to railways. In this way, the apparent flaws in CASRP will not carry over into the other modes.

RECOMMENDATIONS

14. The Board should discuss topics for safety studies and special investigations with senior staff at least annually.

15. The Board should develop a policy that:

a) the Board consult widely with the transportation community in deciding safety study and special investigation topics; and
b) the Board monitor and drive the timely production and release of such studies and investigations.

16. TSBC data collection and retrieval systems should be set up and operated:

a) to be able to acquire and generate data organized compatibly with internationally accepted standards for reporting thresholds and category descriptions;
b) to be user friendly to field investigators and outside Canadian and international users; and
c) to permit statistically valid cross-modal analysis.

17. The TSBC should make better use of its data base systems and analyses as management and operational tools, such as taking steps to use data base information to:

a) monitor the effect of past investigations and studies on transportation safety by recording statistical changes in the incidence of accidents;
b) plan allocation of resources;
c) update the OCRS;
d) assist investigators in categorizing occurrences in the OCRS;
e) assist investigators in field work; and
f) assist selection and preparation of safety studies.

18. 

The Board should take advantage of Agency data bases by making increased use of trend analysis in occurrence reports.

19. 

The Board should introduce voluntary reporting programs into the other modes only when the difficulties associated with the CASRP have been resolved and the choice of who should operate such systems resolved.

Public Inquiries

IN THE *CTAISB ACT*, the Board has been given many instruments through which it can seek to advance transportation safety, including the use of a Board public inquiry.

Full inquiries undertaken by the TSBC would enhance public trust and confidence in the Board itself and in the overall transportation safety system. The transparency of the inquiry process is vital in the event of a major accident, where public testimony and open proceedings can dispel suspicions of manipulation or suppression of information by parties with an interest in the outcome. Historically in Canada, inquiries have provided an open forum where all the facts and circumstances surrounding an accident, as well as the choice of measures to avoid similar accidents, are fully canvassed and discussed. This process instills confidence that the most effective investigation is being conducted and that the best remedial measures will be advanced to prevent similar accidents in the future. The Canadian public has come to expect a public inquiry when the accident is significant.

The Statutory and Regulatory Framework

Under section 21 of the present *CTAISB Act*, there is ample scope for the TSBC to make good use of full public inquiries and to structure inquiries in a manner that enhances the TSBC's public profile and credibility. Section 21 allows the Board to call a public inquiry into any transportation occurrence within its jurisdiction. The Chairperson may appoint a person to conduct the inquiry in accordance with the powers set out in the *Inquiries Act*.[71]

Section 34 of the *CTAISB Act* permits the Board to make regulations "respecting the procedures and rules of evidence to be followed in conducting public inquiries under subsection 21(1)." To this end, section 12 of the Regulations allows inquiries to be called only for "the purpose of ascertaining facts and circumstances relating to an accident, incident, or special situation."[72] Further, an inquiry is to proceed only "by way of a public hearing."[73]

Our Assessment of the Current Situation

Section 12 of the *CTAISB Act* Regulations implies a decision to restrict the use of inquiries to that of a secondary fact-finding process. Under the Regulations, inquiries are to be an appendage to a regular Board investigation. They are not to invite outside information about the accident or to consider possible recommendations.

Comparatively, we find that the TSBC inquiry process has far less scope for action and recommendation than would exist under the *Inquiries Act*. For example, unlike a commissioner investigating an accident under the *Inquiries Act*, the section 21 Inquiry Officer does not have the authority to receive evidence

concerning safety deficiencies or remedial measures, and may also lack authority to grant access to communications records otherwise privileged under section 18 of the *CTAISB Act*. The inquiry process does not oblige the Board to receive participants' submissions on possible remedial measures, and, further, does not allow participants to comment on each other's submissions or the contents of a final inquiry report.

The TSBC's self-imposed restrictions on the scope of a Board inquiry, the limited extent of the Inquiry Officer's powers under the Regulations, and the constraints on the role of participants all indicate to us that a TSBC public inquiry into a major accident would not be as efficient or as effective as one that followed a full public inquiry model. We believe that these restrictions reduce the credibility and effectiveness of the inquiry process and should be removed.

We feel the TSBC's rationale for initiating a public inquiry — and its Regulations to this effect — are overly narrow. It is our view that public inquiries are not only a means of getting to a "report," but should serve the additional function of improving the TSBC's profile and credibility, as well as heightening public awareness regarding transportation safety. By allowing itself to initiate a full public inquiry into a serious accident, the TSBC can achieve the two-fold result of getting at the facts *and* enhancing public confidence.

The TSBC has not yet held a public inquiry, whereas its air predecessor, the CASB, held six public inquiries in five years. Similarly, other agencies with an investigative function, such as the National Energy Board (NEB) and the TSBC's marine and rail precursors, have also historically employed public inquiries into major accidents.[74] The TSBC maintains that since its inception there has not been an accident within its jurisdiction warranting a public inquiry. We would, however, point to the 1992 B.C. Ferries loading accident at Nanaimo, British Columbia and the Christmas 1992 CN derailment in Oakville, Manitoba as instances in which a public inquiry might have been appropriate. In this regard, we note that in the wake of the B.C. Ferries accident, the provincial government commissioned its own public inquiry as a means of restoring public confidence.[75]

Even in the absence of a catastrophic accident, we feel that the TSBC, if it is to manage a major accident investigation successfully in the future, must gain experience. To this end, we believe that it should seek to use its public inquiry process for smaller accidents to prepare itself and to gain experience for the handling of larger accidents.

Issues to be Addressed

In advocating that the Board exercise the option of a full public inquiry, we note several conflicting factors inherent in the TSBC's mandate and work processes which must be addressed.

First, we recognize that the structure of the *CTAISB Act* is not wholly consistent with the notion of a full Board public inquiry. For example, it is difficult to reconcile the TSBC's ability to grant privilege to certain types of evidence during an investigation with the requirement to bring forth facts in a public inquiry. In addition, there is certainly a conflict between the requirement for witness confidentiality and the public hearing phase of an inquiry. In Chapter 3 of our Report, we propose modifications to the privilege and confidentiality system to which the TSBC must currently adhere. Such legislative adjustments should allow the TSBC to perform its work for the regular investigation process better, and will be far more compatible with the need for more Board public inquiries. In the interim, however, the TSBC needs to consider how it will handle these matters.

Second, our legal research reveals procedural anomalies which would throw into doubt the ability of the Inquiry Officer to direct the DOI in the course of an investigation. For example, the current Regulations envisage the field investigation being carried out by the IIC (DOI) outside the scope of any inquiry. In addition, there is no statutory rule preventing a DOI from starting or continuing a regular investigation into the same occurrence even after a public inquiry has been undertaken. This may result in duplication between the regular investigative process and the inquiry, especially since the Board may lack the authority to discontinue a routine investigation classified as requiring a report once it has begun.

We believe that in the event of a serious accident, the organizational and human resources of the TSBC should be shifted to reflect the priority that the convening of a public inquiry entails. Under this full inquiry option, the TSBC staff would function as an investigative and administrative resource for the inquiry. The inquiry itself would encompass the actual field investigation as well as the hearing process. This scenario would require the DOI to be accountable solely to the Inquiry Officer.[76] We recognize that this would be a departure from the present general principle that the DOI should have total control over the investigation. A full public inquiry, however, should be considered an exception to the general principle and should in no way detract from the authority given to the DOI in the *CTAISB Act* for the regular investigation process when an inquiry is not convened.

Third, the TSBC's existing report generation process requires that, after a public inquiry, a draft report is to be sent to the Interested Parties (IP) for comment. We feel there is no need to have an official IP process after the public inquiry report has been presented to the Board for consideration. In view of the substantial role we see participants playing during the inquiry, any such action would be redundant. Also, the TSBC would lose its credibility if a public inquiry was followed by a secretive IP process. This particular inconsistency between the inquiry and IP processes, in our view, represents a fundamental oversight by Parliament in the creation of the *CTAISB Act*.

Another anomaly we have identified is that the Board does not have a developed policy for the calling of inquiries.[77] Some conditions — taken by themselves or existing together — which might indicate when a full inquiry would be appropriate include:

- a catastrophic accident;
- an accident calling into question the adequacy of a regulatory process;
- an accident subject to widespread media concern and public alarm;
- accident circumstances calling into question a government transport operation;
- a series of serious accidents of a similar type suggesting an inadequate response to a recurring problem;
- the circumstances of a serious accident calling into question the adequacy of a public transportation facility; or
- major technological or structural commercial developments appearing to have the potential of altering the transportation risk environment.

The procedural framework supporting public inquiries should recognize that inquiries themselves provide an opportunity for the Board to investigate fully and to report on an accident. To facilitate excellent inquiries consistently, the Board will have to tailor and modify many of its inquiry procedures on a case-by-case basis. To help in this matter, the Board should create a pre-planned series of alternative procedural models — corresponding to types of circumstances — from which it might choose in the event of a critical accident. The pre-hearing conference as prescribed by the existing Regulations would be the appropriate forum for the Inquiry Officer to make final decisions on the inquiry procedures that would best meet the aims of the TSBC and the needs of stakeholders in each particular circumstance.

Ideally, an inquiry can be operated in a manner that is collegial and non-adversarial. Procedures must ensure that the inquiry does not degenerate from finding causes to the assignment of blame. To this end, the Board, in modifying the Regulations, will have to give greater direction to the Inquiry Officer in conducting the inquiry.

Finally, for inquiries of a safety study nature and in which the Board actively solicits the viewpoints of the Interested Parties, it would be in order for the Board to develop and to publish a policy on the funding of participants. By this suggestion, we do not wish to imply that the Board must necessarily fund participants, but only that a policy should be determined.

