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AIG REGIONAL COOPERATION MECHANISM (ARCM) OF SOUTH AMERICA

THIRD MEETING OF AIG AUTHORITIES
(Lima, Peru, 07 to 09 March 2016)

Agenda Item 4: Review of the ARCM AIG procedures manual

- **Development of the proposed amendment to the ARCM accident and incident investigation procedures manual**

(Working paper presented by Uruguay)

Summary

This working paper presents to the Third Meeting of AIG Authorities of South America (AIG-SAM/3) the proposal for amendment of the aviation accidents and incidents investigation procedures manual within the framework of the AIG Regional Cooperation Mechanism (ARCM) of South America.

References

- Report of the Second Meeting of AIG Authorities of the SAM Region (AIG-SAM/2), Buenos Aires, Argentina, 09 to 11 June 2015.
- ARCM AIG regulations
- Annex 13 – Aircraft accident and incident investigation
- ARCM Aviation accidents and incidents investigation procedures manual
- Doc. 9756 – Manual of aircraft accident and incident investigation
    - (Part I) – Organization and planning, Second edition, 2015
    - (Part II) – Procedures and checklists, First edition, 2012
    - (Part III) – Investigation, First edition, 2011
    - (Part IV) – Reporting, Second edition, 2014
- SAM States procedures

Specialists in charge of the task

Mr. Rubén Villagra (rapporteur) - Uruguay
Mr. Alonso Lefno - Chile
Mr. Paula Mc Adam - Guyana
Mr. Pedro Avila - Peru

1. Introduction

1.1 According to the latest results obtained in the framework of ICAO's Universal Safety Oversight Audit Program (USOAP) activities, one of the audit areas with less effective implementation

(EI) in relation to the safety oversight capabilities of the SAM States is still aircraft accident and incident investigation (AIG).

1.2 In this area, we see mainly that the subgroups of policies and procedures for investigation, development, completion and release of the final report; organization, staffing and training of the accident investigation authority; development, release and registry of recommendations on safety and accident/incident data reporting procedures (ADREP) are those addressing the most unsatisfactory protocol questions (PQ) as a general average of SAM States.

1.3 In order for a contracting State to delegate all or part of the investigation to another contracting State by using investigators in an environment of regional cooperation, it is necessary for the States to have common requirements and procedures to facilitate the required cooperation and assistance tasks.

1.4 Having harmonized procedures under a single scheme is vital for the proper operation of any regional AIG mechanism. There cannot be effective exchange of knowledge and skills among States in the Region without first having a group of standard regulations and procedures and trained and qualified investigators under the same scheme and standard.

1.5 During the Second AIG Authorities Meeting (AIG-SAM/2) the following proposed procedure manuals were presented:

- ✓ ARCM accident and incident investigation procedures manual; and
- ✓ ARCM accident and incident investigation reports writing manual.

1.6 In this regard, the Meeting agreed to approve the First Edition of these manuals and asked the Secretariat to circulate the approved procedures manuals in order for ARCM States to submit their comments and differences. It also requested that the ARCM Technical Committee analyse the relevance of including comments from the States and that the amended documents be circulated again for approval of those amendments.

2. Defining the issue

2.1 Based on the conclusion approved by AIG-SAM/2, the First Edition of the ARCM procedures manuals was circulated to the States for their comments. On this particular subject, two (2) States submitted comments on the ARCM accident and incident investigation procedures manual. These comments were reviewed by the ARCM Technical Committee, the contents of which are in **Appendix A** corresponding to each State that issued the comments. When analysing the comments of each State, ARCM's CT accepted some of them, which are found in **Appendix B** of this working paper.

2.2 Appendix A contains two tables with the comments submitted by Chile and Uruguay and CT's analysis of those comments.

2.3 Appendix B contains the ARCM accident and incident investigation procedures manual with CT's approved amendments.

2.4 Based on Appendixes A and B, the Meeting may validate the comments accepted by the CT or, if necessary, include new changes to the analysis.

3. **Suggested actions**

3.1 SAM Regional AIG Authorities are invited to:

a) take note and comment on the information provided in this working paper and **Appendixes A** and **B**; and

b) approve the proposed amendments to the aviation accident and incident investigation procedures manual within the framework of the AIG Regional Cooperation Mechanism (ARCM) of South America.

- END –

Appendix A

Differences checklist - Chile

OCTOBER 2015

Report on the ARCM AIG procedures manual

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
Chapter 3 Reference 3.3.1 3.3.2 3.3.3 3.3.4 3.3.5 3.3.6 Patern	**CHAPTER 3 – INVESTIGATION RESPONSABILITIES** **3.3 SUPPORT COORDINATORS** 3.3.1 Support coordinators are usually individuals belonging to the investigation authority of the State conducting the investigation. The coordinators support the Investigator-in-charge in all endeavours, act in direct support of the investigation process, and liaise with different groups, organizations and States. Coordinators who could be involved in a major investigation include: the deputy Investigator-in-charge, head office coordinator, administration coordinator, public relations coordinator, and site safety coordinator. 3.3.2 The **Deputy Investigator-in-charge** assists the Investigator-in-charge in the organization, conduct and control of the investigation. He also provides continuity in the investigation process when the Investigator-in-charge is absent.	Chapter 3 "Investigation responsibilities", Paragraph 3.3 states "Support coordinators", who are individuals that ssupport the investigator-in-charge in all endeavours. These coordinators are the "deputy investigator in charge","the head office coordinator", the "administration coordinator", the "public relations coordinator" and the "site safety coordinator". While these figures provide support to the investigation and communication with groups-organizations-States, they are not covered neither have similes in the national regulations, and their implementation could act as a numbing element of the investigation, to divide unnecessarily certain functions that now fall in the same establishment, since all are developed by the Department of Accident Prevention.	The guidance material related to support coordinators is not included in the ARCM regulation but in the ARCM procedures manual for aircraft accidents and incidents investigation and therefore, it is not of regulatory nature but it is of procedural instead, so that the text would not affect any national regulations of ARCM States. For purposes of harmonization of ARCM procedures, it is suggested that the State considers the text of Section 3.3 concerning to the support coordinators.

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
	3.3.3 The **Head Office Coordinator** assists the Investigator-in-charge in coordinating internal and external support for investigators in the field and in keeping the States, ARCM and various agencies involved in the occurrence informed as to the progress of the investigation. 3.3.4 The **Administration Coordinator** provides administrative support to the investigation team, including the establishment of a secure on-site office for the collection, retention and distribution of material collected during the on-site investigation. 3.3.5 The **Public Relations Coordinator** provides expertise and advice to the Investigator-in-charge concerning the handling of the media and their requests, arranges media events, provides advice on community relations, assures that media requests and community queries are followed up, and promotes a positive public image for the accident investigation authority.		

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
	On occasion, the public relations coordinator may be appointed as the spokesperson on the following: the investigation authority's mandate, its investigation process, and on previously released investigation information. 3.3.6 The **Site Safety Coordinator** ensures that all the activities at the accident site are properly coordinated with specific emphasis on site and investigation team security and safety. This role should include, but not necessarily be limited to, the following: a) reviewing the cargo manifest and working with local safety officials as necessary; b) conducting an initial assessment of the circumstances of the accident site(s), the geography and condition of the site(s), and the hazards that exist, including biohazards;		

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
	c) defining the boundary(ies) of the site(s) required for the investigation, and the hazardous zones within the site(s); d) on behalf of the investigation authority coordinate with the competent police authority for the custody of the site(s); e) taking action to mitigate the risks within the site(s), to the degree possible; f) determining the safety equipment and safety procedures for investigators operating on the site; and g) establishing and maintaining the safety of operations and of personnel at the accident site(s).		

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
Chapter 3 Reference 3.5.1 3.5.2 3.5.3 Patern	**CHAPTER 3 – INVESTIGATION RESPONSABILITIES** **3.5 ARCM INVESTIGATOR / EXPERT** 3.5.1 An ARCM investigator/expert is that designated by the ARCM General Board Chairman through the ARCM General Coordinator to participate in an accident investigation upon request of the State of the occurrence, member of the ARCM. The investigator/expert would have the same prerogatives that those of a local investigator for carrying out the accident investigation or participating of o group of experts of a determined area. 3.5.2 The ARCM investigator/expert should depend of the investigator in charge of the investigation, and could provide the necessary advisory to proceed in an effective way. 3.5.3 In case that the investigating authority does not count with qualified personnel to assume as investigator in charge, the ARCM should be request that the investigator	Chapter 3, Paragraph 3.5 "Investigator / ARCM expert" refers to the person designated by the ARCM for, at the request of the State of the occurrence; participate in an accident investigation, with the same prerogatives as the local investigator. In this regard, the national legislation does not allow the total neither the partial delegation of the investigation (Art. 181 of the Aeronautical Code), so the figure of the ARCM expert could only be limited to purposes of technical advice in some case needed, but in no event, could have the same prerogatives of a local investigator.	The CT take notes of the State national legislation, which does not allow the total or partial delegation of the investigation. The current approach of the ARCM is cooperation and for this cooperation to happen it must first be a request from an ARCM member State and the acceptance of other State wishing to provide support, in this case the support to a State is subject to the national legislation of each State. If a State does not allow receiving support under its legislation, there is nothing to worry about it, because while a State does not request it, the support will not be granted.

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
	assigned to the investigation should have the necessary qualifications and experience to perform this function. In this case, the ARCM investigator should be in charge of the investigation, but the investigating authority will continue having the responsibility of the investigation.		
Chapter 3 Reference 3.5 Patern	**3.5 ARCM INVESTIGATOR / EXPERT**	Along with the above, Paragraph 3.5 of the document does not correspond to what is stated in the index, which contains "Accredited Representatives" and not "Investigator/ARCM expert".	El CT toma nota del comentario y procederá a realizar la corrección respectiva.
General	General	While the documents studied meet the intended purposes, these texts tend to replicate what is contained in other ICAO documents, which could complicate the development and updating of the internal regulations of the States, having multiple governing documents with the same content and the same subject, which contain some differences, such as those mentioned. According to the above, it is estimated to be more useful for States to strengthen compliance with the standards of Annex 13 and related documentation (such as document 9756), as it not only allow standardization between the ARCM member States, but also with all other signatories to the Convention on International Civil Aviation, also suggesting limit the content of textbooks studied to those guidelines and procedures that are not described in the existing international standards (ICAO) in order to optimize the use of resources, facilitate understanding, updating and	The CT takes note of the comments and will proceed with the respective changes. One of the ARCM objectives is to facilitate cooperation between member States, for that, it is needed to have with a set of harmonized regulations and procedures for that harmonization be effective and efficient. All ARCM documents follow the standards of the documents defined by ICAO, such as Annex 13 and the relevant parts of Doc 9756.

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Chile	ARCM CT analysis and evaluation
		compliance to finally enforce compliance with the standards and recommended practices, which are subject to USOAP audits.	

Appendix A

Differences checklist - Uruguay

OCTOBER 2015

Report on the ARCM AIG procedures manual

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Uruguay	ARCM CT analysis and evaluation
Chapter 1 Reference 1.5.3 Pattern	**CHAPTER 1: INVESTIGATION MANDATE** **1.5 RESPONDING TO NOTIFICATIONS** 1.5.3 The investigation authority's immediate response to notifications will facilitate the immediate response of local authorities (judicial power, fire and police departments) and the prompt arrival on site of investigators. The following tasks should be accomplished without delay, in coordination with the Authority that has the jurisdiction of the place of the accident in order to be able to proceed with the necessary measures for: a) securing the occurrence site, aircraft, wreckage, and other equipment involved to ensure their preservation, including protection against further damage, and the deterioration or disappearance of essential evidence due to theft, displacement or improper handling	Section 1.5 "Response to Notifications" in paragraph 1.5.3 which says "The immediate response ..... of local authorities (judicial power, police and fire departments) . The State suggests the term judiciary should be included.	Whereas the judicial power considers the States as part of the relevant authorities, the inclusion of the term in section 1.5.3 is appropriate. It also highlights the importance of joint work with the judicial power that AIG authorities should consider in order to clarify the objectives of the accident investigation under Annex 13. State comments have technical support and CT qualifies them as appropriate for an amendment to the ARCM Accident and Incident Investigation Procedures Manual.

