Managing a Major Investigation

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Introduction

This presentation gives an overview of the TSB's experience and my views on "Preparedness", "Procedures", and "Planning" on the management of major investigations and how it was applied with the Air France A340 runway-overrun accident at Toronto on August 2nd 2005 from the field phase to writing the report.

This presentation is not designed to provide all the answers to the complexities of conducting a major investigation; instead, I will be highlighting some important issues on how the TSB conducts major investigations.

Preparedness

Organizational readiness is the first step in being able to manage a major investigation. The capability to manage such an event can be affected by limited financial resources, limited human resources, limited investigation experience and expertise. Therefore, the cornerstone to an investigation agency's organizational readiness to respond to a major accident, that will in all likelihood stretch resources and probably exceed in-house capabilities, is a comprehensive Major Occurrence Response Plan.

An investigation agency's plan is not just a document solely based on intuition. It is a document that should be based on in-depth consideration of the following factors:

1. Legislation, policies, and standards that support all the elements of the response plans,
2. Investigation procedures and checklists to meet the requirements of all types of investigations, taking into the account the size and complexity of an investigation;
3. Personnel level of expertise, experience and knowledge;
4. Financial and equipment resources;
5. Management structure and authorities, as well as the decision-making process;
6. Readiness and ability to acquire additional financial, human and equipment resources;
7. The entitlements, responsibilities and procedures of other agencies, departments, and stakeholders that would become involved in the investigation; and,
8. Stakeholder[1] readiness and abilities to support an investigation.

Although careful consideration of each of these points is required to ensure the integrity of an investigation agency's Major Occurrence Response Plan, the first four factors are fundamental to day-to-day investigation operations and should be well understood by all investigation agencies. I will expand on the last four points from the lessons learned by the TSB during our recent major investigations.

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[1] The terms "stakeholder" and "safety partners" represents the various states and organizations that have a safety interest in the investigation and have the expertise necessary to contribute to the investigation agency's mandate to advance aviation safety.

Management Structure and Authorities

The investigation agency's Major Occurrence Response Plan should document the roles and involvement of its management team and executives, the command and control structure, and the communication requirements between the investigator-in-charge and the management team.

Managing a major investigation is like managing any important project. The investigator-in-charge is the project manager who has been assigned a project [the safety investigation] with a clear objective [advancing transportation safety] that will be realized with the production of an investigation report and safety recommendations. The investigator-in-charge is provided with specific financial, personnel, and equipment resources to complete the project. The investigator-in-charge is accountable to the tasking authority [the Director of Investigations, Chief Investigator, etc] for conducting the investigation in accordance with the investigation agency's legislation, policies, standards and procedures.

In larger Investigation Agencies there may be other levels of authority that have a role to play in support of a major occurrence investigation. The Major Occurrence Response Plan should document the involvement and roles of those management levels to ensure that everyone involved understands the chains of authority and scope of responsibilities. The highest level of authority in an investigation agency, such as a Chairperson, a Board or Commissioner is usually vested with the responsibility for legislation, policy, interdepartmental liaison, and memoranda of understanding. The next level of authority such as executives, directors and senior managers are responsible for standards, guidelines, procedures, within-agency liaison, and resource allocation. Next, the investigator-in-charge is responsible for adhering to the legislation, policy, standards and guidelines, and for following established procedures. Finally, the Group Chairpersons of the investigation team members are responsible for following the investigation plan and checklists.

At the TSB, in the context of authority during an investigation our document states, in part:

- The investigator-in-charge is accountable to the Director of Investigations for the management, conduct and control of the investigation.

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- The Director of Investigations has exclusive authority to direct the conduct of investigation on behalf of the Board. The Director of Investigations shall report to the Board with respect to investigations and shall conduct further investigation as required by the Board. This authority must be exercised in accordance with provisions of the Canadian Transportation Accident Investigation and Safety Board Act, and in accordance with TSB policies.

- The Board reviews transportation occurrence reports, makes findings as to causes and contributing factors, identifies safety deficiencies, makes safety recommendations, and issues public reports on its findings. The Board is also responsible for establishing policies that govern the classes of occurrences to be investigated and the conduct of investigations

There is not just one model for the management of major investigations. The important issue is that proper documentation of the process and individual responsibilities will play a significant part in the efficient management of the investigation. In addition, such documentation will add transparency of the process to all those involved in the investigation.