It is vital that the Board prepare a plan to sustain itself during a major inquiry. Indeed, conducting a full public inquiry into a serious accident can be expected to drain the physical and human resources of the TSBC. The Board, in anticipation of intense media scrutiny, will have to devise a whole new series of administrative procedures to deal with the vast differences in process that a full inquiry would

entail. As well, the Board must develop a strategy to enable it to manage its resources in such a way that other regular Board investigations and processes would not suffer in scope and efficiency.

Public inquiries are complex undertakings by their nature. However, we find that the TSBC has chosen to restrict the use of its inquiry powers, refraining from addressing the inconsistencies that could exist between its regular investigations and a full inquiry. Instead, it has limited its inquiries to fit into the rubric of its normal work processes. Rather than tackling these issues head-on, the TSBC has chosen to limit its own flexibility.

Recognizing the value of a public inquiry, the TSBC must take a more open approach to its use. The Board, through its Regulations, should at least give itself the option of a full inquiry. While, the public-hearing format currently adhered to by the TSBC may be warranted in certain circumstances, there is no real need for the TSBC to self-limit its powers in all cases.

Under section 7 of the *CTAISB Act*, one of the TSBC's key tools to advance transportation safety is a public inquiry. The power to convene and conduct public inquiries holds great potential. Apart from providing an investigative forum, public inquiries would mobilize and educate the public about transportation safety. However, the power of inquiry also carries serious responsibilities. If the TSBC is to make its public inquiries adaptable to the circumstances of any accident, the Regulations guiding inquiries will have to address and resolve a variety of difficult issues. The potential value of a public inquiry makes this a priority for the Board.

■ ■ ■

RECOMMENDATIONS

20. 

The Board should develop a policy that the TSBC will employ a range of public inquiry formats for various uses such as:

a) **a full public inquiry for purpose of satisfying public concern immediately after a high-profile accident;**
b) **a wide-ranging special investigation into a transportation industry or system;**
c) **a fact-finding inquiry as an adjunct to a field investigation;**
d) **a technical inquiry focused on a specific factual or scientific issue; or**
e) **an open inquiry focused on the content of recommendations to be made after a field investigation is completed.**

21.

The Board should amend the *CTAISB Act* Regulations to allow for the proposed full range of inquiry formats.

These amendments should include removal of the present procedural restrictions that necessarily make an inquiry only a fact-finding adjunct to a field investigation. The amendments must, depending on which inquiry format is being used, allow the Inquiry Officer(s):

a) to permit parties who have been granted the right to participate:
   i) to advance evidence in respect of findings and safety deficiencies;
   ii) to advance evidence concerning safety actions taken and proposed;
   iii) to make submissions on findings and safety actions;
   iv) to make submissions on one another's submissions; and
   v) to make submissions on the content of the inquiry and the Board report; and
b) to include with the inquiry report, draft recommendations for the Board's consideration.

22.

To permit the recommended range of inquiry formats to be used to its full potential, the President of the Privy Council should introduce amendments to sections 10, 21 and 24 of the *CTAISB Act* that:

a) the DOIs follow the directions of the Inquiry Officer(s) in conducting a field investigation in conformity with the requirements of the particular inquiry;
b) the Inquiry Officer(s) have discretion to grant standing at inquiries to persons other than observers or IPs; and
c) where, at a particular inquiry examining the whole of an occurrence, the Inquiry Officer(s) have directed that parties with standing have an opportunity to make submissions as to findings or to comment on the draft inquiry report, the Board need not provide a copy of its draft report arising from the inquiry to IPs for comment.

The Role of the Board

TO EVALUATE THE TSBC COMPLETELY, it was necessary to review the specific roles and duties of the Board itself, since the *Act* assigns a range of critical tasks to it.

A more philosophical discussion of the Board is included in Chapter 3, while this is a more technical discussion. Though the tasks reviewed here relate to issues already examined in detail in this chapter, we focus on the Board's particular role. We have divided the Board's responsibilities and duties into six categories. They are:

- the Board's participation in the preparation of final accident reports;
- the Board's responsibility for the formulation of policies;
- the Board's responsibility for the adoption of regulations;
- the role of the Board in co-ordinating the TSBC's relationships with other organizations;
- the role of the Board vis-à-vis the general public; and
- the Board's overall duty to ensure that its statutory objective is realized.

Accident Reports

The Board has three specific responsibilities in the development of reports. It reviews the draft reports submitted by DOIs (with a right to request further investigation), receives and considers IP representations on the draft reports and makes findings and recommendations. We found a need for improvement in each of these areas.

In examining the administrative process adopted by the Board, from the moment it first sees a report until it is finally issued, we found that the Board affords itself no chance to question first hand, either those who actually investigated the accident or those who had direct interest in it. The Board, in practice, seldom has exercised the opportunity to review laboratory reports or other investigation file documentation. These practices greatly reduce the Board's ability to challenge the DOI report of an investigation effectively or to request that further investigation be carried out. They also, in our view, diminish the Board's capacity to confirm the thoroughness and accuracy of the findings proposed to it by its staff.

We were surprised to find that Interested Parties (IP) are often unsatisfied with the process; some felt that their views were not properly taken into consideration and speculated that those views may have been disregarded by staff, or may not have been understood by the Board. The mere fact that these perceptions exist is cause for concern. Most of those consulted emphasized the difficulty of explaining clearly, in writing, technical issues which could easily be explained in face-to-face contact.

The Board recently directed staff to respond, in writing, to IP comments, explaining how IP views were received and if they were rejected by staff, why they were rejected. This procedural response does not address the fundamental goal of

assuring IPs a reasonable opportunity for airing their views to the Board. Senior TSBC staff have pointed to this policy of responding in detail to IP submissions as one of their most time-consuming and frustrating processes.

We doubt that the addition of another layer of administrative process before the issuance of final reports will satisfy the Interested Parties. In our view, an open discussion of the issues with Board members would be preferable. However, we note that the Board has not established procedures for an IP to be heard orally, nor have Board members ever been in contact with IPs to discuss their views on particular reports.

Even the Investigator-in-Charge, although not referred to as an IP, must submit comments on the final draft report as an interested party. The following excerpt illustrates how this is to be done.

> The region may itself comment formally on any aspect of a Confidential Draft Report by including appropriate information in a memorandum from the Regional Manager, to the Director, Investigation. Head Office staff will prepare the response to these comments for submission to the Board.[78]

This places individual IICs in an adversarial and distanced relationship with Board members, which is neither called for by the *Act*, nor conducive to a productive flow of ideas between the Board and its staff.

The Board is responsible for considering the views of various parties. We were concerned to hear the perception voiced in submissions that the appointed Board, in certain instances, lacked the required modal expertise to scrutinize a particular investigation effectively and to make meaningful determinations of causes. This concern is compounded by the fact that, in practice, Board members do not call on outside expertise and have no direct contact with IPs. By seeking such outside assistance, the Board would assuage the concerns of stakeholders and would reinforce the integrity of the occurrence review.

The complexities of modern transportation — with digitized vessel traffic systems, sophisticated flight management systems, composite materials and structures, plus the emerging human performance considerations — are, in our opinion, beyond the collective knowledge of any five-member board especially when spread across four modes of transportation. We have no doubt that it was with this in mind that Parliament included the provision that enables the Board to obtain outside expertise to either support an investigation or to assist in the review of an investigation. The Board should not hesitate to use the tools Parliament has provided.

Policy Formulation

Under section 8 of the *Act*, the Board is required to:[79]

- make by-laws respecting the conduct of business at meetings of the Board;
- establish policies respecting the classes of transportation occurrences to be investigated; and
- establish, either generally or in relation to specific classes of transportation occurrences, policies to be followed in the conduct of investigations.

This section also requires the Board to make available to the public any policies made in respect of the OCRS and the conduct of investigations.

Section 34 empowers the Board to make regulations respecting a variety of subjects including how it exercises or carries out its powers, duties and functions under the *Act*, and to promote its efficient operations.

We assessed the Board's performance on all of the above-mentioned responsibilities.

The Board keeps minutes of meetings and records of decision. The minutes of full Board meetings include both operational approval of reports and consideration of internal administrative matters. The minutes of the Initial Review Committee (IRC) and Final Review Committee (FRC) include detailed directions on editorial changes and some directions to staff on report format and procedure. We have reviewed the full Board minutes and records of decision from the TSBC from 1990 to August 1993. We also read excerpts from IRC and FRC minutes relating to the TSBC investigation files reviewed.

No comprehensive set of by-laws directing the conduct of Board business was produced in response to our inquiries. The TSBC has had the benefit of Board member continuity since 1990 and has not faced the need to integrate successor Board members into its management. More detailed administrative direction is needed than is found in the *CTAISB Act* Regulations. In our view, a comprehensive set of by-laws is essential to the efficient operation of the existing Board and to ensure continuity in the case of succession.

The present Occurrence Classification and Response System (OCRS) has already been discussed in this chapter. While reporting forms and the OCRS were approved in principle by the Board in 1990 and 1991, we have not found any indication of a comprehensive Board policy giving DOIs direction in the application of criteria for occurrence classification, or any subsequent review by the Board of the functioning of the OCRS in light of TSBC objectives.

We have identified three decisions from the minutes that set policies relating to the conduct of investigations. These involve the sending of investigation status courtesy letters to IPs, co-operation with other authorities and avoidance of conflict of interest in investigating an occurrence involving TSBC staff.

As well, despite the existence of staff-produced manuals of investigation, there was no indication that such manuals were reviewed by the Board for consistency with Board policy. The manuals themselves lack direction on specific issues as already identified in "Products and Processes" regarding the conduct of investigations — matters that should be determined by the Board.

Because the Board is ultimately responsible for determining accident cause, investigations must be *publicly* seen to be executed in a consistent manner. This, in turn, demands that the Board make public a comprehensive set of policies defining when investigations are to be initiated and how they are to be conducted.