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Uruguay	ARCM CT analysis and evaluation
	of the wreckage; b) taking steps to preserve, through photography or other appropriate means, any evidence of a transitory nature, such as ice or soot deposits, corrosion of the wreckage, obliteration of ground scars, or contamination; c) obtaining the names and addresses of all witnesses whose testimony may aid in the investigation – obtaining early statements from these witnesses could limit the risks that their accounts of the occurrence will become contaminated over time; d) initiating the collection and securing of all records associated with the occurrence flight (for example crew, aircraft, and air traffic services); and e) forming of the investigation team and dispatching the members of the team to the occurrence site. f) In case that the investigation organism needs to count with the participation of an ARCM investigator, this should coordinate and take primary action until the		

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Uruguay	ARCM CT analysis and evaluation
	ARCM investigator presents in the place of the occurrence.		
Chapter 3 Reference **3.2.1** Pattern	**CHAPTER 3 – INVESTIGATION RESPONSABILITIES** **3.2 INVESTIGATOR-IN-CHARGE** 3.2.1 The Investigator-in-charge is responsible for the day-to-day management and conduct of the investigation. During the pre-field phase, the Investigator-in-charge must determine the human, technical and financial resources needed for the investigation and must establish the investigation team that will work in the accident. During the field phase, the Investigator-in-charge is responsible for the conduct and control of the investigation, including defining the scope of factual information to be gathered. During the later phases of the investigation, when the significance of the established facts is under consideration, the Investigator-in-charge must consolidate the group reports, analyse the information, and draft the Final Report.	In Chapter 3 "Investigation Responsibilities" in paragraph 3.2.1. Where it says, "the investigator-in-charge is responsible for managing and conducting the investigation, delete the word daily.	Paragraph 3.2.1 provides that the investigator-in-charge is responsible for daily management and conduct of the investigation. The State suggests deleting the term daily. However, in this point the word refers to daily tasks that the investigator-in-charge must perform in the course of the investigation. For these reasons, we suggest changing the term "daily" to "every day," for the term makes more sense in Paragraph 3.2.1.k

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Uruguay	ARCM CT analysis and evaluation
Chapter 3 Reference 3.2.3 Pattern	**CHAPTER 3 – INVESTIGATION RESPONSABILITIES** **3.2 INVESTIGATOR-IN-CHARGE** 3.2.3 The Investigator-in-charge should have authority over all the members of the investigation team during the field phase of the investigation while they are away from their usual place of work. As such, the Investigator-in-charge should have the power to take administrative action, which includes authorizing travel expenses and overtime, approving. leave, and authorizing the issuance of equipment. The Investigator-in-charge should also have the authority to give out contracts and to engage in other necessary financial commitments.	In paragraph 3.2.3. Replace the word "authority" with "request the competent authority"	Paragraph 3.2.3 provides that the investigator-in-charge should have authority over all the members of the investigation team during the field phase, while they are away from their usual place of work. As such, the investigator-in-charge should have the power to take administrative action, which includes authorizing travel expenses and overtime, approving leave, and authorizing the issuance of equipment. The investigator-in-charge should also have the authority to request the extension of contracts and to conclude other required financial commitments. Annex 13 defines the investigator-in-charge as the person, because of his/her qualifications, responsible for organizing, conducting and controlling an investigation. In this case, if the investigator-in-charge has the responsibility, he/she should also have the authority as defined in Paragraph 3.2.3. For these reasons, we suggest keeping this paragraph as written in the ARCM Accident and Incident Investigation Procedures Manual.
Chapter 3 Reference 3.4.3 Pattern	**CHAPTER 3 – INVESTIGATION RESPONSABILITIES** **3.4 INVESTIGATION GROUPS** **3.4.3 Aircraft Performance Group**	In section 3.4 "Research Group" in paragraph 3.4.3. Where it says, "This group ..... include "may request, if necessary, flight or simulator tests, according to performance."	The Aircraft Performance Group has all the necessary expertise in the investigation to determine the need for performance-related flight tests or simulator tests and should request the corresponding tests. From the text of the procedure, we understand that the Aircraft Performance Group is responsible for determining whether it is necessary to carry out

AIG procedures manual reference	ARCM procedures manual for accidents and incidents investigation	Comments and differences of Uruguay	ARCM CT analysis and evaluation
	An Aircraft Performance Group may be formed when there is a need for an in-depth examination of the aircraft performance characteristics that may have been causal to the accident. This group will gather the information on aircraft performance for the particular phases of flight and complete a scientific/mathematical analysis. This group will coordinate with most of the operational and technical groups to gather the basic information and will determine if there is a need to conduct performance-related flight tests or simulator tests.		performance-related flight tests or simulator tests. Also, a request for such tests will be incumbent upon the investigator-in-charge. For these reasons, we suggest maintaining the existing text of paragraph 3.4.3.

South American AIG Regional Cooperation Mechanism (ARCM)

Procedures for aircraft accidents and incidents investigation

Approved by South American ARCM General Coordinator and published under his responsibility

First edition
July 2015

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AMENDMENTS

Amendments are published on the ARCM website www.arcm-sam.org. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

FOREWORD

The purpose of this manual is to encourage the uniform application of the Standards and Recommended Practices contained in Annex 13 to the Convention on International Civil Aviation and to provide information and guidance to members States of the AIG Regional Cooperation Mechanism (ARCM) of South America on the procedures, practices and techniques that can be used in aircraft accident and incident investigations. Since accident investigations vary in complexity, a document of this kind cannot cover all eventualities. The more common techniques and processes, however, have been included. Although this manual will be of use to experienced and inexperienced investigators alike, it is **not** a substitute for investigation training and experience.

Because this manual deals with both accident and incident investigations and, for reasons of brevity, the term "accident investigation", as used herein, applies equally to "incident investigation".

The following ICAO documents provide additional information and guidance material on related subjects:

— Annex 13 - *Aircraft Accident and Incident Investigation*;
— Manual of aircraft accident and incident investigation (Doc 9756)
— *Manual on Regional Accident and Incident Investigation Organization* (Doc 9946);
— *Manual on Accident and Incident Investigation Policies and Procedures* (Doc 9962);
— *Manual of Civil Aviation Medicine* (Doc 8984);
— *Hazards at Aircraft Accident Sites* (Cir 315);
— *Human Factors Training Manual* (Doc 9683);
— Human Factors Digest No. 7- *Investigation of Human Factors in Accidents and Incidents* (Circ. 240); and
— *Training Guidelines for Aircraft Accident Investigators* (Circ 298).

This manual will be amended periodically as new investigation techniques are developed and updated information becomes available.

Throughout this manual, the use of the male gender should be understood to include male and female persons.

Readers are invited to submit material for possible inclusion in subsequent editions of this manual. This material should be addressed to:

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Chapter 1

INVESTIGATION MANDATE

1.1 GENERAL

1.1.1 In accordance with the provisions of Annex 13 and the AIG State regulation, the State of Occurrence shall institute investigations and be responsible for investigating the circumstances of accidents and of serious incidents when the aircraft is of a maximum mass of over 2 250 kg. Annex 13 also recommends that the State of Occurrence should institute an investigation into the circumstances of serious incidents involving smaller aircraft. The State of Occurrence may delegate the whole or any part of the conduct of an investigation to another State member or not of the ARCM or in a regional accident investigation organization (RAIO) by mutual arrangement and consent.

1.1.2 The sole objective of the investigation of an accident or incident conducted under the provisions of Annex 13 and AIG State regulation shall be the prevention of accidents and incidents. The accident investigation authority responsible for the investigation shall have independence in the conduct of the investigation and have unrestricted authority over its conduct, consistent with the provisions of this Annex and the AIG State regulation. The investigation shall normally include:

a) the gathering, recording and analysis of all relevant information on that accident or incident;

b) if appropriate, the issuance of safety recommendations;

c) if possible, the determination of the causes, contributing factors and system latent conditions; and

d) the completion of the final report.

1.1.3 The extent of the investigation and the procedures to be followed in carrying out such an investigation shall be determined by the accident investigation authority, depending on the lessons it expects to draw from the investigation for the improvement of the State and SAM region safety. The scope and complexity of the investigation and the size and composition of the investigation team would be influenced by the following factors, among others:

a) injuries, deaths and damage to equipment, third parties and the environment;

b) identified and potential safety issues underlying the accident/incident;

c) the likelihood of recurrence, the probability of adverse consequences, and the severity of adverse consequences;

d) accident and incident history related to the type of operation, size and type of aircraft, the operator, manufacturer, and regulator; and

e) actual and potential deviations from industry safety and operational regulations, standards, procedures and practices.

1.2 DEFINITIONS

In addition to the definitions contained in Chapter 1 of Annex 13 and the AIG State regulation, the following definitions apply to this manual:

Investigator-in-charge. A charged, on the basis on his or her qualifications, with the responsibility for the organization, conduct and control of an investigation.

Note.- Nothing in the above definition is intended to preclude the functions of an investigator-in-charge being assigned to a commission or to other body.

Occurrence. Any accident or incident associated with the operation of an aircraft.

Major Accident Investigation. An investigation into an accident involving a large aircraft and usually involving fatalities.

Smaller Investigation. An investigation into an incident involving any aircraft or into an accident involving a small aircraft.

1.3 ORGANIZATIONAL READINESS

In this manual, in part, provides that the investigation authority should have:

a) appropriate legislation that defines the rights and responsibilities of the aircraft accident investigation authority;

b) ready access to sufficient funds;

c) investigators who have the appropriate experience, training, clothing and equipment;

d) State regulations that provide for the accident investigation authority to be immediately notified of any accident or incident in its territory;

e) policies, plans, procedures and checklists required for investigations; and

f) an organization that ensures that accident and incident notifications are received and acted upon on a twenty-four-hour basis.

1.4 PLANNING FOR RESPONSES TO NOTIFICATIONS

1.4.1 Even though an investigation authority may have sufficient personnel, equipment and financial resources to properly handle a normal number of small accidents and incidents, a higher number of occurrences or even one large accident could result in a situation wherein the financial, equipment and personnel expertise resources required to conduct a thorough investigation may exceed those of the authority. In this regard, the authority should have provisions for acquiring supplementary funding and utilizes the ARCM for filling investigation expertise gaps.

1.4.2 The investigation authority shall have a documented process for assessing individual occurrences in order to determine the scope and depth of its investigations and the assignment of available resources. Factors that would influence such decision-making would include the potential for the investigation to result in safety improvements, the available investigative resources, national interests, national and international obligations and commitments, and media and public expectations.

1.5 RESPONDING TO NOTIFICATIONS

1.5.1 The investigation authority must respond immediately to notifications of accidents and incidents. The authority should maintain response plans and a ready posture, and have the capability to act upon these notifications on a twenty-four-hour basis.

1.5.2 The investigation authority's plans for responding to notifications should consider the following:

a) an immediate review of the information in the notification to ensure that all the required information has been provided;

b) the collection of missing or additional information, as soon as possible;

c) the validation of the information collected, to the degree possible;

d) an assessment of the information received and the circumstances of the occurrence to determine the classification of the occurrence (accident, serious incident or incident) and the scope and size of the investigation to be conducted;

e) the appointment of an Investigator-in-charge;

f) the notification of national authorities, local authorities, States and other organizations that may be involved in or have an interest in the occurrence; and

g) the allotment of resources (financial, equipment and personnel) to the investigation.

1.5.3 The investigation authority's immediate response to notifications will facilitate the immediate response of local authorities (judicial power, fire and police departments) and the prompt arrival on site of investigators. The following tasks should be accomplished without delay, in coordination with the Authority that has the jurisdiction of the place of the accident in order to be able to proceed with the necessary measures for:

a) securing the occurrence site, aircraft, wreckage, and other equipment involved to ensure their preservation, including protection against further damage, and the deterioration or disappearance of essential evidence due to theft, displacement or improper handling of the wreckage;

b) taking steps to preserve, through photography or other appropriate means, any evidence of a transitory nature, such as ice or soot deposits, corrosion of the wreckage, obliteration of ground scars, or contamination;

c) obtaining the names and addresses of all witnesses whose testimony may aid in the investigation – obtaining early statements from these witnesses could limit the risks that their accounts of the occurrence will become contaminated over time;

d) initiating the collection and securing of all records associated with the occurrence flight (for example crew, aircraft, and air traffic services); and

e) forming of the investigation team and dispatching the members of the team to the occurrence site.

f) In case that the investigation organism needs to count with the participation of an ARCM investigator, this should coordinate and take primary action until the ARCM investigator presents in the place of the occurrence.

Chapter 2

SIZE AND SCOPE OF THE INVESTIGATION

2.1 GENERAL

2.1.1 It is essential that the magnitude of the tasks and the scope of the investigation be assessed at an early stage so that the size of the investigation team can be planned, and the appropriate expertise can be acquired for the investigation. To achieve its purpose, the investigation should be properly organized, carried out, coordinated and supervised by qualified technical personnel.

2.1.2 Based on its assessment of the information contained in the notification and any other information available, the investigation authority must first decide on the type and scope of investigation and appoint the Investigator-in-charge. The Investigator-in-charge then becomes directly responsible for organizing the investigation team and for assigning responsibilities to its members.

2.1.3 Throughout the investigation, the Investigator-in-charge will manage the progress of the investigation. Specifically, the Investigator-in-charge must review the evidence as it is developed and make decisions that will direct the extent and depth of the investigation. It should be recognized that the precise extent and depth will be contingent upon the nature of the occurrence and, possibly, upon the availability of investigative resources.

2.1.4 Similarities between occurrences may tempt the unwary to arrive at premature conclusions. It is imperative that each investigation be approached individually based on the circumstances of the occurrence. Based on the evidence uncovered by the on-site investigation, it may be possible to eliminate certain areas from possible causal consideration at a fairly early stage during the investigation. As the investigation progresses, however, the need for extensive studies in one or more particular fields might become evident. It should be noted that this later statement or the various sections of this manual that follow are not intended to convey the impression that extensive technical studies need to be performed in every investigation or that every investigation needs to cover every aspect of the aircraft and its operation.