Readiness and the ability to acquire additional resources

Once the major investigation team is established and the day-to-day management of the investigation has been passed to the investigator-in-charge, the investigation agency senior management role should become one of ensuring support to the investigator-in-charge and the investigation team. The investigation agency management should also monitor strategic planning issues, such as acquiring additional financial, technical and human resources as required for the ongoing investigation.

No investigation agency is staffed to the level where it has all the required in-house expertise and resources to respond to a major occurrence. To augment its capabilities, the investigation agency will have to use persons from outside the agency to competently and credibly conduct a major investigation.

To establish readiness for a major investigation, the investigation agency must determine what types of expertise are not available within the investigation agency, and then search for sources of that expertise to fill shortfalls. This search could include other national resources [government agencies, airlines operators, maintenance and technical organizations, and associations], as well as foreign resources [other investigation agencies, manufacturers, regulators, etc]. It is very important to note that an investigation agency cannot afford to wait until the accident happens to do this analysis of resource requirements. Although you will never be able to plan for every circumstance, establishing "safety partnerships" will provide the framework required to rapidly expand resources.

These partnerships can be formalized using memoranda of understanding or working arrangements, or they can be established by less formal means. Notwithstanding, the term "partnership" implies cooperation on the subject matter of mutual interest, and in the context of an investigation, the mutual interest would be "advancing safety". A "safety partnership" does not imply collaboration, complicity, or compromise on safety issues, nor does it include any activity that is not directly linked to advancing safety.

Any safety partnership agreement must clearly state the conditions and limits of the partnership. Some fundamentals to the use non-investigation agency personnel are the following:

- The investigation agency rules and guidelines on and the conditions for use of these "safety partnerships" must be well documented.
- The investigation agency personnel must be knowledgeable about these rules and conditions;
- The investigation agency personnel must be knowledgeable about the safety interests and aware of the potential conflicting interests of the non-investigation agency entities that may become involved in an investigation agency investigation; and
- not only must all non-investigation agency personnel be familiar with the investigation agency's rules and guidelines on and conditions for the use of these "safety partnerships", but they must be knowledgeable about investigation agency's mission, methodology, policies, standards, and procedures.

The entitlements and responsibilities of other agencies, departments, and stakeholders.

Based on the concept that outside expertise will be required, investigation agency legislation, policies and procedures must include provisions for the use of non-investigation agency personnel and resources. These provisions would be based on the requirement of the

investigation agency to maintain its independence and to maintain absolute control of the investigation. Equally important would be the requirement for all those involved in the safety investigation to maintain their independence from all other responsibilities [such as litigation, product liability and discipline], and to conduct themselves in a manner that avoids all actual and potential conflicts of interest. Finally, the investigation agency must take into account the ICAO Annex 13 standards and recommended practices regarding the entitlements of accredited representatives and advisors.

Here is how the TSB handles some of the safety-partner/observer[2] issues:

- First, TSB legislation makes it very clear that it is solely the TSB's discretion to accept observers. It also directs that observers will only be appointed if they have expertise required by the TSB. ·
- The TSB is also very clear that, no matter what organization the observer normally works for, while working on a TSB investigation, observers work directly for the investigator-in-charge.
- Another area of concern is the inadvertent release of investigation information. In this regard, two conditions for a person being granted "Observer Status" on a TSB investigation are that the TSB investigator-in-charge is the sole person entitled to release investigation information, and that no release or use of investigation data is permitted without the specific approval of the investigator-in-charge. For the TSB this is a two-way street: the investigator-in-charge would routinely provide advance notice to stakeholders about information that will be released; and, the observer must request permission to pass any investigation information to his parent organization, prior to any use of that information.
- The TSB meets the information sharing requirements contained in ICAO Annex 13 information provisions, but restricts the release and use of the information as stated above.

In addition to the provisions within Annex 13 regarding the rights of Accredited Representatives and advisors, the TSB has a broader view of the roles of observers on a TSB investigation. Specifically, observers and participants are expected to:

- Contribute their expertise where required by the TSB;
- Be the point of liaison between the TSB and their parent organization or agency;
- Assist in the validation of investigation data;
- Contribute to investigation planning;
- Assist in areas of analysis;
- Assist in determining safety significant events and underlying factors;
- Assist in assessing risks, defences, and risk control options; and,
- Assist in validating safety deficiencies.