Although the Board has explained to us their concepts of investigation policy and the Board's belief that making minutes and records of decision available to the public, in their present form, satisfies the *Act*, in our view such investigation policy has yet to be set down and made available to the public in a consolidated form that would satisfy the purpose of the *Act*.

Regulation

The Board's power to make regulations was first exercised in August 1992 when requirements were published for the reporting of transportation occurrences and a framework for the conduct of public inquiries. Since then, no additional regulations have been published. In many respects, we find that the Board has been somewhat reluctant to use its full powers to make regulations. The Regulations restrict the scope of public inquiries to fact-finding hearings and do not go far enough in permitting the Board or the Inquiry Officer to fashion procedures suitable for a range of hearings and inquiries.

Similarly, the Board has not yet made regulations regarding admittance to, and the control of, accident sites which it has the power to do under paragraph 34(1)(d) of the *CTAISB Act*. Such regulations would have been particularly useful, considering the fact that the Board has not yet completed negotiation of Memoranda of Understanding (MOUs) with other organizations. The regulations, as well as MOUs, may be a suitable means of establishing practices for co-ordination at accident sites.

The TSBC already has jurisdiction over pleasure craft, yet has chosen, because of resource limitations, to exclude pleasure craft from its consideration. The Board decision to exempt pleasure craft from occurrence report requirements causes us concern. By so doing, the TSBC prevents itself from collecting data. The Regulations should not be used to forgo exercise of jurisdiction.

During our consultations, we received several suggestions for amendments — both substantive and incidental in nature — to the Regulations. We have neither rejected nor endorsed these recommendations. Given the obvious care taken and concern demonstrated by those making them, we felt that many of these suggestions were worthy of the TSBC's consideration. They are listed in Appendix 7.

Co-ordination with Other Organizations

Under sections 16 and 17 of the *Act*, the Board is given the duty to ensure that appropriate agreements are in place with other regulatory agencies, federal departments or provincial organizations authorized or required by law to conduct investigations for their own purposes. While we have reviewed in greater detail the status of the MOUs and the relationship between the TSBC and various other agencies, we do note, with concern, that only one such MOU has been signed as of December 1993.[80] We see this issue as a crucial Board priority. As such, the Board must impress on its staff that the urgent conclusion of MOUs is vital if the TSBC is to manage an investigation of a serious accident successfully. We maintain that the Board should take an effective leadership role in the TSBC's external relations, and to this end, must be flexible in recognizing — in the negotiation of MOUs — that other organizations at the accident site have legitimate needs and objectives which must be accommodated.

Public Profile

Although the Board Chairperson and members have made several public appearances, our consultations and research reveal that the general transportation community has little understanding of what the TSBC is and what it does. Further, it is apparent that Board members have taken few steps to ensure that, in the event of a major catastrophe, they are prepared to assume any kind of leadership role in public. With the exception of one isolated incident, Board members have not appeared on site at major occurrences. Media relations with respect to a major accident in Canada have, by Board-approved policy, been left to the Investigator-in-Charge or senior staff, and appear to have been assigned a relatively low priority in the TSBC.[81] Indeed, until such time as a draft report of the occurrence is presented to them for initial review, the Board's role would appear to be minimal. We were also concerned with the fact that the Board has no plan for the public promotion of its recommendations and accident reports. We feel that a more visible and more active Board would go far toward enhancing public awareness of transportation safety issues.[82]

Meeting Goals and Objectives — Performance Assessment/Feedback

Section 7 of the *Act* makes the advancement of transportation safety the only object of the TSBC. We found little indication that the Board has a system in place to measure its performance or success in this regard.[83] For example, the Board has not attempted to measure the effect of the various services and products that it delivers to the transportation community. Because the Board has not provided for an effective monitoring system, the TSBC has no means of giving proper feedback to its staff. This impedes improvement to its performance over time. Although the TSBC produces an annual report and estimates for parliamentary approval, we could not discern any future-oriented strategic plan setting out goals, objectives and budgets

which, in conjunction with the annual operational plan, provide a framework for performance measurement.

The issue of overall organization quality raises concern with respect to the methods in place to ensure that the TSBC is effectively monitoring itself and assessing its actual performance against goals and responsibilities. We could find little evidence to indicate that:

- the Board assigns specific goals to itself and its staff on a long-term basis;
- the overall TSBC performance, including that of the Board, is monitored or measured on the basis of meeting the needs of the transportation community; or
- feedback mechanisms such as consultations, surveys or other input are used regularly to inform the Board of its performance and profile.

In conclusion, we found that the Board, other than through its scrutiny by the Auditor General and Treasury Board, has no effective benchmarks or processes to gauge its performance on an annual basis.

RECOMMENDATIONS

23.

As well as increasing the TSBC's internal efficiency, the Chairperson and Board must increase the Agency's effectiveness in order to fulfil its statutory mandate. The Chairperson and Board should:

a) identify the actual users of the TSBC's services;
b) monitor continually the safety needs of those users;
c) communicate directly with those users what the TSBC's services are and how the TSBC performs them; and
d) act in response to such communication to improve the TSBC's effectiveness.

24.

The Chairperson and Board should develop a strategic plan in addition to the operational plan. Elements of the strategic plan should include long-term goals and objectives for:

a) adapting to emerging transportation technologies and operational environments;
b) adapting the OCRS and data bases to these changing conditions;
c) ensuring that TSBC staffing and training procedures are developed to meet these changing conditions;

d) ensuring that investigation and analytic facilities do not lag behind these changing conditions; and
e) ensuring that budgetary resources are justifiably sufficient for these purposes.

This strategic plan should be reviewed and updated annually in conjunction with the TSBC's operational planning exercise.

25. 

The President of the Privy Council should introduce an amendment to section 13 of the *CTAISB Act* to direct that any parliamentary committee established to review matters relating to transportation conduct an annual review of the TSBC's strategic plan.

26. 

The Board should direct the staff to prepare, update and maintain an indexed and consolidated set of all existing and future by-laws, policies respecting the OCRS and policies respecting the conduct of investigations to ensure that they are readily accessible to the public under section 8 of the *CTAISB Act*.

27. 

The Chairperson and the Board should revise and expand the TSBC's general communications strategy with the goal of increasing the Agency's profile with the general public and the transportation community. This strategy should include:

a) development of an annual communications plan;
b) periodic external evaluation to measure the effectiveness of the plan on the TSBC's actual public profile;
c) active communication by Board members and senior staff with the public and transportation community; and
d) public commentary by Board members on the content of their reports and studies.

28. 

The Chairperson, the Board itself and senior staff should increase dialogue between the TSBC and the transportation community, particularly with operating staff in line government departments and carriers, and with individual boat and aircraft owners.

Relationships with Other Agencies

ALTHOUGH THE TSBC has been given a mandate to investigate accidents[84] in order to determine causes and to make recommendations, many other federal and provincial government bodies have important and legitimate mandates relating to transportation safety — objectives that also require on-site access to facts surrounding an accident. Parliament dealt with these concurrent needs in two ways. The first means, carried over from the *CASB Act*, was to give federal government departments the right to designate a representative to participate as an observer, who could disclose information to the responsible minister. The second was to require the TSBC to make all reasonable efforts to enter into Memoranda of Understanding (MOUs) with provincial coroners and federal departments and agencies.

Ministerial Observers

The intended purpose of the ministerial observer is to permit departments responsible for setting safety standards to obtain immediate information on safety deficiencies so corrective action may be taken quickly. Ministerial observers have special rights not given to industry observers to use sensitive information such as on-board recordings.

During consultations, many in the transportation community questioned the status and authority of the ministerial observer. They see the observer's status as compromising the TSBC's independence. They fear that the TSBC may not be able to get at the whole truth from witnesses if persons being investigated believe the ministerial observer will have access to facts that can be used by regulators for purposes of disciplining licence holders such as ship's masters or air carriers. This perception can only hamper the fact-finding process.

We agree that safety will be improved if federal agencies have the best and quickest means of undertaking safety measures. However, to protect the TSBC's mandate and to ensure that all persons involved in an investigation direct their efforts to the single goal of enhancing safety, we feel that information obtained during an Agency investigation must not be used for collateral purposes. To this end, we believe that the *CTAISB Act* should be amended to clarify that information gathered during an investigation should not be used in departmental, civil, criminal or regulatory proceedings. By restricting the instances in which information from an investigation may be externally used, the Act will be less vulnerable to *Canadian Charter of Rights and Freedoms* challenges.

Clarifications in this regard would, for example, allow Transport Canada to use investigation information to strengthen regulatory inspection of Level III air carriers — but not to revoke a particular air carrier's licence. For this latter purpose, the Department would still have to carry out its own investigation.

Memoranda of Understanding

At accident sites, there are often many government agencies present, other than the TSBC: Transport Canada, the coroner, the RCMP, provincial police, Labour Canada (now part of Human Resources Development), and regulatory and environmental officials. Each agency may have an obligation to be there. Parliament, anticipating the potential for conflict, gave the TSBC's objective of safety enhancement precedence over the aims of other federal agencies except the RCMP and the Department of National Defence. This is reflected in section 15 of the *CTAISB Act*. At the same time, however, the *CTAISB Act* carries with it the obligation and responsibility on the part of the TSBC to co-ordinate its work with other agencies at the accident site.

The TSBC is authorized by legislation to enter into agreements with other government entities to operate jointly or in tandem in their investigations. To this end, section 16 of the *CTAISB Act* obliges the TSBC to "make all reasonable efforts to enter into agreements" with provincial agencies to ensure compatibility of procedures and practices. A similar clause, under section 17 of the *CTAISB Act*, applies with regard to agreements with federal departments.