2.2 MAJOR ACCIDENT INVESTIGATION

2.2.1 In a major accident investigation, a substantial team of investigators is usually necessary to cover all aspects of the occurrence. The Investigator-in-charge should establish working groups, as required, to cover various functional areas of the investigation. Normally, investigators from the State conducting the investigation will head the various working groups. The membership of such groups may include, as appropriate, other investigators from the investigation authority conducting the investigation, from the investigation authorities of the States involved in the occurrence, from the ARCM when requested, as well as experts from the operator and the manufacturers of the aircraft, powerplant and accessories, who can contribute their technical knowledge and experience to the investigation. The number of groups, and the number of personnel assigned to each group, will depend on the type and complexity of the accident.

2.2.2 Nothing precludes using the major accident investigation procedures for the investigation of serious incidents or accidents involving a small aircraft.

2.2.3 In some investigations, the apparent causes/contributing factors may become evident early in the

investigation. In such situations, the subsequent prime investigative effort may then be channelled to good effect into a relatively narrow but specialized area. Nevertheless, it will still be necessary to investigate all factors that might have contributed to the accident and to eliminate those factors that did not. Whenever possible, system latent conditions should be identified for the respective assessment, and recommend mitigation actions. In situations wherein the causes are not readily apparent, the investigator must progress steadily through all aspects of the occurrence, and this type of situation may require substantive effort of many groups of investigators working in a balanced and coordinated manner.

Note.- Chapter 4 of this manual provides more specific guidance on the investigation of major accidents.

2.3 SMALLER INVESTIGATIONS OF INCIDENTS AND ACCIDENTS

2.3.1 In the case of incidents and non-major accidents, the investigative effort required in terms of manpower and resources may be proportionately smaller than that required for a major accident. In such situations, the smaller investigation might be handled by one or two investigators. One group of investigators can be assigned responsibilities normally assigned to two or more groups, or alternatively, one trained investigator can conduct the investigation assisted by one or more subject-matter experts.

2.3.2 Most investigations into serious incidents may be conducted by a small investigation team. Notwithstanding, this does not preclude investigating a serious incident using a larger investigation team and following the guidance for major investigations contained in section 2.2 and in Chapter 4 of this manual.

2.3.3 Even in small investigations, the degree of individual effort and diligence in accurately recording the facts and developing the analysis and conclusions must be of the same high standards as for major accident investigations.

Note.- Chapter 5 of this manual provides more specific guidance on the investigation of incidents involving any aircraft, or into accidents involving a small aircraft.

Chapter 3

INVESTIGATION RESPONSIBILITIES

3.1 GENERAL

3.1.1 The investigation authority has overall responsibility for the investigation and the investigation final report, including those investigations that have been delegated to other States or to the ARCM, therefore ensuring the necessary funds for the investigation. In practice, the authority delegates the day-to-day conduct of the investigation to the appointed Investigator-in-charge, who will be in every case an investigator from the AIG authority in charge of the investigation.

3.1.2 The Investigator-in-charge must keep the authority apprised of any major shift in the size and scope of the investigation and of any other situations that may result in a significant change to the resources required for the investigation.

3.1.3 The following sections provide an overview of the typical responsibilities of investigation team members of a major investigation. The Major Accident Investigation Guide (MAIG) in Appendix 6 of this manual provides more information on these responsibilities.

3.1.4 For smaller investigations, the Investigator-in-charge should be responsible for the managerial, administrative and support responsibilities. The remaining responsibilities listed in section 3.3 “Group Responsibilities”, if pertinent to the investigation, should be divided amongst the Investigator-in-charge and the other available investigators.

3.2 INVESTIGATOR-IN-CHARGE

3.2.1 The Investigator-in-charge is responsible for the day-to-day management and conduct of the investigation. During the pre-field phase, the Investigator-in-charge must determine the human, technical and financial resources needed for the investigation and must establish the investigation team that will work in the accident. During the field phase, the Investigator-in-charge is responsible for the conduct and control of the investigation, including defining the scope of factual information to be gathered. During the later phases of the investigation, when the significance of the established facts is under consideration, the Investigator-in-charge must consolidate the group reports, analyse the information, and draft the Final Report.

3.2.2 The Investigator-in-charge should liaise and coordinate investigation activities with other organizations, agencies and parties; enter into necessary informal agreements to facilitate the coordination; recognize and authorize observer/participant status; act as the investigation spokesperson; and, in the absence of established standards, procedures or instructions, take appropriate action, as necessary.

3.2.3 The Investigator-in-charge should have authority over all the members of the investigation team during the field phase of the investigation while they are away from their usual place of work. As such, the Investigator-in-charge should have the power to take administrative action, which includes authorizing travel expenses and overtime, approving. leave, and authorizing the issuance of equipment. The Investigator-in-charge should also have the authority to give out contracts and to engage in other necessary financial commitments.

3.3 SUPPORT COORDINATORS

3.3.1 Support coordinators are usually individuals belonging to the investigation authority of the State conducting the investigation. The coordinators support the Investigator-in-charge in all endeavours, act in direct support of the investigation process, and liaise with different groups, organizations and States. Coordinators who could be involved in a major investigation include: the deputy Investigator-in-charge, head office coordinator, administration coordinator, public relations coordinator, and site safety coordinator.

3.3.2 The **Deputy Investigator-in-charge** assists the Investigator-in-charge in the organization, conduct and control of the investigation. He also provides continuity in the investigation process when the Investigator-in-charge is absent.

3.3.3 The **Head Office Coordinator** assists the Investigator-in-charge in coordinating internal and external support for investigators in the field and in keeping the States, ARCM and various agencies involved in the occurrence informed as to the progress of the investigation.

3.3.4 The **Administration Coordinator** provides administrative support to the investigation team, including the establishment of a secure on-site office for the collection, retention and distribution of material collected during the on-site investigation.

3.3.5 The **Public Relations Coordinator** provides expertise and advice to the Investigator-in-charge concerning the handling of the media and their requests, arranges media events, provides advice on community relations, assures that media requests and community queries are followed up, and promotes a positive public image for the accident investigation authority. On occasion, the public relations coordinator may be appointed as the spokesperson on the following: the investigation authority's mandate, its investigation process, and on previously released investigation information.

3.3.6 The **Site Safety Coordinator** ensures that all the activities at the accident site are properly coordinated with specific emphasis on site and investigation team security and safety. This role should include, but not necessarily be limited to, the following:

a) reviewing the cargo manifest and working with local safety officials as necessary;

b) conducting an initial assessment of the circumstances of the accident site(s), the geography and condition of the site(s), and the hazards that exist, including biohazards;

c) defining the boundary(ies) of the site(s) required for the investigation, and the hazardous zones within the site(s);

d) on behalf of the investigation authority coordinate with the competent police authority for the custody of the site(s);

e) taking action to mitigate the risks within the site(s), to the degree possible;

f) determining the safety equipment and safety procedures for investigators operating on the site; and

g) establishing and maintaining the safety of operations and of personnel at the accident site(s).

3.4 INVESTIGATION GROUPS

3.4.1 General

3.4.1.1 The investigation groups can typically be divided into two categories: the operational category and the technical category. The operational category may include the following groups: Operations; Aircraft Performance; Medical/Human Factors; Witness; Flight Recorders[1]; Meteorology; Air Traffic Services/Airport; Survivability; and Cabin Safety. The technical category may include the following groups: Maintenance and Records; Systems; Structures; Powerplants; Site Survey; Crashworthiness; and Photo/Video.

3.4.1.2 Depending on the circumstances of the occurrence and the number of qualified personnel available to carry out the investigation, it may be impractical to approach each investigation with a full investigation team; therefore, some groups may be combined and/or some groups may be eliminated altogether. The Investigator-in-charge will ultimately determine the investigation team composition. A group chief will be responsible for all the activities of his group for the whole period of the investigation. Normally, the activities of the various groups cease when their group reports are completed and submitted to the Investigator-in-charge.

3.4.2 Operations Group

3.4.2.1 The Operations Group is responsible for collecting the facts concerning the history of the flight and the flight crew activities before, during and after the accident/incident. This includes the man-machine relationship and the actions or inactions present in the events surrounding the accident. It also includes flight planning, dispatch, mass and balance, weather and weather briefing, radio communications, air traffic services, navigation facilities, en-route stops, refuelling, flight experience, flight checks and general information concerning the flight crew. It also includes all aspects of training received and an assessment of the adequacy of this training; the level of supervision, including orders, regulations and manuals; and, the performance of supervisors, instructors and company management. The medical history of the flight crew, including any recent illnesses, psychological factors, rest periods, and activities, particularly during the seventy-two hours prior to the accident, should be determined. This latter aspect of the investigation should be coordinated with the Medical/Human and Organizational Factors Group. The Operations Group should also determine the flight path prior to the accident or incident. In this effort, it is essential to coordinate with the Witness Group, the Flight Recorder Group, and the Site Survey Group.

3.4.2.2 There are occasions when it is desirable to form additional groups to take over some of the functions of the Operations Group.

3.4.3 Aircraft Performance Group

An Aircraft Performance Group may be formed when there is a need for an in-depth examination of the aircraft performance characteristics that may have been causal to the accident. This group will gather the information on aircraft performance for the particular phases of flight and complete a scientific/mathematical analysis. This group will coordinate with most of the operational and technical groups to gather the basic information and will determine if there is a need to conduct performance-related flight tests or simulator tests.

1. Depending on the circumstances of the occurrence, it may be appropriate to establish the Flight Recorders Group as a technical group.

3.4.4 Medical/Human and Organizational Factors Group

3.4.4.1 Support regarding the investigation of medical and human and organizations factors issues would be achieved by assigning the subject-matter experts to the investigation group(s) requiring such assistance. A separate Medical/Human Factors Group would only be formed when there is a requirement to conduct an in-depth examination of the aero medical, crash injury, and/or human performance issues.

3.4.4.2 For human factors issues, this group would be responsible for gathering and analysing evidence on the general physical, physiological and psychological conditions, the environmental factors, and the organizational and management factors that might have adversely affected the crew or other individuals in the performance of their duties. The investigation of human factors should be conducted always, which would include the performance of, among others, cabin crew, air traffic controllers, maintenance crew, engineers, regulatory officials, decision-makers and the organization.

3.4.4.3 For medical issues, this group would be responsible for gathering and analysing evidence associated with the pathological, aviation-medical and crash-injury aspects of the investigation, including the identification of the crew, their location at the time of the accident, and by reviewing their injuries, their position and their activity in the cockpit at the time of the impact. This group will cover matters involving autopsies of crew and passengers, as appropriate, not only to identify the victims and to assist in legally determining the cause of death, but also to obtain all possible medical evidence which may be of assistance in the investigation. The group will also investigate the design factors related to human engineering that may have contributed to the causes of the accident, the survival aspects, and the crashworthiness of the aircraft contributing to the injury or death of the occupants.

3.4.4.4 The functions of the Medical/Human and Organizational Factors group must be closely coordinated with the Operations Group, Air Traffic Services/Airports Group, Witness Group, Recorders Group, Maintenance and Records Group, Structures Group and Crashworthiness Group.

3.4.5 Witness Group

The Witness Group is responsible for contacting and interviewing all survivors of the flight, and all persons who may have seen or heard some portion of the flight, or who may have knowledge concerning the flight or of the weather conditions at the time of the accident. The group's activity can range from questioning relatively few witnesses to a door-to-door activity covering great distances along the flight path in which hundreds of possible witnesses are interviewed. Information concerning observed positions, heights, altitudes, sounds, aircraft behaviour and in-flight disintegration can be gathered in this manner. The location of witnesses at the time of the accident should be plotted on a suitable map of the area. Whilst interviewing witnesses, close coordination must be maintained with the Operations Group, the Flight Recorder Group and the Site Survey Group in determining the flight path. In some instances, interpretation and translation facilities have to be provided for the interview of witnesses.

3.4.6 Flight Recorders Group

3.4.6.1 The Flight Recorders Group is responsible for examining and analysing the on-board and ground-based flight recorders, including the flight data recorders, cockpit voice recorder(s), and cockpit airborne image recorders. The Group will arrange through the Investigator-in-charge for their read-out. The calibration of the parameters in the flight data recorder must be taken into consideration in the interpretation of such read-outs; this work will often require coordination with manufacturers, vendors, or the operator(s) to ensure proper conversion of the parameters. The results of the read-outs must be closely coordinated with the Operations Group and such other groups as the circumstances indicate.

3.4.6.2 Due to the importance of flight recordings, extreme care must be taken in handling the recorders to prevent damage. Only fully qualified personnel should be assigned to recover and handle the recorders. Handling and transportation of the flight recorders from the accident site to the read-out facilities should be carried out by a member of the investigation authority.

3.4.6.3 The Flight Recorders Group may also be responsible for recovery and analysis of information contained on other aircraft computers (for example, flight management systems, traffic collision avoidance system, and terrain awareness and warning system), on memory units containing satellite navigation information, and on other portable electronic recording devices that can store some data related to the accident. The group may also be responsible for collecting and synchronizing flight data, audio and video information stored on ground-based devices.