The following are those who the TSB normally invites and accepts observers:

- Accredited Representatives from the investigation agencies of involved states;
- Advisors to Accredited Representatives as appointed by the foreign states ;

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2 In the Canadian Transportation Accident Investigation and Safety Board Act, the term "Observer" is defined in part as … "a person who is invited by the Board to attend as an observer because, in the opinion of the Board, the person has a direct interest in the subject-matter of the investigation and will contribute to achieving the Board's object." (Other wording in the Act recognizes Accredited Representative entitlements contained in ICAO Annex 13.

- Transport Canada, by legislation, is permitted to appoint a Minister's Observer, but this observer's participation is limited to observing;
- Airline Safety Department investigators of the involved airline;
- Manufacturer Safety Department investigators of the involved manufacturer;
- Safety staff of other involved organizations – we do not accept lawyers, or managers and staff who may be implicated in the investigation;
- Association Safety Department investigators of the association whose members are involved; and,
- Foreign investigation agency investigators for both training purposes and for specific expertise.

Stakeholder Readiness and Abilities

The TSB spends significant effort at establishing and maintaining relationships with key foreign states, companies, departments, organizations and associations to ensure that these are ready to participate in TSB investigations. Some of the following include:

State investigation agencies: TSB investigators are frequently in contact with foreign investigation agencies when they become involved as Accredited Representative representing Canadian safety interests in foreign investigations. The TSB also conducts liaison visits, exchanges training opportunities, and shares experiences with these agencies. The TSB also consults other agencies when establishing and revising investigation policies, standards and procedures.

Manufacturers: The TSB maintains relationships with the safety departments of Canadian manufacturers of aeronautical products to ensure response readiness for Canadian and foreign investigations involving these products. The TSB does likewise with foreign manufactures whose products are used in Canada.

Airlines: The TSB maintains relationships with the safety departments of all Canadian and some foreign airlines to ensure response readiness and effectiveness for Canadian and foreign investigations.

Police Forces: TSB regional offices maintain close contact with provincial and municipal police forces during day-to-day investigations operations. These relationships are further enhanced by joint disaster response exercises, routine meetings, and briefings to ensure clear understanding of each other's mandates and procedures. The TSB also has memoranda of understanding with some police forces to ensure proper handling of evidence, security for accident sites, immediate access to accident sites for TSB investigators, and procedures for resolving conflicting interests and priorities.

Coroners: TSB regional offices maintain close contact with provincial coroners during day-to-day investigations operations, and the TSB and coroners exchange services, such as coroner autopsies for TSB investigations, and TSB technical assessments of accident scenes for the coroner inquiries. The TSB also has memoranda of understanding with the coroners of all our provinces.

Other Canadian Government Organizations: The TSB maintains close liaison with other Canadian government departments involved in responding to major accidents. The TSB established and maintains working arrangements with Transport Canada, Foreign Affairs Canada, emergency measures organizations, Department of Health, Treasury Board, National Defence, etc. The TSB also participates in meetings and exercises with most of them.

Insurance Adjusters: TSB regional offices work with insurance adjusters to share efforts in recovering wreckage.

Media: The TSB liaises with media organizations to understand their requirements and to educate them on our mandates and procedures. The TSB's current communications posture, procedures, and products have been formulated based on mutual knowledge of the media's and the TSB's requirements.

Finally, to ensure the readiness of potential safety partners, the investigation agency may have to conduct training for them. Such training could include involving non-investigation agency personnel in investigation response exercises and having them participate as observers on investigations. Equally important for investigation agency personnel is that they participate in the emergency response exercises conducted by other agencies that have disaster response responsibilities.

Procedures

Each investigation agency should have procedures for reacting to accidents. The factors in the procedures would normally include the following: the collection and assessment of the occurrence information to determine the type and scope of the investigation agency response required; the call out of required investigators and support personnel; the notification of national authorities, including regulators, air traffic service providers, police, etc; the notification of involved airlines, manufacturers, etc; and, the notification of foreign states as required by ICAO Annex 13. The only difference for this aspect in a major investigation situation would be the requirement to notify and increased number of investigators, support staff and non-investigation agency entities.