These agreements, known as Memoranda of Understanding (MOUs), are meant to establish the terms of appropriate working relationships during accident investigations and make it clear what everyone's responsibilities and roles must be. In the confusion of a serious accident, there is no place for disagreement among government officials over issues of agency primacy and authority. MOUs clarify the overall hierarchy of authority and responsibility *before* the accident has occurred.

A multiplicity of agencies at an accident site holds the potential for conflict, duplication of effort, confusion and overall inefficiency. Indeed, our consultations reveal that there are many conflicts of duty and responsibility[85] between the TSBC and other agencies. Most of these conflicts can be, yet have not been, resolved through MOUs. This cannot continue. Unless well co-ordinated by MOUs, the legitimate causes and objectives of several agencies, as well as the TSBC, are bound to suffer and be undermined.

At its inception, the TSBC inherited several MOUs from the CASB which had been negotiated with the provinces and other federal departments and agencies.[86] For the sake of continuity, it agreed to honour the obligations under those agreements, but with the understanding that it would begin to establish its own set of MOUs to accommodate the new Agency's legislation and operations. However, to our surprise,several provincial ministers indicated to us their unfamiliarity with the TSBC. This suggests a low level of activity by the TSBC with regard to the negotiation of MOUs and the maintenance of relations with provincial governments and other organizations in general.

Overall, we are not satisfied that this issue is receiving the priority it deserves. We find that the efforts of the Board and other agencies to conclude workable arrangements have been inadequate, and note with concern that as of December 1, 1993, only one MOU — with the St. Lawrence Seaway Authority — had been signed. The TSBC has offered no satisfactory explanation for this situation.

Although some conflicts do exist, generally the on-site relationship between the TSBC and other governmental entities has been cordial and professional. However, the current "informal" lines of co-operation, responsibility and co-ordination are unlikely to withstand the widespread media pressure attending a major disaster.

We wish to emphasize that the overlaps in legislation are not the fault of the TSBC and other agencies. Parliament crafted the CTAISB Act without full regard to its "institutional fit" within the framework of laws guiding transportation safety. Parliament must sort out the hierarchy of values and public needs that these various laws represent. In the meantime, however, the TSBC must urgently seek to conclude workable arrangements with other agencies.

The Board, in recognition of the various mandates of other agencies at the accident site, should be flexible in the negotiation of MOUs. While the list of incidental problems associated with having several agencies at the accident site is extensive, we will not attempt to inventory every single dilemma brought to our attention. However,one matter raised repeatedly by stakeholders does warrant mentioning, that is, the proliferation of differing reporting requirements and forms when an accident occurs.[87] The TSBC and other organizations, through amendments to regulations and MOUs, should seek to harmonize their reporting requirements and forms. Our comments about external relations do not include all the issues or all the organizations that the TSBC may conceivably deal with, but only those that we considered most important at this time.

Transport Canada

Since 1990, there have been many discussions between the TSBC and Transport Canada. Transport Canada officials told us in May 1993 that a tentative agreement on an MOU had been reached with the TSBC. We were later advised that a final draft MOU had been completed in July 1993. However, as of December 1993, it had still not been signed.

The TSBC has the legislative capacity to preclude most other agencies from conducting investigations into accidents that it is in the process of investigating. In this context, Transport Canada officials expressed concern that the TSBC often fails to decide quickly enough if it is going to initiate an investigation. Transport Canada referred to situations in which the TSBC, after having initially decided not to investigate, changed its mind and decided to investigate. Transport Canada

remarked that such actions force it to stop its own investigations in midstream, effectively wasting much time, resources and energy. MOUs between the TSBC and other federal agencies must seek to address this problem.

Aside from occurrence investigations, other common activities stand to benefit from a co-ordination of TSBC and Transport Canada efforts. In particular, we would like to see a co-ordination of the selection of topics for safety studies between the appropriate divisions of Transport Canada and the TSBC Safety Analysis group, and a co-ordination of editorial policy for safety promotion publications between the two organizations. Such matters have not been addressed in the current draft MOU.[88]

Labour Canada (Human Resources Development)

Although MOU discussions have taken place between the TSBC and Labour Canada, Labour department officials indicated to us in September 1993 that a recent TSBC draft MOU failed to address any of Labour Canada's concerns. In this respect, Labour Canada officials maintained that, in the absence of an MOU, their ability to carry out their mandate with regard to occupational health and safety would be compromised by the TSBC's interpretation of its "exclusive jurisdiction."

The Canada Labour Code requires employers to investigate workplace accidents and gives employee representatives or committees the right to participate in workplace accident investigations. By contrast, the *CTAISB Act* gives TSBC investigators primacy over employers in collecting accident information and permits an employer or employee to be recognized as an observer only on a restricted and discretionary basis. While Parliament must seek to resolve the inconsistencies between the two pieces of legislation, we feel that a provisional MOU respecting and balancing the tenets of both acts would go far toward alleviating this conflict. For example, Labour Canada could agree not to prosecute an employer for failing to investigate because information is in the hands of the TSBC, and the TSBC could agree to give favourable consideration to recognizing workplace health and safety committee representatives as observers and Interested Parties.

National Energy Board

Nowhere is the overlapping of legislation more apparent than in the "conflict" between the TSBC and the National Energy Board (NEB), in which both agencies are mandated to conduct extensive investigations into pipeline accidents. While an MOU cannot hope to solve or settle the overarching problem of conflicting legislation, we note that both agencies have been unable to conclude an agreement. We acknowledge that neither can willingly divest itself of its legislative responsibilities; however, each could co-ordinate the exercise of its discretion to investigate. In the end, Parliament must decide which organization is to be solely responsible for investigating the causes of pipeline accidents.

Royal Canadian Mounted Police

By all accounts, the relationship between the TSBC and the RCMP is sound. While MOU discussions between the two were initiated in March 1992, an official MOU has yet to be signed.

Canada–Newfoundland and Canada–Nova Scotia Offshore Petroleum Boards

We believe that the jurisdictional chaos surrounding the *Ocean Ranger* disaster demonstrates a need for clarity in the area of offshore oil rigs. In this regard, there is uncertainty about the TSBC's overall scope to investigate accidents involving offshore rigs. For example, mobile oil rigs — as opposed to those that are firmly grounded — may conceivably be construed as "ships" under the TSBC's legislative definition. This problem of interpretation could be further compounded by the potential difficulties in determining whether accidents on such rigs qualify as marine occurrences, or if they are actually industrial in nature.

The Canada–Nova Scotia Offshore Petroleum Board (CNSOPB) indicated to us that the two organizations officially contacted one another in May 1992, but that there has been very little discussion regarding an MOU. The CNSOPB further mentioned that several aspects of its enabling legislation may preclude it from working closely with the TSBC in the event of an accident.[89] As well, the CNSOPB's guiding legislation provides that its mandate shall prevail in cases of inconsistency or conflict with any other Act.[90] Such issues may eventually require an intervention by Parliament and the provincial legislatures. In the interim, however, MOUs between the TSBC and the appropriate offshore petroleum boards would appear to be a desirable means of addressing these issues.

Provincial Coroners

Submissions from provincial coroners addressing the state of their relations with the TSBC varied from contentment to serious criticism.[91] This, we believe, is reflective of the vast disparities in field relations between the two groups in each of the provinces. Some of the thorny issues that have been brought to our attention include the coroners' use of confidential TSBC reports, duplication of pathology work, access to pathology test results and differing levels of co-operation.

We will not go into detail over the TSBC's relationships with each of the provincial coroners' offices. However, nowhere is the need for the TSBC to be flexible and conciliatory in the conclusion of MOUs more important than with regard to provincial coroners' offices. This is demonstrated by the problems the TSBC has had with the Quebec Office of the Coroner. That office rejected a proposed TSBC MOU on the grounds that it failed to recognize the need for the two organizations to co-operate at the accident site. The Quebec government argued that the draft MOU sought to relegate the coroner to a minor role in an investigation, and failed

to recognize the province's concurrent jurisdiction over accidents resulting in death. Without an MOU confirming co-operation at both the field and laboratory levels, the Quebec Office of the Coroner indicated to us that its ability to fulfil its mandate would be diminished.

We understand that in the summer of 1993 nine provinces deputized the Association of Chief Coroners and Chief Medical Examiners of Canada to undertake to develop an MOU with the TSBC. In August 1993, we were informed by the Chief Coroner of Ontario that representatives from Ontario and New Brunswick were to negotiate a draft MOU with the TSBC in September 1993. The draft MOU, if agreed upon, would then be sent to each province for separate ratification with the TSBC. However, as of December 1, 1993, no MOU between the TSBC and any provincial ministry responsible for coroners had been signed.

Given that serious accidents involving deaths will usually bring both the TSBC and the coroner to the accident site, we feel that there is pressing need for the negotiation of MOUs between these two parties. MOUs with the provincial coroners' offices would create much needed efficiencies not only at the accident site, but for the work to be done after the field investigation.

Health Canada

The relationship between Health Canada and the TSBC exists by virtue of the TSBC's use of the laboratory personnel and facilities of Health Canada's Civil Aviation Medicine Unit (CAMU). We were told that communications between the two organizations are poor, which in turn has hindered the best use of CAMU's facilities by the TSBC. We feel an MOU is a necessary means of formalizing the mutual obligations and responsibilities of the two organizations, and of ensuring that the resources of CAMU and the TSBC are jointly available to the benefit of safety.

Selling Services to Provincial Authorities

The *CTAISB Act* now permits the TSBC to investigate specific occurrences at the request of a provincial Cabinet. Experience, however, shows that in the aftermath of an accident a provincial government is more likely to establish its own inquiry than to think about the TSBC. The TSBC, in the context of growth in short-line rail, might consider selling its accident investigation services to the provinces. Because the amount of short-line activity in any province is unlikely to justify the establishment of a separate railway accident investigation agency, the "hiring" of the TSBC would, for a provincial government, be fiscally and administratively efficient. As well, it would facilitate the TSBC's collection of accurate accident statistics and provide a way to increase its level of rail investigation activity, thereby helping it to retain and enhance railway accident investigation expertise. The TSBC, in considering how this might be done, should seek to remove impediments to such arrangements.