3.4.7 Meteorology Group

When the weather is an important factor in an accident, a separate Meteorology Group, composed of meteorology and operations specialists, can best serve the investigation. The Meteorology Group is responsible for the collection and compilation of meteorological data pertinent to the accident, including both surface and upper air reports of actual conditions, pilot reports, recorded meteorological data, as well as forecasts of anticipated conditions prepared and issued by the agencies involved. This group is also responsible for investigating the systems, sensors, equipment and processes used to generate and provide weather information. Of necessity, the Meteorology Group must maintain close coordination with other groups, particularly the Operations Group, the Air Traffic Services/Airports Group and the Witness Group.

3.4.8 Air Traffic Services and Airport Group

3.4.8.1 When air traffic services or navigation aids are involved in the occurrence, the Air Traffic Services and Airport Group, which should include air traffic services specialists, should be established. This group is responsible for the review of the records of the air traffic services units concerned, including radar screen recordings, the radio communication and telephone line voice recordings; and, for the verification that written transcripts of voice communications are consistent with the recordings. This group should provide, when appropriate, a reconstruction of the history of the flight based on air traffic services information. In addition, the Group should determine the operating status of pertinent navigation aids, communications equipment, radar, transponder equipment, computers, and other equipment; and, should provide technical data on all such equipment and its operation, whenever it is deemed necessary.

3.4.8.2 When applicable, this group should investigate the operational status of the airport, pertinent navigational aids, communications equipment, radar, transponder equipment, and computers, and provide technical data on all such equipment and its operation.

3.4.9 Survivability Group

When required, the Survivability Group will be established to investigate the evacuation, the crash response, the firefighting, the survival and the rescue issues. The activities of this group include an examination of the respective equipment and of the manner in which it was used. Close coordination with the Human Factors Group, Operations Group and Cabin Safety Group will be required. This group could also logically be a sub-group of the Medical/Human and Organizational Factors Group.

3.4.10 Cabin Safety Group

The Cabin Safety Group is responsible for thoroughly exploring all the aspects of the accident related to the actions of the passengers and cabin crew members. This will normally include the following aspects:

passenger/crew member survivability factors; company policies and procedures as they relate to passenger/crew member safety; industry policies, procedures and regulations; and flight attendant training with respect to operational safety issues.

3.4.11 Maintenance and Records Group

The Maintenance and Records Group is responsible for reviewing the maintenance records to ascertain the maintenance history of the aircraft regarding adequacy of inspection, malfunctions that might be related to the occurrence, flight time on the aircraft, engines and components, and the flight time since overhaul. These activities are normally performed at the maintenance base of the operator. The function of this group involves close coordination with the other technical investigation groups, the State of Registry and the operator. This group is also responsible for reviewing recovered technical flight documents. Close coordination with the Operations Group will be required.

3.4.12 Systems Group

The Systems Group is responsible for the detailed examination of all systems and components, among others hydraulics, pneumatics, electrical and electronics, radio communication and navigation equipment, air conditioning and pressurization, ice and rain protection, cabin fire extinguishers, and oxygen. The examinations will include determination of the condition and operational capabilities of components. It is important that all system components be accounted for, within reason. The examination includes determination of the positions of associated controls and switches, as well as the identification and downloading of data contained in built-in test equipment. This group must coordinate its activities with the Flight Recorders, Operations, Site Survey, Maintenance and Records, Structures and Powerplants groups.

3.4.13 Structures Group

3.4.13.1 The Structures Group is responsible for collecting and analysing the facts and evidence related to the airframe and flight controls. If the wreckage is scattered, the Group's first concern is to locate and identify as many sections, components and parts as possible and to plot their positions on a wreckage distribution chart.

3.4.13.2 A reconstruction of the aircraft structure may be necessary, and this task could vary from laying out various pieces of wreckage on a flat area to the more complicated re-assembly of all available pieces in position on a framework. This procedure is most often used for in-flight break-up, in-flight fire and explosion type accidents. The main purpose of such a reconstruction is to identify the point of initial failure and to establish the progression of the break-up pattern. Close cooperation with the Site Survey Group is usually required.

3.4.14 Powerplants Group

The Powerplants Group is responsible for collecting and analysing the evidence related to the engine(s), including fuel and oil systems, propeller(s) and powerplant controls. The initial work of this group may be carried out in conjunction with the Structures Group and the Site Survey Group in the locating and plotting of wreckage. All powerplant fires should be investigated. This group is also responsible for determining the type of fuel used, the possibility of fuel contamination, and the effectiveness of the powerplant fire extinguisher system. The functions of this group must be coordinated with the Site Survey, Structures, Systems, Flight Recorders and Operations Groups.

3.4.15 Site Survey Group

The Site Survey Group is responsible for producing, in pictorial and graphic format, a description of the accident site, showing the location and distribution of the wreckage, human remains and other associated items, such as impact marks. This group must establish a probable flight path, an impact angle and impact speed. The activities of this group are linked to the Aircraft Performance Group, Structures Group and Recorders Group.

3.4.16 Crashworthiness Group

The Crashworthiness Group is responsible for determining the survivability issues for all aircraft occupants. The activities of this group will overlap with those of the Structures Group, Site Survey Group, Survivability Group, Flight Recorders Group and Witness Group. This group is often a sub-group of the Structures Group.

3.4.17 Photo/Video Group

The Photo/Video Group is responsible for ensuring that a systematic photographic/video record of the accident is created. This group would also provide photo/video support to the other groups during the field phase and post-field phase, including the documentation of teardowns, examinations and testing of components, and the analysis of photo/video records. This group is often a sub-group of the Site Survey Group.

3.5 ARCM INVESTIGATOR/EXPERT

3.5.1 An ARCM investigator/expert is that designated by the ARCM General Board Chairman through the ARCM General Coordinator to participate in an accident investigation upon request of the State of the occurrence, member of the ARCM. The investigator/expert would have the same prerogatives that those of a local investigator for carrying out the accident investigation or participating of o group of experts of a determined area.

3.5.2 The ARCM investigator/expert should depend of the investigator in charge of the investigation, and could provide the necessary advisory to proceed in an effective way.

3.5.3 In case that the investigating authority does not count with qualified personnel to assume as investigator in charge, the ARCM should be request that the investigator assigned to the investigation should have the necessary qualifications and experience to perform this function. In this case, the ARCM investigator should be in charge of the investigation, but the investigating authority will continue having the responsibility of the investigation.

3.6 ACCREDITED REPRESENTATIVES

3.6.1 Each accredited representative is the official representative of his State and, as such, is responsible for ensuring the safety interests of his State in the investigation. Accredited representatives are the essential links between the State conducting the investigation and the States that have a direct interest in the occurrence. The State of Registry, the State of the Operator, the State of Design, the State of Manufacture and any other State that, on request, provides information, facilities or experts are usually represented by an accredited representative. Chapter 5 to Annex 13 specifies the conditions under which these States are entitled to appoint an accredited representative, including the accredited representative's obligations and rights of access to, among others, the scene of the accident, the relevant evidence, and all pertinent documents. The essential guide in the conduct of investigations, in which accredited representatives participate, is comprised of a spirit of cooperation, participation, access to all relevant information, mutual trust and consultation.

3.6.2 Ideally, the accredited representative(s) should arrive at the accident site with the least possible delay. For this purpose, ICAO Annex 9 relating to Facilitation, provides for the temporary entry into a contracting State for the purpose of participation in an accident investigation. In normal circumstances, the accredited representative should be well advised to proceed directly to the accident site and to make contact with the Investigator-in-charge. Upon the arrival of the accredited representative, the State conducting the investigation should have already received a communication indicating the nomination of the accredited representative and the date of his arrival. During the investigation, the accredited representative should maintain close contact with the Investigator-in-charge rather than participate in a particular group. In this way, he should have an overall appreciation of all the facts relating to the accident and can be most responsive to the needs of the investigation. He should be considered free to communicate investigation information to his own government authorities; however, he must not divulge information on the progress and the findings of the investigation without the express consent of the Investigator-in-charge, exercising considerable care to ensure the preservation of the confidential nature of any information. To this end, the accredited representative should take appropriate precautions to ensure the proper transmission and handling of sensitive investigative information. In some situations, the accredited representative should be well advised to use the communications facilities that might be available at the nearest diplomatic or consular establishment of his government, since the security of communications by email, facsimile or other public services cannot be guaranteed.

3.6.3 Upon the arrival of an accredited representative, the Investigator-in-charge should provide him with a thorough update on the investigation and provide copies of all relevant information and pertinent documents. The Investigator-in-charge should also ensure that the investigation personnel, particularly the Group chiefs are introduced to the accredited representatives and their advisers, and are made aware of their rights and responsibilities.

3.6.4 On those occasions when the Investigator-in-charge requires documents or information, or requires aircraft component examinations to be carried out in the State of Registry, the State of the Operator, the State of Design, the State of Manufacture, or in any other State, it is the responsibility of the accredited representative to endeavour to comply with the request and to use his authority in his own State to ensure that the request is met in so far as it is compatible with the policies of his government.

3.6.5 During the later stages of the investigation, in which the significance of the established facts are under examination, it is desirable that the accredited representative be kept fully informed and invited to express his views, in particular when conclusions are being developed which bear upon persons, organizations, or activities within his State.

3.7 ADVISERS TO ACCREDITED REPRESENTATIVES

3.7.1 An adviser to the accredited representative is a person appointed by a State, on the basis of his or her qualifications, for the purpose of assisting its accredited representative in an investigation. A State that is entitled to appoint an accredited representative shall also be entitled to appoint one or more advisers to assist the accredited representative in the investigation. Normally, advisers will be representatives of the aircraft operator, aircraft manufacturer, and the Civil Aviation Administration (CAA).

3.7.2 Advisers assisting accredited representatives shall be permitted, under the accredited representatives' supervision, to participate in the investigation to the extent necessary to enable the accredited representatives to make their participation effective. In addition, advisers may be invited by the Investigator-in-charge to provide their expert knowledge to one or more groups of the investigation.

3.8 OBSERVERS/PARTICIPANTS

3.8.1 Observer[2] or participant[3] status is a privilege granted by the State conducting the investigation to a person having a direct interest in the investigation and who has the expertise to contribute to achieving the objective of the investigation. Among others, the following persons may be granted observer/participant status: persons representing a State department or agency, the aircraft owner and operator, union or employee associations, the flight crew involved in the accident.

3.8.2 The Investigator-in-charge should advise all the observers/participants in writing of their rights and responsibilities. In this regard, the investigation authority should have a letter of appointment that stipulates the terms and conditions of being granted observer/participant status. The letter of appointment should be signed by both the observer/participant and the Investigator-in-charge.

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2. An observer would be a representative of an involved government department who is authorized by the authority to attend an investigation as an observer.
3. A participant would be a person authorized by the authority to participate in an investigation because in the opinion of the authority that person has a direct interest in the subject matter of the investigation and has the expertise to contribute to achieving the authority's objective.

Chapter 4

MAJOR ACCIDENT INVESTIGATIONS

4.1 GENERAL

4.1.1 The investigation into a major accident routinely requires a substantial team of investigators to cover all aspects of the occurrence. This team should be led by an Investigator-in-charge who has a thorough understanding of applicable national legislation and regulations; a sound understanding of the international standards, recommended practices, requirements, guidelines and protocols; and, experience in the conduct of investigations into accidents involving large aircraft.

4.1.2 The Investigator-in-charge should normally be a senior investigator of the investigation authority of the State responsible for the investigation, or an investigator designated by the ARCM and approved by the State in charge of the investigation. The Investigator-in-charge is responsible for the management and conduct of all aspects of the investigation from the start of the investigation to the time the Final Report is submitted for approval to the State investigation authority.

4.1.3 The size and scope of the investigation and the size and organization of the investigation team should be based on the circumstances of the accident. In this regard, the Investigator-in-charge should consider establishing working groups, as required, to cover various functional areas of the investigation. The number of groups and the number of personnel assigned to each group will depend on the type and complexity of the accident. Normally, investigators from the State conducting the investigation or from the ARCM, when these are requested, will head the various working groups. The members of such groups may include, as appropriate, other investigators from the investigation authority conducting the investigation and from the investigation authorities of the States involved in the occurrence, as well as experts from the operator and the manufacturers of the aircraft, powerplant and accessories, who can contribute their technical knowledge and experience to the investigation. It is preferable that accredited representatives not be assigned to a particular group because such an involvement may adversely affect the accredited representatives' availability and primary responsibilities to their States and to the Investigator-in-charge.

4.1.4 Chapter 5 of Annex 13 details the responsibilities and entitlements of the States involved in an investigation. National legislation and regulations of the State conducting the investigation should contain similar information. In summary and in part, members of an investigation group should have access to all relevant information uncovered in the course of the investigation and should be required to continue in the investigation until the group report is completed. Supporting experts should normally have access to the information necessary for them to advise in their area of expertise.