The next step would be to establish the composition of the major investigation team. Based on the profile and type of occurrence, the location of the occurrence, the type of operation and aircraft, the number of persons on board, the damage to property, and etcetera, the investigation agency would have to determine the type and depth of investigation expertise, resources and equipment required. These factors would also influence the selection of the investigator-in-charge (investigator-in-charge) and group chairmen, and the provision of personnel and other resources to the investigation team, if need be from non-investigation agency sources.

Another important factor that will result in a successful response to a major accident is that the investigation agency should concentrate on managing the existing initial response plan. This would not be the time for making changes to your plan – doing so will probably result in uncertainty and cause confusion. Specifically, resist the temptation to second guess your preparations, and go with your plan and rely on the readiness and training of your staff. Effectively, the investigation agency response plan and the major occurrence checklists in most situations are, in fact, the investigation agency's Day #1 and Day #2 investigation plan. An important element in the TSB's response plan is that the initial response to the accident site is conducted by the same small regional team that would react on a day-to-day basis to routine accidents. This team remains in control until the major investigation team arrives on site. This practice allows more time to organize and deploy the major investigation team to the accident location.

Planning the Major Investigation

General

The most critical aspect of a successful major accident investigation is the investigator-in-charge's management of the project. Effectively, the investigator-in-charge, who probably is very comfortable in applying his technical and operational investigation expertise, now has to rely on the expertise of his group chairmen and investigators to do this work. To be successful, a major accident investigation investigator-in-charge must:

- Concentrate on Managing the Investigation: An investigator-in-charge should be monitoring the progress of the investigation, looking forward, and planning ahead.
- Use the Major Occurrence Investigation Checklist: It is the basis for monitoring the progress of the investigation, and planning future investigation activities. This is not to suggest that the investigator-in-charge should blindly follow the checklist. The investigator-in-charge's monitoring of the checklist is the best way to determine if the checklist is effective in all areas of the investigation and to determine if the checklist needs to be revised.
- Manage Investigation Team Resources: Throughout the investigation, the investigator-in-charge must ensure that the major investigation team has the investigation expertise required, that the personnel provided to the investigation are assigned to investigation groups, and that future needs of the investigation team are determined. This type of planning is critical in setting out work requirements and schedules. In reality, the investigator-in-charge may have to do more with fewer investigators, may have to do with fewer resources, may have to delay some aspects of the investigation until resources become available, and in some circumstances may even have to set aside some non-critical investigation tasks.

Tracking Major Investigation Issues

As stated earlier, an investigator-in-charge cannot be expected to do all the work and to know every aspect of an unfolding investigation, in particular during the first few days of the investigation. To be successful the investigator-in-charge needs to concentrate on the validated factual information and significant safety issues identified by the investigation team, on the status of the overall investigation plan, on the plans of all the investigation groups, and on the outstanding investigation requirements.

Managing Investigation Schedules

One of the most valuable resources that an investigator-in-charge has is his or her assigned personnel, and the investigator-in-charge must ensure that they maintain their physical and mental health and that their work areas are safe. If investigators are left to do their own work scheduling, the work pressures and their own enthusiasm can easily cause most of them to try to work 24 hours a day and 7 days a week. The only time-critical investigation task that exists is ensuring that perishable evidence is not compromised or lost. Once this task is completed, the investigator-in-charge must not only manage the team work schedule, but his or her schedule as well. This aspect of management must be done to not only ensure that the investigator-in-charge and the Group Chairmen have the time available to meet their investigation management responsibilities, but to also ensure that the investigators are not over worked. Needless to say, overtime costs may also have an influence on scheduling.

Investigator-in-Charge Meetings

Team meetings are vital to the investigator-in-charge's ability to competently manage the investigation. Investigator-in-charge meetings should be held daily during the first few weeks of an investigation, and then as required as the investigation progresses. The following are some factors that should be considered when planning team meetings:

- An investigator-in-charge should plan investigation meeting times that will establish a limit to the work day for all investigation team members; establishing firm times and mandatory attendance for meetings will help in that regard. Other factors to be considered are the potential loss of perishable evidence, daylight hours, travel time, briefings, interviews, etc. At the TSB, investigation progress meetings are scheduled at about 1900 hours and at 0800 hours.