The issue of cost sharing between the TSBC and provincial agencies for joint investigative efforts should be a primary matter of discussion. For example, the Minister of Justice and Attorney General of Alberta, as the Minister responsible for Medical Examiners, argued that the acceptance of a draft MOU proposed by the TSBC could cause the province to assume unwanted financial obligations with respect to the performance of post-mortem examinations and toxicology analysis in the course of a combined investigation.[92] This problem is most likely to arise if the TSBC and the provincial ministry have differing opinions concerning the scope of any investigation. We do not consider that section 14 of the *CTAISB Act* should be interpreted to require a province to pay for whatever the TSBC thinks necessary. The province should pay only for such services as the province considers necessary. For this reason, we believe that the TSBC should be mindful of cost apportionment when concluding agreements for joint investigations with provincial coroners.

Having missed some self-established deadlines for getting new MOUs in place, the TSBC is vulnerable to serious problems that could arise during investigations. For this reason, the TSBC must give the negotiation of MOUs the priority it deserves. This requires that Board members take an active leadership role in ensuring the conclusion of MOUs. If substantial progress in the completion of MOUs is not made in the near future, we maintain that the responsible ministers should intervene directly in these negotiations or assign a "referee" to ensure that all necessary agreements are reached in a timely manner.

■ ■ ■

RECOMMENDATIONS

29. **The President of the Privy Council introduce an amendment to the section 23 of the *CTAISB Act* to clarify that the right of attendance at investigations by the representative of the Minister of Transport or other ministers, shall only be for the purposes of:**

a) **determining causes and contributing factors to safety deficiencies; and**
b) **enabling the Department to take prompt remedial measures with respect to the operation of a transport conveyance, transport facility or transport undertaking, or with respect to national security or a regulatory process, and not for the purpose of gathering information for regulatory enforcement.**

30. 

The Chairperson and Board should take immediate steps to complete Memoranda of Understanding with all relevant federal departments and agencies, including:

- Transport Canada
- Labour Canada (Human Resources Development)
- National Energy Board
- RCMP
- Canada–Newfoundland and Canada–Nova Scotia Offshore Petroleum Boards
- Health Canada

If the TSBC and any such federal department or agency are unable to reach agreement by December 31, 1994, the President of the Privy Council and other responsible ministers should refer the matter to cabinet or arbitration between the departments and the Agency, to achieve resolution.

31. 

The Chairperson and Board should take immediate steps to complete Memoranda of Understanding with all provincial authorities responsible for coroners and emergency response. If the TSBC and any provincial authorities are unable to reach agreement by December 31, 1994, then the Government of Canada and the governments of any of the provinces concerned should intervene at the ministerial or cabinet level to achieve resolution.

32. 

The Chairperson and Board should be receptive to negotiating agreements with provinces for the contracting of TSBC services to investigate accidents on provincial transportation facilities within TSBC areas of expertise, such as short-line railways and provincial pipelines. The President of the Privy Council and provincial governments should facilitate such agreements.

Readiness

WE WERE, ON BALANCE, satisfied with the TSBC's readiness to respond to routine investigations at the B-2 classification level and below. Nonetheless, over the course of our review we began to question the TSBC's ability to cope with the external pressures which the investigation of a major or catastrophic accident would inevitably generate — the lawyers, the cameras, the intense public scrutiny — as well as the enormous demands on managers of major investigations. We identified the need for improvement in five key areas. Specifically, the TSBC has not — in any mode — yet developed a major accident response capability with:

- a cohesive team environment;
- a clearly defined and appropriate set of internal roles and responsibilities;
- clear rules and procedures for its own personnel;
- formal agreements on roles with the other agencies with which it will have to work in the aftermath of a catastrophic accident; or
- a comprehensive inventory of skills and resources to ensure ready access to the skills it may be required to call upon in the event of a catastrophic accident.

Readiness for a Major Accident

We saw no evidence of a sense of urgency regarding readiness issues. Modal arrangements for a major accident are largely informal, except in air, where the TSBC has had much more experience with major accidents, both abroad and in Canada.

During the period of our review, a tug damaged a railway bridge near Mobile, Alabama. The consequent derailment of an Amtrak train and the deaths of many of its passengers served as a grim reminder that cross-modal accidents can happen. Little planning has been done to be able to deal with such an occurrence, and while we are mindful that major accidents are rare and multimodal ones even less probable, we believe the TSBC should be prepared for all eventualities.[93]

The existing response plan for marine investigations is basically reactive. No formal list of participants for a "Go Team" is maintained at head office. The IIC would be the Senior Investigator in the region involved. In general, the IIC would choose a team and decide whether outside expertise would be required. The team would usually include an overall co-ordinator, naval architect and safety analyst all from head office, a nautical investigator and an engineer.[94]

Like the marine mode, rail and pipeline have no formal "Go Team" structures or procedures in the event of a major accident. With a small investigation staff, all are believed to know their roles. A full-time co-ordinator handles initial response notification. Either the Chief of Operations for Rail or for Pipeline would be the IIC. Team members would include head office senior specialist rail investigators,

the Chief of Railway Investigations, the Chief of Standards and a Calgary-based track specialist. The DOI (Railway and Pipeline) determines what support is needed from other organizations. Specialists in each region would respond at once to secure the site.[95]

Two specialists are available at head office to work on major pipeline investigations. Regional rail staff assist by securing the site; other external or TSBC specialists could be called on by the DOI.[96]

In 1991, the DOI (Air) prepared the Major Occurrence Investigation Checklist. Still technically in draft form, the 25-section, 200-page document is nevertheless an active part of response planning, as is the regularly up-dated "Go Team" list.[97] Potential team members have the occasional opportunity to maintain and develop the management and other skills needed on major accidents by leading or assisting investigations in other countries (sometimes under ICAO auspices).

The team has 19 positions, with an investigator or safety analyst allocated to each: 16 positions are staffed from head office and three from the region concerned. In practical terms, actual membership and size of a team depend on individual availability and the nature of the occurrence, but as many designated staff as possible participate. As soon as one "Go Team" has been sent to a site, a new list is prepared for the next possible occurrence.

We identified several areas of improvement related to air-mode investigations, primarily because the TSBC's air-mode contingency planning is so much further advanced than for the other modes. Given the significantly lower levels of readiness in the other modes, some of our comments might usefully be applied to those modes as well. In addition to those items referred to in "Products and Processes" we note the following points.

- Provision should be made in the Checklist for reception and assistance to other countries' representatives under ICAO Annex 13 and where foreign ships or rolling stock are involved.
- A human performance position is currently assigned to each region, but not all regions have staffed the position. Provision should be made for a human performance site investigator.
- The Director, Medical Services should assist on-site investigators.

Readiness for a High-Profile Event

The TSBC's ability to respond to an occurrence which draws intense media and public attention, in any mode, remains untested. On the basis of our review of advance planning in the air mode and an assessment of occurrence reports on accidents overseas in which TSBC staff played significant roles, we find that the TSBC is adequately prepared for certain initial aspects of many foreseeable aviation accident investigations. We have seen less evidence of readiness for high-profile events in

the other modes, and we urge the TSBC to develop or update contingency plans immediately. It is not, of course, enough simply to make plans. A good contingency plan is a living document, and an effective program of preparedness should include provision for continuous updating and regular testing of plans against realistic worst-case scenarios.

The TSBC may find that coping with a high-profile occurrence requires skills and resources not normally needed, for example, skills in dealing with the media. With this in mind, training in media relations might be appropriate for members of the Board. Similarly, the TSBC should consider developing rosters of experts in various disciplines and lists of suppliers of various goods and services who can respond immediately when required.

In raising its level of readiness, the TSBC might do well to examine the efforts of Canada's pipeline industry and the National Energy Board (NEB). Pipeline company and NEB plans are tested regularly, in realistic simulations which include media relations officials and lawyers acting for adverse parties. NEB regulations currently require that plans be in place; provisions requiring regular testing of company plans come into effect in 1994.

The NEB recognizes that every emergency has public affairs and legal components, partly for purposes of public confidence but also to ensure that its response is not impeded by media or legal considerations. Likewise, clarification of the TSBC's legal powers is extremely important, as a skilled litigator could discredit or obstruct an investigation or public inquiry.

We consulted with judges and lawyers who have participated in judicial inquiries into transportation accidents. All forcefully argued for advance planning and emphasized the importance of a pragmatic approach to dealing with the various parties involved in an investigation or inquiry. The object: to avoid having an inquiry derailed in a time-wasting legal dispute.

Such calls for a high level of readiness cannot be taken lightly, especially in view of the recent history of governments turning to judicial inquiries to investigate catastrophic transportation accidents. For future potential accidents, there will continue to be a strong political appeal for any government to make a decisive announcement of an independent public inquiry, especially if the alternative is a little-known and untested federal agency.

We agree emphatically with the stakeholder who told us during our consultations that the TSBC lacks "an organizational sense of urgency." This must be remedied. There is a great deal more to readiness than the ability to get an investigation team on site in a very short time. All TSBC personnel, from investigators to Board members, must recognize that the urgency of the task at hand does not diminish once a "Go Team" reaches the site of an accident. The urgency subsides only when the report and recommendations are released.

■ ■ ■

RECOMMENDATIONS

33. 

The Chairperson and Board should develop a more comprehensive contingency plan for response to a major occurrence by no later than September 30, 1994. Essential elements of the plan should include:

a) criteria for the immediate calling of a public inquiry if warranted;
b) a duty roster of Board members available at all times to respond to governmental and media questions about the TSBC's response to the occurrence, preferably on site;
c) provision to facilitate continuation of an investigation or a public inquiry, in the event legal challenges are launched; and
d) up-to-date response plans, procedures and policies to ensure that no investigation need, or available capability, skill or facility, is overlooked. This could include information on transportation safety and investigation experts and others (including judges) who could assist in a public inquiry or other major occurrence investigation.