4.1.5 A major accident is always a significant event that may challenge the competency of the State investigation authority. The credibility of the State investigation authority, its investigation and its Final Report and recommendations will hinge on the independence of its investigation and on its ability to communicate investigation information in timely fashion to those entities having an interest in the investigation, including entities external to the investigation such as survivors, families of victims, and the media. No investigation information should be released without the express approval of the State responsible for the investigation. In most situations, the Investigator-in-charge is delegated this authority, or in the public relations coordinator.

4.2 RESPONDING TO A NOTIFICATION

4.2.1 Immediate notification of accidents to the accident investigation authority is essential because the proper conduct of an investigation requires the prompt arrival of investigators at the accident site. Any delay in their arrival may result in the deterioration or disappearance of essential evidence, displacement or improper

handling of the wreckage, corrosion of the wreckage, and obliteration of ground scars. (Section 1.5 of this manual provides a list of the factors that should be considered by the Investigator-in-charge when responding to notifications.)

4.2.2 For the case of a major accident, communication difficulties and significant travel times may delay the arrival of accredited representatives, advisors, operators and manufacturers at the accident location. In addition, loss of contact with entities while travelling may unnecessarily delay the formation of the investigation team and the initiation of the field phase of the investigation. In this regard, an accredited representative should provide the Investigator-in-charge with his enroute contact information, and with the contact information of an alternate point-of-contact for the travel period.

4.3 SECURING DOCUMENTATION

4.3.1 From the early stage in the investigation, it is important to secure the operational and maintenance documents of the accident aircraft and all other documents relevant to the occurrence. What documents will be required for the investigation depends on the nature of the accident. The Investigator-in-charge, as soon as possible, must decide what documents need to be obtained and must ensure that the relevant organizations are contacted and requested to collect the documents.

4.3.2 The operator, maintenance facility, air traffic services and airport service providers, civil aviation authorities, and meteorological services are examples of organizations that should be contacted as soon as possible to collect and secure documents necessary to the investigation. Typically the Investigator-in-charge or a person delegated by him will contact the applicable organizations preferably by telephone, or by e-mail or any other suitable means, to request that required documents and recordings be secured. For more guidance as to the typical documentation to collect, refer to the applicable sections of the *Investigations Management System Event Checklist* and the *Major Accident Investigation Guide* – both documents are appendices to this manual.

4.3.3 The Investigator-in-charge should remind the accredited representatives, the air operator and the manufacturers that the requested documents are needed urgently. These documents either could be provided electronically via email or, alternatively, could be transported to the accident location as personal baggage on board aircraft.

4.4 FIELD PHASE OF THE INVESTIGATION

4.4.1 When arriving at the site of the occurrence, investigators should meet leaders of firefighting and rescue teams, police, and other officials to determine the accident site situation regarding who has control, what has been done, and what has not been done. Before taking control of the site, the Site Safety Coordinator on behalf of the Investigator-in-charge, should assess the circumstances of the occurrence, the geography and condition and boundaries of the site, the hazards that exist, and the coordination requirements for ensuring the security and safety of the site. When ready to take control of the site, the Site Safety Coordinator should establish site boundaries, security, and access control procedures, and should request the competent police authority to apply them.

4.4.2 The size and organization of the investigation team should be based on the circumstances of the accident, the complexity of the investigation and the areas that will require significant investigation resources. The Investigator-in-charge must determine, first, the expertise requirements for the investigation; second, the expertise available within the authority; third, the expertise shortfalls; and fourth, how to fill the expertise gaps. Most of these expertise gaps should normally be filled using investigators from the State investigation authorities involved in the occurrence, the ARCM, and subject-matter experts from the involved operator and manufactures. The number of groups and the number of personnel assigned to each group will depend upon the type and complexity of the accident. The Investigator-in-charge should appoint a chief to head each

investigation group.

4.4.3 The investigation groups in a major investigation may include the following: Operations, Maintenance and Records, Site Survey, Aircraft Performance, Survivability, Cabin Safety, Crashworthiness, Photo/Video, Medical/Human and Organizational Factors, Structures, Systems, Powerplants, Flight Recorders, Witnesses, Meteorology, and Air Traffic Services/Airport. Examples of typical group structures can be found in Appendix 1 to this manual.

4.4.4 To manage the investigation effectively, the Investigator-in-charge must be kept informed as to the progress of the investigation. In this regard, open communications between all members of the team is paramount. To achieve this objective the Investigator-in-charge should consider the following:

a) As soon as possible after arriving at the accident location, he should hold an organizational meeting. During this meeting the Investigator-in-charge will assign responsibilities to the investigation groups.

b) On a daily basis, hold end-of-day investigation team meetings. The purpose of these meetings should be to determine the progress and status of the investigation, to identify strategic issues affecting the investigation, and to identify any significant safety issues.

c) At the end-of-day meetings, the chief of each investigation group should report on the significant work completed, important factual information determined, important work not completed, important information that is missing, any safety issues uncovered, the next day's planned investigation activities, and the group's revised investigation plan.

d) At the end-of-day meeting, the Investigator-in-charge should adjust the investigation plan according to actual circumstances.

4.4.5 For more guidance on assigning responsibilities (tasks) to investigation groups, on tracking the progress of the investigation, and on the typical documentation to collect during the field phase of the investigation, refer to the *Investigations Management System* and the *Major Accident Investigation Guide*. More detail on these investigation tools can be found in sections 4.7 and 4.8 of this chapter.

4.4.6 Prior to leaving the occurrence site, the Investigator-in-charge should consider the following:

a) chiefs of each investigation group should collect copies of any photos and reports prepared by team members; prepare a group field report of work completed and the work that still needs to be done; identify all potential safety issues, including the plans to validate them; and, coordinate the collation and archiving of all documents, recordings and components;

b) review group field-phase reports and review the status of group checklists and of the post-field-phase investigation plans, including the required tasks and deadlines;

c) update the investigation plan, including investigation tasks completed, investigation work remaining;

d) hold a final team meeting during which tasks and deadlines should be assigned to the chief of the investigation groups;

e) ensure that all required wreckage of interest has been removed from the site; that all wreckage no longer required for the investigation has been returned to the rightful owners; and, that the responsibility for the accident site has been passed to the appropriate local authority or the owner of the aircraft.

4.5 POST-FIELD PHASE OF THE INVESTIGATION

4.5.1 Subsequent to the field phase, significant investigation work remains, and the Investigator-in-charge must work diligently to maintain and manage the progress of the investigation. In general, the post-field phase involves the continued collection and validation of evidence; the examination of all pertinent personnel, company, aircraft, facility, government and other records; the examination of selected wreckage in the laboratory; the testing of selected components and systems; the reading and analysis of recordings; the conduct of further interviews; the determination of the sequence of events; the analysis of all investigation information; and completion of technical and group reports, if any. The post-field phase can take many months, depending on the size and complexity of the investigation.

4.5.2 It is always a challenge to ensure that the investigation continues to progress following the field phase, for the most part because the members of the investigation team are no longer centrally located, and subject matter expertise is no longer readily available. As a result, the group chiefs and the Investigator-in-charge will have to increase their efforts to maintain communication with team members and to ensure that investigation tasks are completed on time. In this regard, the Investigator-in-charge should have frequent, regularly scheduled, decision-oriented team meetings, and have additional meetings for significant issues or for issues that will require a change to the investigation plan. Specifically, it is prudent for the Investigator-in-charge to convene an investigation planning meeting soon after the team returns from the accident scene. The meeting should be attended by the group chiefs and senior management and should provide for a discussion of the scope of the investigation, the primary issue areas, and the scheduling of future investigative tasks. All team members should understand that they do not have to wait for a meeting to communicate significant, new information.

4.5.3 To ensure the continued progress of the investigation, the Investigator-in-charge should ensure that all team members regularly refer to the *Investigations Management System Event Flow Chart* and the applicable sections of the *Investigations Management System Event Checklist*.

4.6 INVESTIGATION REPORTING

Reporting — General

4.6.1 Timely and effective release of investigation information, including preliminary and other reports, interim statements, final reports and safety recommendations, is important to ensure that those involved and/or implicated in the occurrence are kept informed of the progress of the investigation and of the safety deficiencies uncovered.

Safety recommendations

4.6.2 Annex 13 requires that at any stage of the investigation of an accident, the accident investigation authority of the State conducting the investigation shall recommend to the appropriate authorities, including those in other States and the ARCM, any preventive action that is considered necessary to be taken promptly to enhance aviation safety in the region. Consequently, safety recommendations can be made any time during the investigation or be made in the safety recommendations part of the Final Report.

4.6.3 Safety recommendations should describe the safety problems and provide justification for the recommended safety actions. A safety recommendation should identify what actions to take, but leave scope for the authorities responsible for the matters in question to determine how to accomplish the objective of the recommendation. (More information on safety recommendations is contained in the ARCM . Manual on

aircrafts accidents and incidents investigation reporting)

4.6.4 The safety recommendations made during the investigation, as well as the preventive actions taken in response to these recommendations, should be presented in the safety recommendations part of the Final Report. Publishing the preventive actions taken has significant value for accident prevention for other authorities involved in similar operations; therefore these publications will be shared by the ARCM with its State members.

Final Report

4.6.5 The Final Report of an investigation, including its recommendations, is the catalyst for preventing further occurrences. Therefore, the Final Report must establish in detail what happened, how it happened and why it happened. For reporting on small investigations, abbreviated report formats have created, which only contain the history of flight, information on the deficiencies discovered by the investigation, analysis of the factors contributing to the occurrence, and findings related to the deficiencies. The findings and the causes/contributing factors of Final Reports should usually lead to safety recommendations so that appropriate preventive actions can be implemented, and disseminated similarly to major investigations..

4.6.6 The Investigator-in-charge and the group chiefs should refer to the following documents related to the production of the Final Report:

a) Annex 13, Chapter 6 contains the Standards and Recommended Practices on the consultation process and the release of the investigation Final Report;

b) the Appendix to Annex 13 details the format of the Final Report; and

c) the ARCM Manual on aircrafts accidents and incidents investigation reporting , provides detailed guidance on completing each section of the Final Report.

4.7 INVESTIGATION MANAGEMENT SYSTEM (IMS)

4.7.1 In the case of an accident investigation involving a large or complex aircraft (major investigation), a large team of investigators is usually required to conduct the investigation in the most effective and expeditious way. The effective management of a major investigation requires a management system based on a comprehensive plan, checklists, and a method and flow charts to track the progress of the investigation. In effect, a major investigation is a project that must managed. This section of the manual presents one such project management system, called the “Investigation Management System.” This system divides the investigation activities into functional events. Each event is numbered with a corresponding descriptive phrase. The list of Investigations Management System (IMS) events is contained in Appendix 2 to this manual.

4.7.2 To assist in the management of the investigation and the monitoring of the workload, each event should be assigned to a group within the investigation team. These assignments should be documented. An example Investigation Event Task-Assignment Chart is contained in Appendix 3 to this manual.

4.7.3 The Investigation Management System flow chart, which consists of a set of events, should be completed sequentially in the course of an investigation. The flow chart allows the investigators to ensure that the essential sequence of events is followed, and it provides an up-to-date picture of what has been completed to date. An example of the Investigations Management System — Event Flow Chart is contained in Appendix 4 to this manual.

4.7.4 A checklist is provided for each Investigation Management System event. The checklists should be reviewed to ensure that the tasks are appropriate to the organizing and conducting of accident investigations and are in line with the procedures of the State and the respective AIG authority. The breakdown

of activities and tasks into checklists allows the Investigator-in-charge to indicate clearly what is to be accomplished by the investigators and by the groups during an investigation.

4.7.5 Use of the task-assignment flow chart, the event flow chart, and checklists also allows the Investigator-in-charge to provide direction and guidance to persons who are participating in an investigation for the first time and who may require specific advice. The checklists, aside from being part of the Investigation Management System, provide some order in what is sometimes a confusing situation. The Investigations Management System Event Checklist is contained in Appendix 5 to this manual.

4.7.6 The investigation team members should be familiar with the IMS. The group chiefs must be knowledgeable about this system and the tasks that their groups will be required to carry out. Group chairpersons should be well aware that the tasks listed for each event may not be complete and that particular circumstances may require additional tasks. When using the checklists, investigators should note the completion date for each task, any further action that is required, and any significant issues associated with a particular task Regardless of how much planning goes into the provision of this type of checklist, there will be cases in which the outlined tasks have to be adapted to the special circumstances of the investigation.

4.7.7 The event flow chart and the checklists provide tools for the group chiefs to organize the work of their groups. The flow chart also provides the Investigator-in-charge with a tool to monitor investigation progress. At the daily progress meetings, the investigators should report the particular tasks in their checklists that have been completed since their last report, and the Investigator-in-charge should note the progress on the event flow chart. Another advantage of using this chart is the ease with which progress of the investigation can be reported to the headquarters office from the investigation site.

4.7.8 The Investigation Management System is one of the tools that an investigator should be called upon to use. The effectiveness of the Investigation Management System is directly related to the adherence to the flow chart and the checklists. An investigator likely to be appointed Investigator-in-charge or group chief in a major investigation should be familiar with this system prior to attempting to use it in the field.