- Investigator-in-charges must have a concise, consistent and specific plan for all meetings, and should follow the plan. Doing so will enhance the investigator-in-charge's credibility, and will be the catalyst to effective participation by others. For the most part, attendees at the meeting should be limited to the active participants in the investigation.

- The focus of the team meetings should be on Group Chairman presentations on the following points: the completed elements of the investigation plan; the significant facts determined; the safety issues under consideration; the proposed adjustments to short-term and long-term group investigation plans; the resource requirements and implications; and, any assumptions and analysis, but only if they are required to support of safety issues and changes to the group investigation plans.

The objectives of these of investigation team meetings are the proper assessments of the progress of the investigation, and the validation of the team and group investigation plans for the following days. In this regard, the success in managing the investigation will hinge on the investigator-in-charge's decisions made as the result of these meetings.

A factor that will play an important role in the effectiveness of the investigator-in-charge team meetings is the effectiveness of communications within and between the investigation groups. The investigator-in-charge should encourage that investigation group meetings, as well as inter-group liaison and communications, take place regularly before investigation team meetings.

Communications, Communications, Communications

The investigation agency major investigation plan should document the responsibility for communication between the investigation team and senior management, and within the investigation agency executive. In this regard, the investigator-in-charge would be the logical link between the investigation team and management. At the TSB, the investigator-in-charge is required to communicate internally with the Director of Investigations on a daily basis and whenever a significant issue arises that requires higher level advice or support.

The plan should document who within the investigation agency will be responsible for external communications with involved organizations and people with a direct interest in the investigation, such as crew, passengers, next-of-kin, and the media. In the Canadian context, the investigator-in-charge is the spokesperson on investigation matters. Although a Public Relations Coordinator and Families Liaison Coordinator may be assigned to the investigation team, the investigator-in-charge must consider and must make time available for external communications tasks.

In particular, during the first week(s) of a major investigation, the external communications tasks have the potential to be overwhelming, and resources outside of the investigation agency, including media specialists, may be needed. In the TSB Major Occurrence Investigation Checklist, in the context of communications during an investigation, the document states, in part:

- The Investigator-in-charge is the TSB official spokesperson throughout the investigation regarding the progress of the investigation, release of factual information, investigation plans, and the TSB Investigation process. If approved by the Director of Investigations, the investigator-in-charge may also be the TSB official spokesperson on the release of TSB safety communications and the TSB final investigation report.

- The Director of Air Investigations, throughout the investigation, is the TSB executive responsible for communicating on TSB investigation legislation, policy, process, standards and procedures; and, on released Aviation Safety Advisories and Aviation Safety Information Letters. The Director of Investigations may also respond to inquiries on released TSB Board recommendations, and if approved by the Chairman, the Director of Investigations may also be the TSB official spokesperson on the release of TSB Board recommendations, safety concerns, and the TSB final investigation report.

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- The Chairman, throughout the investigation, can communicate on TSB investigation legislation, policy, and process, and on TSB Board recommendations, concerns and final investigation reports. Questions on ongoing investigations and on technical issues would normally be deferred to the investigator-in-charge or the Director of Investigations.

Expect Surprises

There will always be some surprises during an investigation; so, the investigator-in-charge and management should expect them. When surprises happen, investigator-in-charges must remain calm and not jump to judgment or conclusions quickly. Also investigator-in-charges must not take on tasks that are beyond their responsibilities or beyond the capabilities of the investigation team.

Managing Critical Issues

The investigator-in-charge of a major investigation will frequently encounter critical issues that need prompt handling. Good management principles suggest that establishing a separate project team may be best way to handle this "unplanned-for" event. The disposition of the issue should be based on whether the issue is critical to the safety investigation and whether the existing investigation team can take on the issue without adversely affecting the progress of the investigation.

The investigation agency's Major Occurrence Response Plan and Major Occurrence Investigation Checklist should include guidelines to assist in decision making for this type of event. In some cases, the best solution may be to assign a separate project leader reporting to someone other than the investigator-in-charge.

Managing Investigation Creep

Throughout the investigation, the scope and depth of the investigation will have to be re-evaluated, in particular when a lack of resources will dictate that the investigation team cannot investigate all deficiencies or ambiguities discovered during the investigation. In such situations, hard decisions will have to be made. Important criteria for these decisions should be the relationship of the potential investigation area with the identified safety significant events of the occurrence, as well as on the potential of the additional investigation work to result in significant enhancements to aviation safety.