34. 

The Chairperson and Board should develop and exercise occurrence contingency response plans indigenous to the marine, rail and pipeline modes by no later than September 30, 1994.

35. 

The Chairperson and Board should ensure that major occurrence response plans for each mode are tested in a biennial simulation (with participation by the Board and staff from the TSBC, other agencies and industry) and externally evaluated to improve each plan's effectiveness.

Overall Assessment of the Agency

BASED ON OUR CONSULTATIONS and our research, we must come to the overriding conclusion that the present TSBC is not performing fully when measured against any set of reasonable standards, including its own.

We did find a high degree of professional competence throughout the TSBC. We also found that the laboratory services were considered to be outstanding, and that when TSBC officials participated in international investigations, it was a source of pride and admiration for the Agency and for Canada. In short, the TSBC has many inherent strengths on which it can build.

However, there are myriad organizational and operational issues which need improvement. The TSBC has organized itself in a way that results in delay and confusion. Perhaps the most serious result is the tortuous, time-consuming process of writing, checking, re-checking, reviewing and re-reviewing before basic facts and findings are issued to the people who need them.

The TSBC's structure would also appear to be a source of delay and confusion. We found that the Board itself appears to be underused, a situation we discuss further in Chapter 3.

We are alarmed at the lack of basic administrative planning tools which would ordinarily allow any organization not only to establish objectives but also to measure its own performance. A public agency must be able to demonstrate that it is doing what it is mandated to do.

We consistently found a basic imbalance among the modes, with the air mode dominating virtually every aspect of the TSBC, from personnel to procedures. We say more about this important issue in Chapter 3. But in broad terms, we feel that the benefits of a multimodal agency are not being realized to their full potential.

Finally, we found that the TSBC seems content to react to situations rather than to reach out and take the lead in advancing transportation safety. This overly cautious approach to most issues shows itself in an unwillingness to accept a higher public profile. We believe this approach seriously misreads the intention of Parliament, an issue we also discuss in Chapter 3.

NOTES

1. International Organization for Standardization, ISO 9004-2 Quality management and quality system elements, "Part 2: Guideline for services," ISO 9000 Compendium: *International Standards for Quality Management*, 3rd edition (Geneva, Switzerland, 1993).
2. Pearmain Partners, *A Review of Resource Allocation in the Transportation Safety Board of Canada*, (Research report prepared for the CTAISB Review Commission, Ottawa, September 1993).
3. Hickling Corporation, *Comparison of National Level, Permanent Non-Carrier Affiliated Accident Investigation Functions in Canada, Australia, France, Germany, the United Kingdom and the United States*, (Research report prepared for the CTAISB Review Commission, Ottawa, September 1993).
4. W. Pullen, *The New Board* (Ottawa: Supply and Services Canada, 1992).
5. Transportation Safety Board of Canada, *1993-94 Estimates, Part III* (Ottawa: Supply and Services Canada, 1993), p. 23.
6. Although the TSBC annual report refers to these as regional offices, we describe them as field offices because regional responsibilities are assigned differently for each mode.
7. In documentation forwarded to the Review Commission on November 18, 1993 on the breakdown of head office and regional personnel, the TSBC describes its regional administration as follows:

   > Air regions are the only ones to have regional managers (classification level: Civil Aviation Inspector — Level 05), other modes have senior investigators. There are no regional managers for the offices. Each mode reports directly to the mode branches. In other words, there is one TSB office with each mode responsible to the respective DOI in head office.

   Exceptions to the above with respect to rail are: Petrolia reports to Senior Investigator Toronto, Québec City reports to Montreal and Edmonton reports to Calgary.
8. Pearmain Partners, *A Review of Resource Allocation in the Transportation Safety Board of Canada*, *op. cit.*, p. 23.
9. In most cases we have used personnel figures from the Part III Estimates, modified where appropriate on the basis of positions in the TSBC Organizational Chart (EXE1.OPW 93-07-29 Chart). The TSBC Organizational Chart includes many vacant classified positions which we have generally not included. In fact, whereas in the Estimates there are 188 positions in Investigation Operations, on the TSBC Organizational Chart there are 212 classified positions when we include the vacant positions. Similarly, where the Estimates have 55 positions for Safety Analysis and Communications, the Organizational Chart has 79 classified positions including vacant positions.
10. Canadian Aviation Safety Board, *Annual Report 1989* (Ottawa: Supply and Services Canada, 1989), p. 2.
11. See Chapter 2, "Products and Processes," for a detailed description.
12. See Transport Canada, Accident rates and safety indicators: *Comparative Analysis of Aviation Level of Safety Between Canadian Level I & II Air Carriers and U.S. Air Carriers Operating Under 14 CFR 121*, Appendix 2 and Appendix 7, July 1991.
    NTSB's mandate includes the highway mode.
13. Pearmain Partners, *A Review of Resource Allocation in the Transportation Safety Board of Canada*, *op.cit.*

14. *Ibid.*, p. 39.
15. Transportation Safety Board of Canada, Submission to the CTAISB Review Commission, June 1993, p. 5.
16. Transportation Safety Board of Canada, *Statistical Summary: Air Occurrences; Statistical Summary: Rail/Commodity Pipeline Occurrences; Statistical Summary: Marine Occurrences* (Ottawa: Supply and Services Canada, 1992).
17. The Transportation Safety Board Regulations, gazetted August 12, 1992, *Canada Gazette* Part II, Vol. 126, No. 17. Section 2(1). The Regulations define a "reportable railway accident" as an accident resulting directly from the operation of rolling stock, where
    a) a person sustains a serious injury or is killed as a result of
        i) being on board or getting on or off the rolling stock, or
        ii) coming into contact with any part of the rolling stock or its contents, or
    b) the rolling stock
        i) is involved in a grade-crossing collision,
        ii) is involved in a collision or derailment and is carrying passengers,
        iii) is involved in a collision or derailment and is carrying dangerous goods, or is known to have last contained dangerous goods the residue of which has not been purged of the rolling stock,
        iv) sustains damage that affects its safe operation, or
        v) causes or sustains a fire or explosion, or causes damage to the railway, that poses a threat to the safety of any person, property or the environment.
18. *Ibid.* The Regulations define a "reportable commodity pipeline accident" as an accident resulting directly from the operation of a commodity pipeline, where
    a) a person sustains a serious injury or is killed as a result of being exposed to
        i) a fire, ignition or explosion, or
        ii) a commodity released from the commodity pipeline, or
    b) the commodity pipeline
        i) sustains damage affecting the safe operation of the commodity pipeline as a result of being contacted by another object or as a result of a disturbance of its supporting environment,
        ii) causes or sustains an explosion, or a fire or ignition that is not associated with normal operating circumstances, or
        iii) sustains damage resulting in the release of any commodity.
19. *Ibid.* The Regulations define a "reportable aviation accident" as an accident resulting directly from the operation of an aircraft, where
    a) a person sustains a serious injury or is killed as a result of
        i) being on board the aircraft,
        ii) coming into contact with any part of the aircraft or its contents, or
        iii) being directly exposed to the jet blast or rotor downwash of the aircraft,
    b) the aircraft sustains damage or failure that adversely affects the structural strength, performance or flight characteristics of the aircraft and that requires major repair or replacement of any affected component part, or
    c) the aircraft is missing or inaccessible.

20. Level III Carrier — A Statistics Canada reporting category for any Canadian air service that, in each of the two calendar years immediately preceding the report year, transported 5,000 revenue passengers or more, but fewer than 50,000 revenue passengers or 1,000 tonnes of revenue goods or more, but less than 10,000 tonnes of revenue goods.

    Level IV Carrier — A Statistics Canada reporting category that includes every Canadian air carrier not classified in level I, II or III that, in each of the two calendar years immediately preceding the report year, realized annual gross revenues of $250,000 or more for the air services for which the air carrier held a licence. Statistics Canada, *Carrier Operations in Canada*, Cat. No. 51-002 (Ottawa: Supply and Services Canada, 1992).
21. Both the Gander and Jeddah accidents involved charter aircraft, as opposed to scheduled Canadian or foreign flights, with the latter accident occurring outside Canada.
22. Research indicates that of the 218 truck accident fatalities reported in 1989 in Ontario, 116 fatalities were non-truck occupants in car-truck collisions. Only 50 fatalities were truck occupants. Truck occupant fatalities in car-truck collisions represent less than five percent of all truck accident fatalities in 1989. Further discussion of these issues is contained in: F.F. Saccomanno and M. Huque, "Large Truck Accident Analysis for Ontario Highways." Unpublished paper of the Department of Civil Engineering, University of Waterloo, Waterloo, Ontario, 1993.
23. Highway accident data were provided by the Surface Group, Transport Canada, as detailed in *Competition in Transportation*, Vol. II, Report of the National Transportation Act Review Commission (Ottawa: Supply and Services Canada, 1993).
24. Transportation Safety Board of Canada, *1992 Annual Report* (Ottawa: Supply and Services Canada, March 1993), pp. 7-10.
25. The two A-2 occurrences were the Air Manitoba crash in Sandy Lake, Ontario, November 10, 1993 and the collision between the Canadian Coast Guard vessel *Griffin* and a fishing vessel in 1990.
26. Transportation Safety Board of Canada, Submission to the CTAISB Review Commission, *op. cit.*, p. 8.
27. Interviews with TSBC personnel.
28. Transportation Safety Board of Canada, Submission to the CTAISB Review Commission, *op.cit.*, p. 8.
29. Transportation Safety Board of Canada, *1992 Annual Report*, *op.cit.*, p. 30.
30. Pearmain Partners, *A Review of Resource Allocation in the Transportation Safety Board of Canada*, *op. cit.*, p. 23.
31. Atlantic Pilotage Authority, Submission to the CTAISB Review Commission, May 1993.
32. Canadian Airlines International, Remarks to the CTAISB Review Commission, Calgary consultation meetings, August 1993.
33. Company of Master Mariners of Canada Maritimes Division, Submission to the CTAISB Review Commission, June 1993.
34. "Justice Moshansky told the *New York Times* (March 31, 1992), 'If the report had been read, there is more than adequate information to have preempted this accident.'" Reprinted with permission from Ralph W. Nader and Wesley Smith, (Blue Ridge Summit, P.A.: TAB Books a division of McGraw-Hill Inc., 1994).