4.8 MAJOR ACCIDENT INVESTIGATION GUIDE (MAIG)

4.8.1 In order to discharge his duties effectively, it is essential that the Investigator-in-charge of a major accident investigation have appropriate directing principles for the conduct of the investigation. The Major Accident Investigation Guide, Appendix 6 to this manual, complements the Investigation Management System and provides the Investigator-in-charge, group chiefs and other investigation team members with basic major investigation guidelines. These guidelines are not exhaustive. The Investigator-in-charge and members of the team are expected to exercise common sense and initiative, dependent on the circumstances of the accident.

4.8.2 The Major Accident Investigation Guide has proven to be an excellent method of conducting a thorough investigation of a major accident. It may prove to be impractical, however, to approach each investigation with a full investigation team; consequently, some investigation groups may be combined or eliminated altogether. The final determination of the team composition rests with the Investigator-in-charge. All personnel assigned to an investigation should remain responsible to the Investigator-in-charge until released by him.

4.8.3 One of the pitfalls of major accident investigations is the potential for the breakdown of effective communications between the various groups. This guide is aimed at eliminating that possibility.

Chapter 5

SMALLER INVESTIGATIONS OF INCIDENTS AND ACCIDENTS

5.1 GENERAL

5.1.1 The investigation of incidents and non-major accidents may be conducted by one investigator, sometimes assisted by one or a few other investigators. In such situations, the Investigator-in-charge will have the responsibility for the organization, conduct and reporting of the investigation, and will also be active in the investigation work appropriate to his expertise and background. If, for example, the Investigator-in-charge has a pilot background, then another team member could have different technical expertise and background. Depending on the circumstances of the occurrence, other subject-matter experts (such as air traffic services, aircraft performance, recorders, and human factors) could be assigned to the investigation team. Appendix 1 contains sample organization charts for smaller investigation teams.

5.1.2 Smaller investigations will vary from occurrence to occurrence. For example, the investigation could be a field investigation for which some or all of the investigators would deploy to the occurrence site, the location of the aircraft, the airline's offices, and/or the air traffic facility; or, it could be an office investigation where all or most of the investigation is conducted from the investigation authority's offices.

5.1.3 Where a non-major accident occurs on an airfield, there will likely be significant pressure to remove the wreckage so that normal operations can resume. In the same vein, for incidents that occur in flight or on the airport manoeuvring area, there might be significant pressure to move the aircraft and to return it to normal operations. In both these situations, the primary concern for the investigation should be the potential for loss of evidence. In this regard, the investigator may have to put a priority on properly documenting the wreckage site and/or the aircraft prior to its removal.

5.1.4 For incidents wherein there has been little or no damage, there will likely be significant pressure to return the aircraft to normal operations. Removing a recorder may delay the dispatch of an otherwise serviceable aircraft. In this regard, the investigator may have to put a priority on: first, ensuring that flight recordings are protected properly; second, determining if the recordings are required for the investigations; third, downloading the recordings; and fourth, releasing the aircraft for operations. (See section 5.3 for additional guidance on downloading recordings.)

5.1.5 For incidents and non-major accidents, it may be difficult to get on-site support from all entities having an interest in the investigation, such as from foreign States, airlines and aircraft and component manufacturers. As a result, extra effort will have to be taken to ensure good communications between the authority's investigators and these other entities throughout the investigation.

5.2 RESPONDING TO A NOTIFICATION

5.2.1 Although immediate notification of accidents and incidents to the accident investigation authority is essential, the uncertainty regarding the circumstances of incidents and non-major accidents, and a perception that such occurrences may be low-risk events, frequently lead to delayed and incomplete notifications. Such time delays usually lead to the loss of perishable evidence. (Section 1.5 of this manual provides a list of the factors that should be considered by the Investigator-in-charge when responding to

notifications.) 5.2.2 The following are important considerations associated with incidents and non-major accidents:

a) Immediately contact the reporting source to ensure that all the required information has been provided, to determine who and what organizations may have been involved in the occurrence, to determine who else has been informed of the occurrence, and to determine what actions have already been taken in response to the occurrence.

b) Notify national and local authorities, air traffic services, and other organizations who may be involved in or who have an interest in the occurrence regarding:

— the type of investigation that will be conducted;

— the requirement to secure the occurrence site, aircraft, wreckage, and other involved equipment to ensure their preservation, and the requirement to preserve and to photograph any evidence of a transitory nature;

— the requirement to secure all documentation and recordings associated with the occurrence; and

— the urgency to obtain the names and contact information of all those who may have been involved in the occurrence flight and of all eyewitnesses.

5.3 SECURING DOCUMENTATION

5.3.1 From the early stage in the investigation, it is important to secure the operational and maintenance documents of the occurrence aircraft, as well as all other documents relevant to the occurrence. What documents will be required for the investigation also depends on the nature of the occurrence. The Investigator-in-charge should decide, as soon as possible, what documents need to be obtained. He should contact the relevant organizations to collect the documents.

5.3.2 The operator, maintenance organization, air traffic services and airport service providers, the civil aviation authority, and meteorological services are examples of organizations that should be contacted as soon as possible to collect and secure documents necessary for the investigation. Typically the Investigator-in-charge or a person delegated by him should contact the applicable organizations preferably by telephone, by e-mail or any other suitable means, to request that required documents and recordings be secured. For more guidance as to the typical documentation to collect, refer to the applicable sections of the *Investigations Management System Event Checklist* and the *Major Accident Investigation Guide*. Both documents are appendices to this manual.

5.3.3 Flight recorders are an important source of factual information for investigations; consequently, recorder data should be recovered as a matter of course when the decision is made to investigate. An aircraft involved in an incident (and its flight recorders) may have moved a considerable distance from where the occurrence took place. Some operators have the equipment to copy the flight data recorder (FDR) and cockpit voice recorder (CVR) recordings without removing the unit from the aircraft.

5.3.4 Before demanding that a FDR or CVR be removed from an aircraft, the following should be carefully considered:

a) Is the recorded data vital to or useful to the investigation?

b) Can the data be obtained from other sources?

c) Can a suitable copy of the data be made without the recorder being removed from the aircraft?

d) If a copy of the recordings cannot be made at the location of the aircraft, what is the length of time that the aircraft can operate before the desired data is overwritten?

Note.— Removing CVRs for incidents: ICAO Annex 6 states that "Flight recorders shall not be switched off during flight time". In addition, the aircraft minimum equipment list normally does not allow an aircraft to be flown with a "purposely" removed or disabled flight recorder. The investigation authority might be taking an unacceptable risk if the CVR is pulled and the operator continues to fly without a replacement installed since, if the aircraft subsequently sustains another occurrence, there would be no CVR recording.

5.4 FIELD PHASE OF THE INVESTIGATION

5.4.1 When arriving at the site of the occurrence, investigators should meet leaders of firefighting and rescue teams, police, and other officials to determine the accident site situation, which has control, what has been done, and what has not been done. Before taking control of the site, the investigator should assess the circumstances of the occurrence, the geography and condition and boundaries of the site, the hazards that exist, and the requirements for ensuring the security and safety of the site. When ready to take control of the site, the investigator should establish site boundaries, security, and access control procedures, and request the local police authority to secure and protect the accident or incident site. This would relieve the investigators from this task and allow them to concentrate on other investigation matters.

5.4.2 The detailed on-site examination requires an orderly approach both to the examination and the recording of the information. The following is a partial list of actions required at the occurrence site:

a) locate the flight recorders;

b) initiate photo and video recording, in particular of perishable and important parts;

c) collect perishable evidence and flight recorders;

d) mark and photograph components in their original places;

e) construct a wreckage distribution plot;

f) locate major components and initiate searches for missing components;

g) assess general failure patterns (wings, fuselage and empennage);

h) document the initial ground impact and the subsequent path of the aircraft.

5.4.3 The Investigator-in-charge should also consider the following activities:

a) initiating an event flow chart to track the progress of the investigation. To assist in this regard, investigators should use, and adapt as necessary, the *Investigations Management System Event Flow Chart* located in Appendix 4 of this manual.

b) interviewing aircraft crew members;

c) interviewing eyewitnesses, including local authorities and first responders;

d) conducting preliminary examinations of systems, structures, engine(s), and propeller(s);

e) sending flight recorders to a readout facility, and conducting an immediate initial assessment of the recordings; and

f) sending aircraft parts and components for laboratory testing and analysis.

5.4.4 Prior to leaving the occurrence site, the Investigator-in-charge should ensure that:

a) all required wreckage of interest has been removed from the site and is secured elsewhere;

b) all wreckage not required for the investigation has been returned to the rightful owners; and

c) responsibility for the accident site has been passed to the appropriate local authority or the owner of the aircraft.

5.4.5 To avoid leaving the accident/incident site with information undetected or unrecorded, the Investigator-in-charge should consider referring to the applicable sections of the *Investigations Management System Event Checklist* and the *Major Accident Investigation Guide* — both documents are appendices to this manual.

5.5 POST-FIELD PHASE OF THE INVESTIGATION

5.5.1 Subsequent to the field phase, significant investigation work remains, and the Investigator-in-charge must work diligently to maintain and manage the progress of the investigation. In general, the post-field phase involves the continued collection and validation of evidence; the examination of all pertinent personnel, company, aircraft, facility, government and other records; the examination of selected wreckage in the laboratory; the testing of selected components and systems; the reading and analysis of recordings; the conduct of further interviews; the determination of the sequence of events; the analysis of all investigation information; and completion of technical and group reports, if any. The post-field phase can take many months, depending on the size and complexity of the investigation.

5.5.2 To ensure that all pertinent information is considered, the Investigator-in-charge should refer to the applicable sections of the *Investigations Management System Event Checklist* and the *Major Accident Investigation Guide,* and should maintain an *Investigations Management System Event Flow Chart*. All these documents are appendices to this manual.

5.6 INVESTIGATION REPORTING

Reporting — General

5.6.1 Timely and effective release of investigation information, including preliminary and other reports, interim reports, final reports and safety recommendations, is important to ensure that those involved and/or implicated in the occurrence are kept informed of the progress of the investigation and of the safety deficiencies uncovered.

Safety recommendations

5.6.2 Annex 13 and States AIG regulations require that at any stage of the investigation of an accident, the accident investigation authority of the State conducting the investigation shall recommend to the appropriate authorities, including those in other States and in the ARCM, any preventive action to be taken promptly to enhance aviation safety. Consequently, safety recommendations can be made any time during the investigation or be made in the safety recommendations part of the Final Report.

5.6.3 Safety recommendations should describe the safety problems and provide justification for the recommended safety actions. Safety recommendations should identify what actions to take, but leave scope for the authorities responsible for the matters in question to determine how to accomplish the objective of recommendations. (More information on safety recommendations is contained in theManual on aircraft accidents and incidents investigation reporting.)

5.6.4 The safety recommendations made during the investigation as well as the preventive actions taken in response to these recommendations should be presented in the safety recommendations part of the Final Report. Publishing the preventive actions taken has significant value for accident prevention for other authorities involved in similar operations, as well as for the ARCM States.

Final Reports

5.6.5 The Final Report of an investigation, including its recommendations, is the catalyst for preventing further occurrences. Therefore, the Final Report must establish in detail what happened, how it happened and why it happened. For reporting on small investigations, abbreviated report formats have been created, which only contain the history of flight, information on the deficiencies discovered by the investigation, analysis of the factors contributing to the occurrence, and findings related to the deficiencies. The findings and the causes/contributing factors of Final Reports should usually lead to safety recommendations so that appropriate preventive actions can be implemented. The dissemination of this report is similar to that of an important investigation.

5.6.6 In some cases, report forms have been created that contain narrative sections, wherein the sequence of events is described; point-form sections, wherein free text can be entered; and, check-off boxes for certain parameters that will facilitate data storage and extraction for statistical programmes. A well-designed form could serve as an investigation checklist and/or as the investigation Final Report.

5.6.7 The investigator in charge and the group chiefs should refer to the following documents for the production of the final report:

a) Annex 13, Chapter 6 and State AIG Regulation. These documents contain the dispositions about the consultation process and the dissemination of the investigation final report;

b) Appendix to Annex 13 – Final report format. This appendix presents detailed information about this format; and

c) ARCM *Manual on aircraft accidents and incidents investigation reporting.* This manual includes detailed guidelines about the way in which each section of the final report should be completed.

Appendix 1

SAMPLE INVESTIGATION ORGANIZATION CHARTS

Depending on the circumstances of the occurrence, it may be appropriate to establish the Flight Recorders Group as a technical group under the airworthiness group chief.