Possible decisions include the following: aggressively pursuing the proposed area of investigation, with the probable consequence of limiting other aspects of the investigation or delaying the overall investigation; setting aside the proposed area of investigation; or, delaying the decision. There also will be situations wherein the investigation has already reached positive conclusions and validated a safety deficiency, to the point that a recommendation to conduct further technical or operational analysis can be passed on to the responsible authority.

The pressures for an investigation team to investigate everything and the concern that not doing so may put the investigation agency's reputation at risk will always be present on a major investigation. Consequently, the investigation agency should plan for this problem area and have a decision-making process that includes documenting the decisions made and the supporting rationale.

Conducting Lessons Learned

Another important part of enhancing the readiness of an investigation agency to conduct major investigations is having a process to learn from past experience. In this regard, the TSB conducts a post-investigation wrap-up meeting to review of the lessons learned during the investigation. This review evaluates the adequacy of investigation standards and procedures; evaluates the effectiveness of the investigation team organization, planning, procedures and processes; re-examines the problems encountered and the effectiveness of the actions taken to resolve the issues; and, evaluates the safety actions taken by the investigation agency, regulators and industry as a result of the investigation and its report. The review is expected to result in recommendations for improvements for future investigations.

To enhance the effectiveness of this review, investigation team members are encouraged throughout the investigation to record both positive and negative lessons learned and ideas for improvements. This review includes all parts of the investigation agency that supported the investigation and, rather than waiting for the end of the investigation, corrective action is taken on all significant issues as soon as they are recognized.

This checklist is updated after every major investigation. Since our last five major investigations, additional plans and checklists have been put in place across the TSB to ensure that all parts of the organization are ready to manage and provide support to the major occurrence investigation teams.

Air France A340 Runway Overrun Investigation Experience

On August 2nd 2005, the crew of Air France Flight 358, an Airbus 340-313, conducted an approach to Runway 24L at the Toronto/Lester B. Pearson International Airport, Ontario, Canada. At 1602 eastern daylight time, the aircraft landed long, overran the end of the runway and came to rest in a ravine just outside the airport perimeter. There were no reported

dangerous goods on board the aircraft. An ensuing fire destroyed the aircraft. Two crew members and nine passengers received serious injuries. The Transportation Safety Board of Canada (TSB) was notified within minutes of the accident by air traffic control (ATC) services at the Toronto/Lester B. Pearson International Airport. The TSB Ontario regional office notified the TSB Head Office immediately and responded sending regional investigators to the site.

Based on the profile of the accident, the decision was made to establish a major occurrence investigation team. All available TSB investigators were called to the Head Office to assist in the planning. The Director of Investigations selected an investigator in charge (Mr. Real Levasseur, Chief of Investigation Operations at the TSB Head Office). The Director of Investigations and the investigator in charge made an assessment of the types of investigation expertise required and the level of expertise available within the TSB. The investigator in charge then formed his team based on this information and the TSB's Major Occurrence Response Team list. Once those on the team were informed of their task, they began to review the Major Occurrence Investigation Checklist to review their duties. A pre-departure team meeting was held at the Head Office 3 hours after the team was formed. This allowed the TSB investigators to obtain their equipment, make travel arrangements, contact stakeholders, and gather preliminary information. At the pre-departure meeting, the IIC briefed the team and senior management on the all the occurrence information to date including the type of aircraft, the operator, time of the occurrence, history of flight, number of crew and passengers, nature of the occurrence and the extent of damage to the aircraft as it was known at the time and the physical characteristics of the occurrence site. The Investigator in charge then proceeded to inform the team of the additional resources and expertise would be attending.

Although the TSB had investigated a number of occurrences involving Airbus products and large passenger aircraft, it did not have any specific operational or technical expertise on the A340 aircraft. To fill this requirement, TSB used the expertise of Airbus, Air France and the Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile (BEA) of France. Another example is that although TSB had one Cabin Safety specialist investigator, it was readily apparent that additional resources would be required. In addition to the expertise that would be available from Airbus and Air France, TSB requested additional support from the National Transportation Safety Board (NTSB). Another example of another source from which expertise was acquired was the Aircraft Accident Investigation Branch (AAIB), which, in response to a TSB request, supplied expertise for the Engines Group and the Operations Group.