35. Company of Master Mariners of Canada, Maritimes Division, Remarks to the CTAISB Review Commission, Halifax consultation meetings, May 1993.
36. Transportation Safety Board of Canada, *1992 Annual Report*, op. cit., p. 11.
37. *Canadian Transportation Accident Investigation and Safety Board v. Parrish* (1993) 60 F.T.R. 110 (Rouleau J.).
38. Level I carriers include all airlines which carry at least one million revenue passengers or at least 200,000 tonnes of revenue-earning cargo per year; Level II carriers include all airlines which carry at least 50,000 revenue passengers or at least 10,000 tonnes of revenue-earning cargo per year.
39. TSBC Occurrence Reports/Briefs Reviewed by Experts:

    Air: A88P0221 (draft only), A89A0284, A90A0046, A90A0284, A90C0037, A90C0075, A90H0001, A90H0002, A90P0121, A90P0389, A90W0284, A90W0293, A91A0044, A91A0062, A91A0135, A91C0012, A91F0011, A91H0002, A91H0007, A91H0008, A91H0012, A91O0395, A91O0491, A91P0020, A91P0062, A91P0140, A91P0191, A91Q0150, A91W0149, A91W0156, A92H0016, A92O0004, A92O0013, A92O0120, A92W0214

    Rail: R90M0021, R91H0206, R90S0420, R91H0005, R90C0092, R90T0169, R92D0013 and R92T0138 including interim recommendation of July 31, 1992 on straight-plate wheels.

    Marine: M90M4001, M90M4020, M90N5017, M91C2008, M91C2009, M91W1094, M90M4025, M92M4032

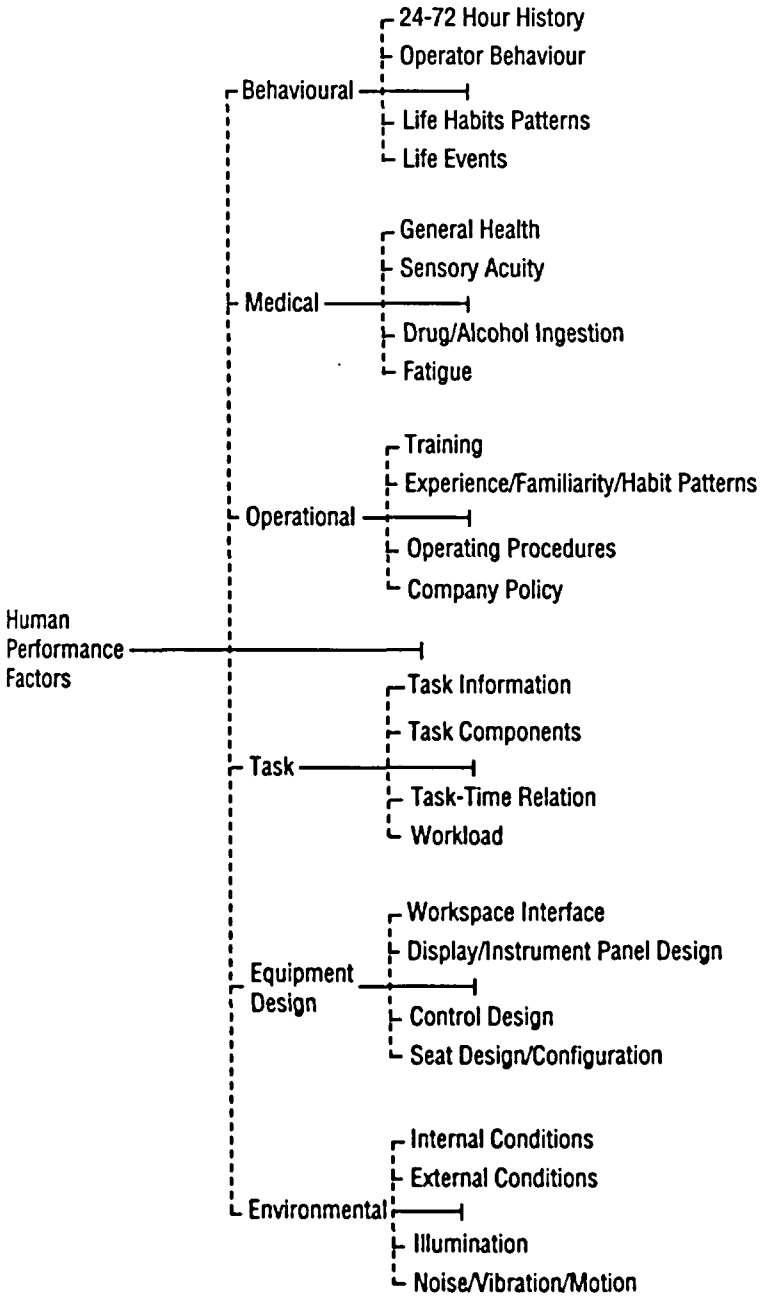
    Pipeline: P90H0606, P90H0929

    TSBC Occurrence Files Reviewed by Staff

    Air: A89A0284, A90A0046, A90A0284, A90C0037, A90H0001, A90H0002, A90P0389, A90W0284, A90W0293, A91A0044, A91C0012, A91H0002, A91H0007, A91H0012, A91O0491, A91P0020, A91P0140, A91Q0150, A91W0149, A92O0004, A92O0013, A93O0044, A93P0051

    Rail: R90W0172, R91T0016, R91V0063, R91W0120, R92D0002, R92D0013, R92T0138

    Marine: M91L3010, M91L3025, M91W1094
40. For marine, rail and pipeline modes, all reports issued before June 1, 1993 were provided to our Commission by the TSBC. While 347 air mode reports were provided, we were unable to verify how many in total had been issued by the TSBC.
41. "Human factors" is the term generally used to describe those factors which influence performance, including behavioural, medical, operational, task-load, machine interface and work environmental factors. The National Transportation Safety Board (U.S.) has provided the Commission with the factors which its human performance group is assessing. The relevant factors are summarized in the chart below.


Human Performance Factors
Behavioural
24-72 Hour History
Operator Behaviour
Life Habits Patterns
Life Events
Medical
General Health
Sensory Acuity
Drug/Alcohol Ingestion
Fatigue
Operational
Training
Experience/Familiarity/Habit Patterns
Operating Procedures
Company Policy
Task
Task Information
Task Components
Task-Time Relation
Workload
Equipment Design
Workspace Interface
Display/Instrument Panel Design
Control Design
Seat Design/Configuration
Environmental
Internal Conditions
External Conditions
Illumination
Noise/Vibration/Motion

42. Review of occurrence report and group chair and laboratory reports from investigation into 1991 crash of Nationair DC-8 at Jeddah, Saudi Arabia.
43. The Board recommended that Transport Canada make port state control information readily accessible by Vessel Traffic Services.
44. International Civil Aviation Organization, "Part IV — Reporting of Occurrences," *Manual of Aircraft Accident Investigation*, 4th edition, amendment 10/9/76, p.IV-4-3.
45. *Ibid.*, p. IV-4-9.
46. Transportation Safety Board of Canada, "Chapter 7 — Report Standards," *Aviation Occurrence Report Procedures*, April 1991. The TSBC provided this chapter in isolation; it does not correspond with the appropriate chapters of the manuals provided previously.
47. Mr. Justice Virgil P. Moshansky, *Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario* (Ottawa: Supply and Services Canada, 1992), Vol. III, pp. 1,152-1,153.
48. International Civil Aviation Organization, "Part II — Organization of the Investigation," *Manual of Aircraft Accident Investigation*, 1970, pp. II-2-3 and II-2-4.
49. There is a legally justified way to avoid this difficulty which we discuss in Chapter 3.
50. Explanation of policy by the TSBC Board in a meeting with the Review Commission.
51. This information was obtained from the TSBC's files of formal recommendations made.
52. Review of TSBC files.
53. Response of the Minister of Transport, dated January 21, 1993, to recommendations contained in TSBC Report R91H0206.
54. Bureau of Air Safety Investigation, *Violations of Controlled Airspace — Special Study* (Australia: June 1993), p. ii.
55. Moshansky recommendation MCR 186 suggests: "That the annual report of the Transportation Safety Board of Canada continue to set out, as it now does, all of the recommendations, whether interim or final, that have been made by the Board to the Minister in the preceding year, but that it add comment regarding the actions taken by the Minister in response thereto." Virgil P. Moshansky, *Commission of Inquiry into the Air Ontario Crash at Dryden, Ontario, op. cit.* Deschênes Recommendation 82 states: "The investigating authority should follow up on the implementation of its recommendations and report thereon publicly on an annual basis." Bernard M. Deschênes, *Study on Marine Casualty Investigations in Canada* (Ottawa: Supply and Services Canada, 1984).
56. Transportation Safety Board of Canada, *1992 Annual Report, op. cit.*, p. 31.
57. *Ibid.*, p. 31.
58. Hickling Corporation, *Review of TSB's Reporting Process*, (Research report prepared for the CTAISB Review Commission, Ottawa, September 1993), Vol. I, p. 22 and Vol. II, pp. 13 and 15.
59. We caution the Board to reconsider the ambivalent message contained in the two main sections of its Record of Decision 39 (November 12, 1992), which reads as follows:

    > Such advisories shall describe fully the safety deficiency in issue for the attention of the proper authority and shall not incorporate suggestions on how the deficiency should be dealt with or request a reply as to what action was taken pursuant to the advisory. The said suggestions and request of a reply procedure is restricted to recommendations.