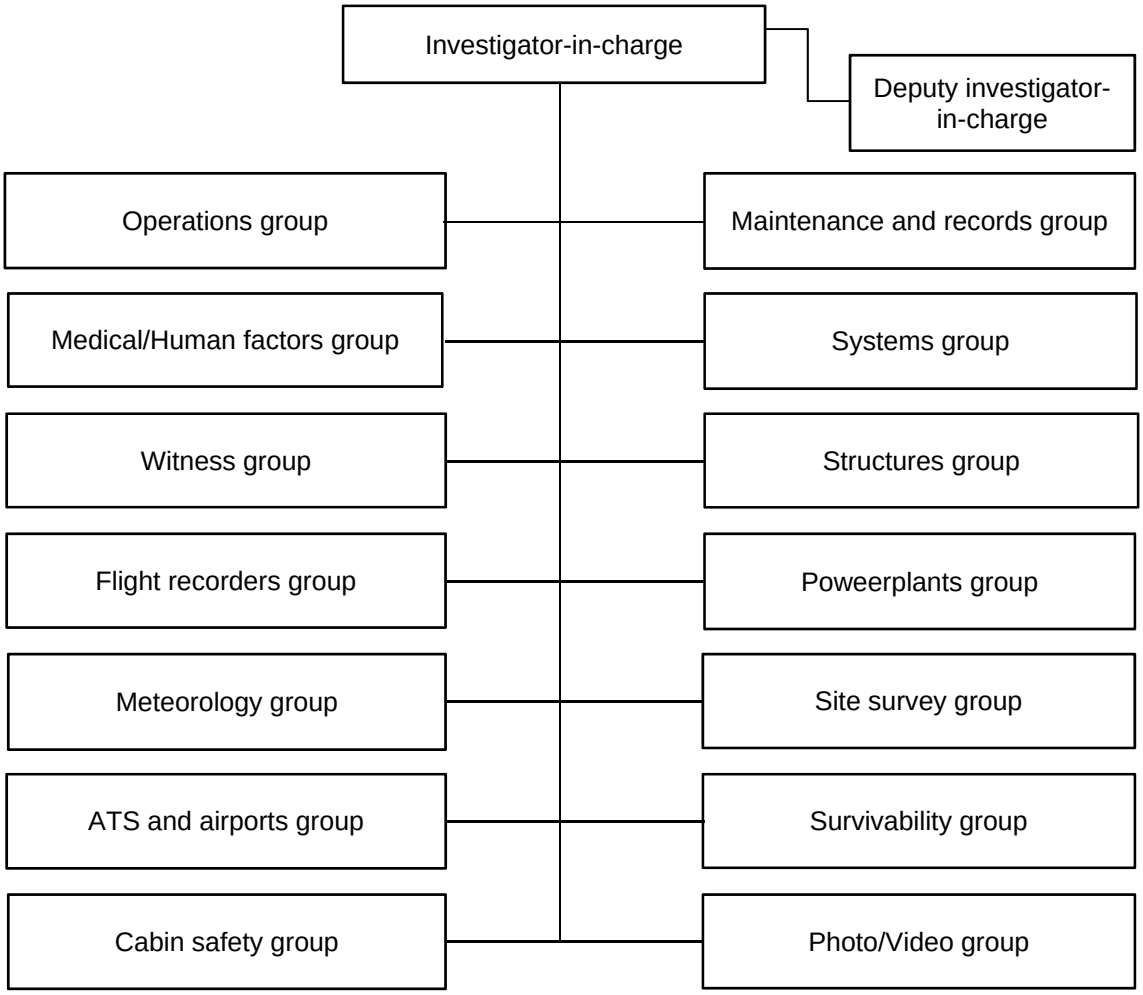
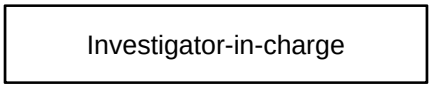


Figure A1-1. Major accident investigation team organization - A



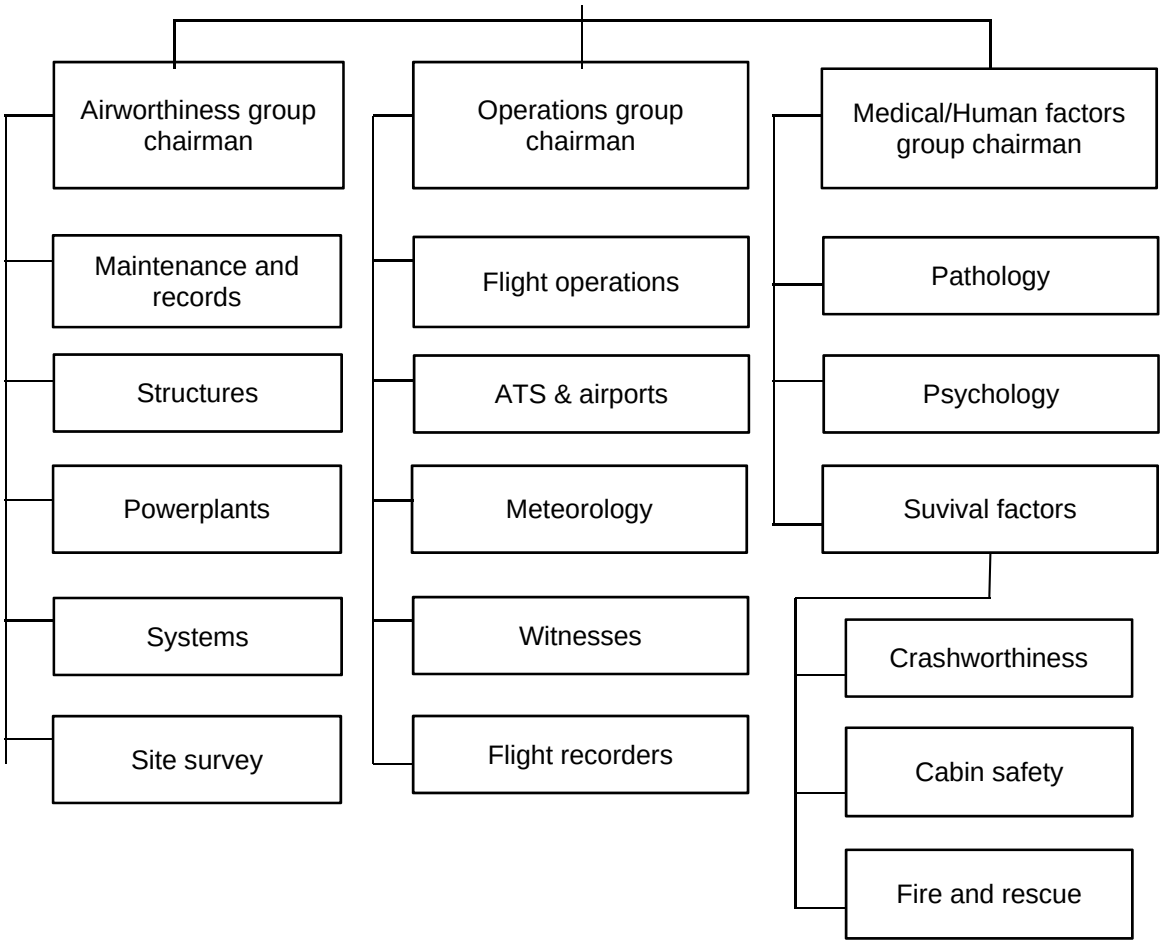


Figure A1-2. Major accident investigation team organization - B

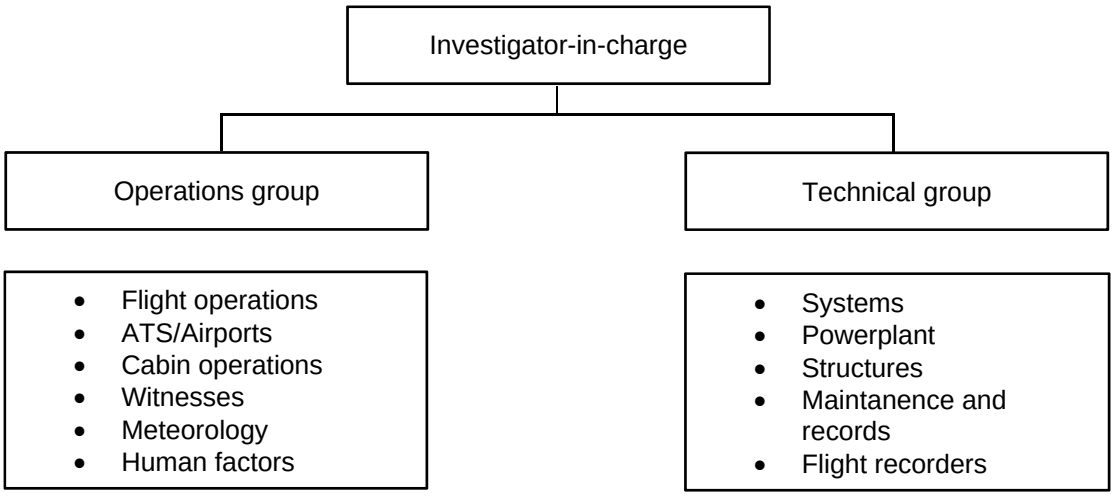
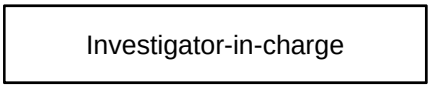