The Deputy IIC and the Head Office Administration Officer made all the arrangements for the TSB team travel and accommodation, including appropriate facilities for meetings and an operations centre. The team arrived at the site within 12 hours of the accident. The team for the field phase of the investigation comprised 35 TSB investigators, supported by accredited representatives from the BEA and the NTSB, and 43 observers from the following entities: Transport Canada, the Federal Aviation Administration (FAA) of the United States, NAV CANADA, Air France, Airbus, General Electric, the UK AAIB, Goodrich Corporation, the Peel Regional Police, and the Greater Toronto Airport Authority (GTAA).

As investigation team members arrived at the site or operations centre, the group chairs began gathering information, forming group teams based on the accredited representatives technical advisors and observers. The technical groups went to the accident site to assist the regional TSB investigators in gathering evidence (primarily the recorders) and setting site security. The operational groups made preparations to interview witnesses and crew members.

The investigator in charge held nightly meetings with all members of the team to discuss the events of the day, problems encountered and future investigation plans. The investigator in charge ran the meeting wit the group chairs reporting on their group's activities.

At the accident site a number of concerns had to be dealt with. There were a number of requests for tours, meals for the team, biological hazard suits and decontamination sites, site security 24 hours a day, cooperation with the airport for runway closure, wreckage removal and access to the site during the investigation.

The field phase of this investigation was completed in 14 days. On August 16, control of the site and Runway 24L was returned to the airport authority.

The investigations team returned to the TSB Engineering Branch Laboratory to discuss future investigation activities. Temporary facilities at the TSB Lab were provided for the investigation team. The technical groups and operations groups worked for approximately six months to conduct post-field investigation work, tests, and research. Many on the non-TSB participants stayed for extended periods and some returned to work on special projects. The group chairs worked with their teams to write their group reports. The stakeholders were given an opportunity to review and comment on the group reports before the reports were submitted to the Investigator in charge. A draft investigation report was written and the stakeholders were given an opportunity to comment on the draft report. Throughout the investigation the stakeholders participated in identifying safety deficiencies.

The lessons already learned from this investigation were significant in a number of areas. First, there was no question that having previously established relations with the airport authority, local police, and the air traffic control authority (NAV CANADA), and having participated with these entities in disaster response exercises, greatly enhanced the initial responses by the TSB and the other agencies. Also, knowing each others' requirements greatly facilitated cooperation and coordination of activities at the accident site. Second, having work experience and close relationships with BEA, NTSB and the AAIB and in-depth knowledge of each others' legislation, investigation procedures and expertise, resulted in ensuring that needed expertise and support were immediately made available to this investigation.

TSB has also learned lessons as the result of problems encountered during the field phase of the investigation. The first problem area that came to light was related to site security and site safety. In this regard, within weeks following the completion of the field phase, TSB examined the problem areas, and in part, determined that the there were weaknesses in the delineation of responsibilities for both site security and site safety. In addition, the responsibility for the applicable checklist had been assigned as a secondary duty to an individual who was heavily tasked with the management of other technical areas of the investigation. The resolution of this problem area, in part, has resulted in separating these two areas of responsibility, and the establishment of a new checklist, procedures and forms for formally transferring the control of accident site between the TSB and other authorities.

Summary

Unfortunately, not all aspects of investigation management could be covered in this presentation. But it did cover some important aspects regarding the response to a major occurrence, concentrating on an investigation agency's preparedness to the initial response, the need for investigation agencies to augment their resources using non-investigation agency personnel and equipment, on selected aspects of managing the field investigation, and on the importance of having a process to learn from both the successes and difficulties encountered

during the investigation. The TSB's recent experience during its response to the Air France Airbus A340-313, Runway Overrun accident that occurred in Toronto challenged the TSB. However, our success confirmed the importance of our readiness, plans, checklists, procedures and approach to investigation management. I hope that this presentation will be of benefit to other accident investigation authorities, as well as any other entities that may become involved in a major aircraft accident investigation.

If you require additional information on managing major investigations, do not hesitate to contact me directly. Alternatively, you can go to the TSB web site (http://www.tsb.gc.ca), where additional information on TSB legislation, policies, investigation process, occurrence reports, recommendations, subscription services, and statistics is readily available. TSB manuals are also available on request.