> By way of example, such advisory may be terminated by words indicating that such information is being forwarded for their attention and consideration, to permit them to undertake whatever remedial action they deem necessary, *or that they may wish to consider certain described action* (which can be briefly outlined) [emphasis added] without suggesting that they ought to or request a reply outlining action taken subsequent to receipt of the advisory.

In reference to the portion of the above text which we show in italic, it seems to offer unnecessary licence to imply the equivalent of a recommendation and should be rescinded from the Record of Decision.

60. *CTAISB Act* section (7)(1)(e).
61. House of Commons Standing Committee on Transport, *Minutes of Proceedings and Evidence*, Issue 11 (Ottawa: Supply and Services Canada), June 6, 1989, p. 68.
62. Hickling Corporation, *Review of TSB's Reporting Process*, *op. cit.*, Vol.2, p.16.
63. Other safety studies have also resulted in large numbers of recommendations. For example, the CASB's final group of recommendations (a total of 48) resulted from the study *ATC Services in Canada*. That study, published in March 1990, was a detailed and rigorous analysis of many aspects of the overall ATC system.
64. We understand that the TSBC has recently (autumn 1993) initiated training courses in human factors to be given to all investigators. The second one-week course was given in December 1993. The syllabus includes a major focus on possible company roles in contributing to occurrences, in terms of procedures, policies and practices.
65. One study deals with float plane survivability issues, and the other with pilot skills and attitudes.
66. This study was requested by members of the Standing Committee on Transport in February 1993; work on the subject had actually begun a few months earlier at the TSBC.
67. Very occasionally and well before completion, a study may prove unfruitful, but that seems to bother no one. The incidence is low, in any case, because of the type of planning that takes place.
68. This would be a good approach for the TSBC to use. The incidence of occurrences varies with the seasons, and there are thus periods when investigative staff have less to do. The specific data needs of a study would supply added focus and priority to occurrence investigations. Furthermore, the benefits of more, well-done safety studies would be usable by all at the TSBC, not least by investigators.

    Ideally, there should be one principal category of TSBC employee, the investigator, who would be capable of doing investigations or studies. However, because these are quite different functions, they should be under separate TSBC managers. In this regard, the BASI model is worth emulating.
69. For the time being, only aviation and rail safety staff at Transport Canada use TSIS because the marine data are not yet on line.
70. Other concerns related to international incompatibility include lower reporting thresholds than comparable U.S. or other international standards. This permits accessibility by others to more information about Canada. If appropriate specifications are not expressed there can be negative consequences:
    - if data comparable to the international standards cannot be extracted as a subset, then Canadian data cannot be put in the much larger context; and

- overreporting Canadian occurrences makes Canadian operations seem less safe. This could undermine the competitive position of Canadian carriers vis-à-vis foreign carriers.

In aviation, the TSBC reporting criteria are both different and considerably more detailed than those of the NTSB. Both sets of national standards are more exacting than the minimum requirements under ICAO's Annex 13.

The TSBC reporting requirements for rail occurrences are more demanding than the FRA's. Also in rail, the TSBC's requirements for dangerous goods release are more stringent than Transport Canada's rules for rail and truck.

71. The actual wording of section 21 of the *CTAISB Act* is:

> 21.(1) Where, in the course of an investigation of a transportation occurrence, the Board considers it necessary that a public inquiry be made into the transportation occurrence and the Governor in Council has not caused a public inquiry to be made under Part I of the *Inquiries Act*, the Chairperson may, subject to section 18, [investigations of military related transportation occurrences] designate a person or persons, who may be or include the Chairperson, to conduct a public inquiry into that transportation occurrence in accordance with any regulations made under section 34 and to report to the Board thereon.
>
> (2) Any person designated to conduct a public inquiry under subsection (1) has and may exercise the powers of a person appointed as a commissioner and under Part I of the *Inquiries Act*, subject to any restrictions specified in the designation.

72. A special situation is defined under the Regulations as "any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident."

73. Also under section 12(2) of the Regulations.

74. In the 1980s, the National Energy Board held four public inquiries into pipeline occurrences (one in 1984, two in 1986 and one in 1987). There were eight public inquiries under the auspices of the Canadian Transport Commission/National Transportation Agency into railway occurrences during the 1980s. As well, there was the Foisy Commission of Inquiry into the Hinton crash. After the Marine Casualty Investigation Unit became a separate entity in 1973, it organized 10 public inquiries into marine occurrences, the last being in 1984.

75. Nathan T. Nemetz, *An Inquiry pursuant to Section 1 of the Inquiry Act into Safety of Loading Procedures Used by British Columbia Ferries*, Victoria, September 1992.

76. We note that when an occurrence involving a foreign aircraft or ship is being investigated, requirements under ICAO Annex 13, or other international standards, may need to be followed. In such cases the TSBC Chairperson has authority under section 21 of the Act to direct in the instrument of appointment that the Inquiry Officer instruct the DOI to act consistently with such standards.

77. We understand the TSBC has prepared a draft discussion paper entitled, "Public Inquiries and TSB." In the present form, we do not consider that this draft addresses fully the issues we have discussed in this chapter.

78. Transportation Safety Board of Canada, "Chapter 7 — Report Standards" *Aviation Occurrence Report Procedures*, *op. cit.*, p. 34.
79. The *CTAISB Act* was amended during debate to alter these powers from the permissive "may" to the imperative "shall."
80. With the St. Lawrence Seaway Authority.
81. The TSBC Board communications policy referred to in minutes of September 10, 1991.
82. We note with interest that the U.S. National Transportation Safety Board (NTSB) plans to hold a three-day symposium with industry in the spring of 1994 on the subject of the NTSB's aviation accident investigation process. At this symposium, the third since 1975, the NTSB will explain its programs, as well as receive constructive advice from the industry and other investigative authorities on a range of topics including: "Go Team" major aircraft investigations, major investigations designated by regional offices, general aviation accident investigations, relations with the news media and international accident investigations. We believe that such comprehensive "outreach" initiatives advance the profile and the credibility of the NTSB and its procedures, as well as generally advancing transportation safety. We readily endorse such activities and commend them to the TSBC for consideration.
83. We recognize that the Board has made some effort to improve the timeliness of reports and to standardize their presentation and format. These efforts at improving efficiency are at the "micro" level. In our discussion of the need by the Board to think through how the TSBC is to achieve its purpose, we are referring to the effectiveness of the agency at a "macro" level.
84. Where an accident involves a military transport or a military transport facility, the *CTAISB Act* sets out special provision for the Department of National Defence to investigate.
85. Transport Canada, Labour Canada, Environment Canada, VIA Rail, TSBC regional offices, Quebec Office of the Coroner, Consumers Gas, Canadian Association of Petroleum Producers, and Canadian Ferry Operators Association were among those who noted problems of co-ordination among agencies at the accident site.
86. Gowling, Strathy & Henderson, *Report of Study of Miscellaneous Legal Issues*, *op. cit.*
87. Marine Atlantic, Railway Association of Canada, Canadian Coast Guard, TransCanada PipeLine Ltd., Canadian Gas Association, Interprovincial Pipe Line System and the Canadian Association of Petroleum Producers were among several stakeholders that raised the administrative problem of duplication of reporting requirements.
88. MOU dated April 27, 1993 (Document/MOU-TC-E). This MOU only contemplates notification of the other party of special studies and special investigations to be conducted. There are provisions for cost recovery where one party conducts an investigation or study at the other's request; the draft also provides for annual meetings to "discuss their working relationship, investigations in progress and the need to amend..." the MOU.
89. Oil and gas activities in the Nova Scotia offshore area are administered by the CNSOPB under the federal *Canada–Nova Scotia Offshore Petroleum Resources Accord Implementation Act*, S.C. 1988, c. 28, and the provincial *Canada–Nova Scotia Offshore Petroleum Resources Accord Implementation* (Nova Scotia) *Act*, S.N.S. 1987, c.3 (the *Accord Acts*).

There may be a potential problem regarding the disclosure of information by the CNSOPB to TSB in the course of an investigation. The *Accord Acts* provide, in sections 122 and 121 respectively:

(2) ...information or documentation provided for the purposes of this Part or Part III or any regulation made under either Part, whether or not such information or documentation is required to be provided under either Part of any regulation made thereunder, is privileged and shall not knowingly be disclosed without the consent in writing of the person who provided it except for the purposes of the administration or enforcement of either Part or for the purposes of legal proceedings relating to such administration or enforcement.

(3) No person shall be required to produce or give evidence relating to any information or documentation that is privileged under subsection (2) in connection with any legal proceedings, other than proceedings relating to the administration or enforcement of this Part of Part III.

90. Section 4 of each of the *Accord Acts*; see endnote 88.
91. Consultations with and submissions from the Quebec Office of the Coroner, Alberta Department of Justice and Attorney General, B.C. Office of the Chief Coroner, Newfoundland Chief Forensic Pathologist, Ontario Ministry of the Solicitor General, and Saskatchewan Department of Justice and Attorney General.
92. Minister of Justice, Submission to the CTAISB Review Commission, June 1993.
93. The only TSBC exercise involving a cross-modal accident was conducted in November 1993, as we drafted our Report.
94. Interviews with TSBC personnel.
95. *Ibid.*
96. *Ibid.*
97. Transportation Safety Board of Canada, Major Occurrence Investigation Checklist, Interim Draft, 1991.