Figure A1-2. Smaller accident investigation team organization - A



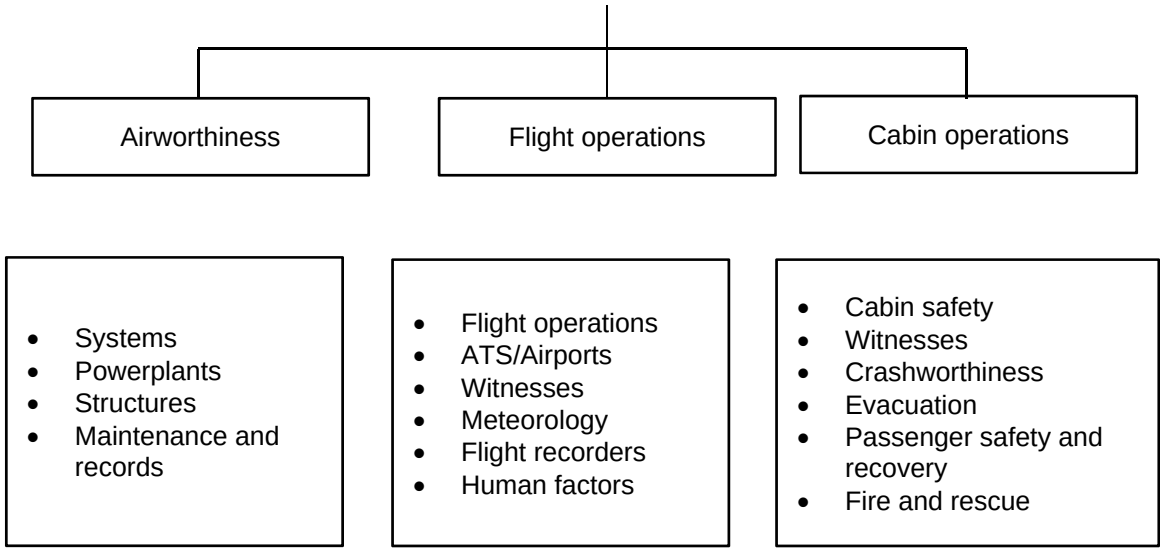


Figura A1-4. Smaller accident investigation team organization - B

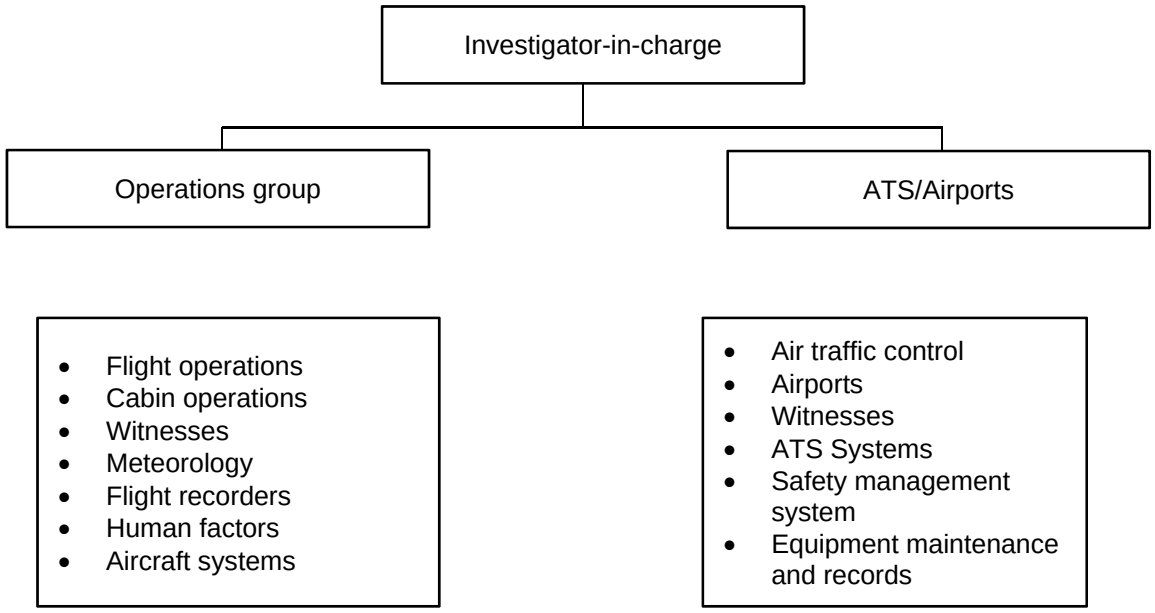


Figura A1-5. Smaller accident investigation team organization - C

Appendix 2

INVESTIGATION MANAGEMENT SYSTEM EVENTS

1. Initial response
2. Initial actions at the site
3. Secure flight operations documents
4. Human remains recovery
5. Eyewitness interviews
6. Flight recorder recovery
7. Secure weather documents
8. Secure air traffic services and airport documents
9. Search and rescue operations
10. Secure pertinent cabin documents
11. Secure maintenance documents
12. Examination of systems
13. Examination of structures
14. Examination of engine(s) and propeller(s)
15. Initial survey of the accident site
16. Site photography (Phase 1)
17. Review of operations documents
18. Crew member medical examinations
19. Plot flight path
20. Read-out of flight recorders
21. Review of weather documents
22. Review air traffic services and airport documents
23. Evacuation operations
24. Review pertinent cabin documents
25. Review of maintenance documents
26. Examination and testing (Systems)
27. Fire and explosion
28. Examination and testing (Powerplants)
29. Wreckage distribution plotting
30. Site photography (Phase 2)
31. Flight crew members interviews
32. Victim identification
33. Interviews of next of kin
34. Analysis of flight recorders data
35. Interviews (Meteorology)
36. Interviews (Air Traffic Services and Airport)
37. Rescue operations
38. Cabin condition
39. Interviews (Maintenance and Records)
40. Interviews (Systems)
41. Crashworthiness
42. Aircraft performance
43. Autopsies
44. Re-interviews (Eyewitnesses)
45. Navigation aids and airport status
46. Firefighting operations
47. Interviews (Cabin crew and passengers)
48. Maintenance management
49. Wreckage reconstruction
50. Analysis and report of Operations Group
51. Analysis and report of Medical/Human Factors Group
52. Analysis and report of Witness Group
53. Analysis and report of Flight Recorders Group
54. Analysis and report of Meteorology Group
55. Analysis and report of ATS and Airport Group
56. Analysis and report of Survivability Group
57. Analysis and report of Cabin Safety Group
58. Analysis and report of Maintenance and Records Group
59. Analysis and report of Systems Group
60. Analysis and report of Structures Group
61. Analysis and report of Powerplants Group
62. Analysis and report of Site Survey Group
63. Analysis and report of Photo/Video Group
64. Operations analysis and findings
65. Technical analysis and findings
66. Report of the Investigator-in-charge

Appendix 3

INVESTIGATION EVENT TASK-ASSIGNMENT CHART

Investigation Group	Assigned Events								
Administration Support									
Head Office Coordinator									
Media Coordinator									
Site Safety									
Investigator-in-charge									
Deputy Investigator-in-charge									
Operations									
Aircraft Performance									
Human Factors									
Medical and Pathology									
Witness									
Flight Recorders									
Meteorology									
Air Traffic Services									
Airports									
Survivability									
Cabin Safety									
Maintenance and Aircraft Records									
Systems									
Structures									
Crashworthiness									
Powerplants									
Site Survey									
Photo/Video									

(Example of a blank chart – Modifications may be necessary).

Investigation Group	Assigned Events								
Administration Support									
Head Office Coordinator									
Media Coordinator									
Site Safety		2							
Investigator-in-charge	1	2					64	65	66
Deputy Investigator-in-charge							64	65	66
Operations	3	17	31		50		64		
Aircraft Performance				42			64		
Human Factors	4	18	32	43	51		64		
Medical and Pathology							64		
Witness	5	19	33	44	52		64		
Flight Recorders	6	20	34		53		64		
Meteorology	7	21	35		54		64		
Air Traffic Services	8	22	36	45	55		64		
Airports							64		
Survivability	9	23	37	46	56			65	
Cabin Safety	10	24	38	47	57		64		
Maintenance and Aircraft Records	11	25	39	48	58			65	
Systems	12	26	40		59			65	
Structures	13	27		49	60			65	
Crashworthiness			41					65	
Powerplants	14	28			61			65	
Site Survey	15	29			62			65	
Photo/Video	16	30			63			65	

(Example of a filled-in chart – Modifications may be necessary)

Appendix 4

INVESTIGATION MANAGEMENT SYSTEM (IMS) — EVENT FLOW CHART

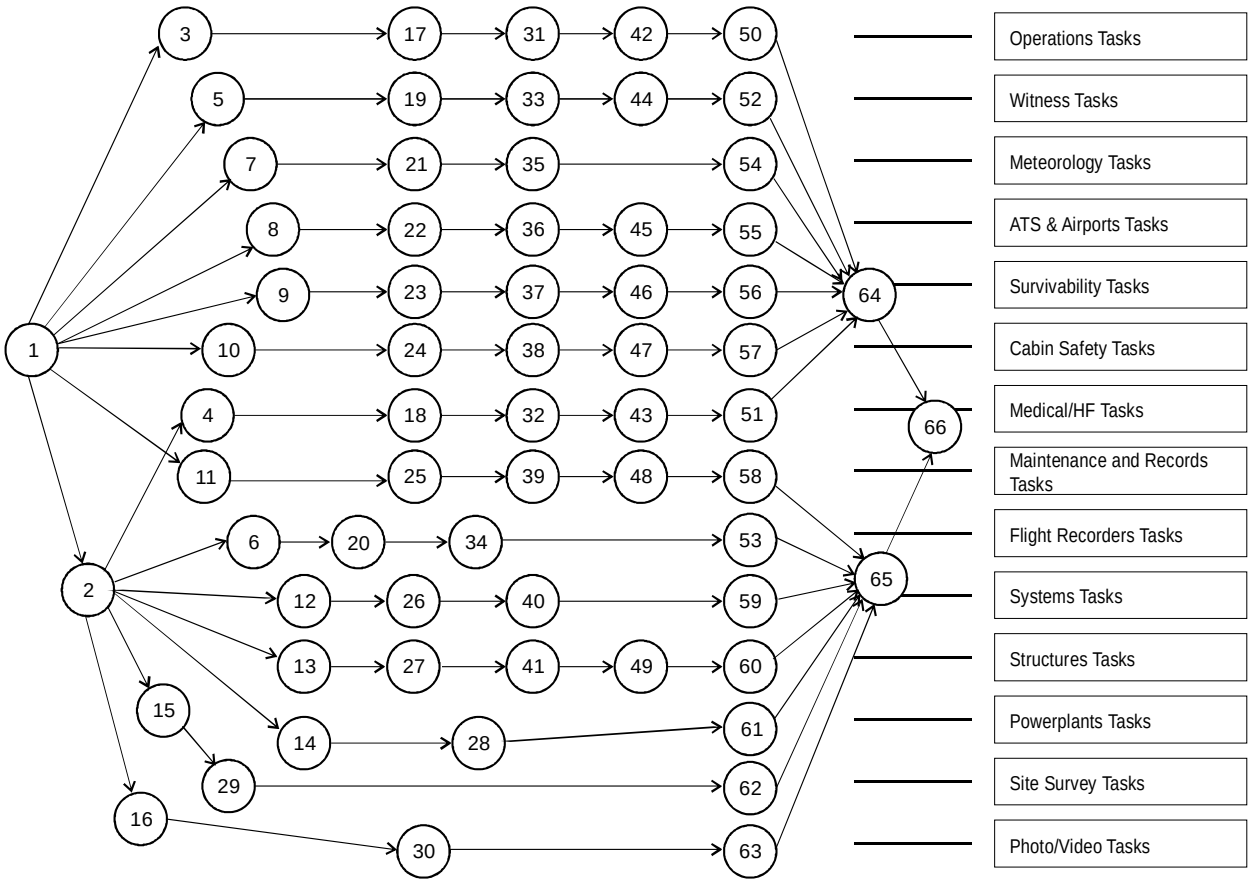


Figure A4-1. Investigation Management System — Event Flow Chart

Appendix 5

INVESTIGATIONS MANAGEMENT SYSTEM (IMS)— EVENT CHECKLIST

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EVENT 1. Initial response

1. Collect as much accident-related information as practicable from the reporting source and relevant authorities;

2. Contact the local police or other authority responsible for site security to determine what actions have been taken and convey the intentions and requirements of the accident investigation authority, in particular the safeguarding of recorders and other perishable investigation evidence;

3. As appropriate, advise the coroner, the attorney-general or the police of the requirements of the investigation authority regarding the recovery and handling of the human remains, in particular the safeguarding of perishable investigation evidence;

4. Determine from the air operator if hazardous material, such as chemicals, explosives, biological and radioactive materials, were carried on the aircraft;

5. Determine the composition of the investigation team, taking into account pre-assignments, such as a go-team;

6. Make arrangements for travel, accommodation, and facilities required for meetings, briefings, and other investigation activities; and

7. Complete and dispatch the notification to other States involved and to ICAO as per Chapter 4 of Annex 13, and Part 1, Chapter 4 of this manual.

EVENT 2. Initial actions at the accident site

Event 1 refers.

1. Review the guarding arrangements and adjust the limits of the site as required;

2. Arrange for guarding of the site for the time period envisaged for the field investigation;

3. Obtain a briefing from the local authorities on actions taken at the site; and

4. Make a preliminary survey of the site with the investigation team.

EVENT 3. Secure flight operations documents

1. Obtain and secure the following documents, as appropriate:
   a) From the operator/company:
      – Air Operator Certificate;
      – Air Operator Operations Manual;
      – Flight Manual (FM);
      – Flight crew and cabin crew members' training records;
      – Aircraft Operating Manual (including Standard Operating Procedures);
      – Copy of current cockpit checklists (normal, abnormal and emergencies);
      – Pilot log books;
      – Pilot's flight log;
      – Pilot flying schedule for the last six months;
      – Aircraft Journey Log Book;
      – Minimum Equipment List (MEL);

- Air Operator dispatch logs;
- Daily dispatch logs, including the week prior to and the day of the accident;
- Mass and balance and centre-of-gravity calculations for the accident flight and previous flight;
- Passenger and freight manifests;
- Air Operator schedules and aircraft schedules;
- Air Operator Route Manual;
- National and international agreements associated with the transfer of some or all of the State of Registry's responsibilities (if applicable);
- Refuelling documentation; and
- Record of pertinent communications.

b) From the pertinent civil aviation authority:
- Flight crew personnel licensing file;
- Copy of approved Flight Manual (FM);
- Copy of approved Minimum Equipment List (MEL);
- Copy of company Master Minimum Equipment List (MMEL);
- Files on chief pilot, chief inspector, cabin crew, chief flight engineer and chief of maintenance;
- Copy of in-flight inspections covering the last six months;
- Documentation in support of applications for the Air Operator Certificate;
- Copy of any civil aviation authority Policy Letters applicable to the company;
- National and international agreements associated with the transfer of some or all of the State of Registry's responsibilities (if applicable);
- Copy of the last company audit by the civil aviation (regulatory) authority; and
- Air operator files.

EVENT 4. Human remains recovery

1. Coordinate with forensic personnel for human remains recovery.

2.
2. During the recovery, photograph the remains and record their location; and

3. Prepare a plot of the locations of the human remains.

EVENT 5. Eyewitness interviews

1. Search for and identify eyewitnesses;

2. Interview eyewitnesses, at their location of observation, if feasible;

3. Obtain photographs and videos taken by witnesses, and those recorded by security or operations monitoring devices; and

4. Develop an initial plot of the aircraft flight path.

EVENT 6. Flight recorder recovery

1. Locate the flight recorders, as well as any other recorders such as standby recorders and quick-access recorders;

2. Photograph the flight recorders in situ;

3. Examine and record the condition of the flight recorders;

4. Recover the flight recorders;

5. Prepare the flight recorders for transportation;

6. Arrange for the timely and secure transport of the flight recorders to the playback facility; and

7. Carry the flight recorders by hand to the readout facility.

EVENT 7. Secure weather documents

1. Determine where the flight crew obtained a weather briefing;

2. Interview the individual(s) who provided the weather briefing;

3. Secure copies of briefings and other weather documentation given to the flight crew;

4. Obtain and secure the following documents, as appropriate:
   - The actual and forecast weather conditions for the route, area, terminal, destination, alternate and site of the accident;
   - Hourly and special reports;
   - Weather radar reports;
   - Pilot weather reports (PIREP);
   - Surface observations, logs and records;
   - Precipitation records;
   - Barograph records;
   - Wind records;
   - Synoptic charts;
   - Upper air charts;
   - Runway Visual Range (RVR) records;
   - Radiosonde observations;
   - Satellite pictures;
   - Conditions of natural light and sunrise/sunset;
   - Special weather observations;
   - Significant Meteorological Information (Sigmets) weather advisories; and
   - Witness weather reports.

EVENT 8. Secure air traffic services and airport documents

1. Obtain and secure the following documents, as appropriate:
   - Flight plan;
   - Flight plan message;
   - Departure message;
   - Notices to Airmen (NOTAMs);
   - Pertinent air traffic services and airport recordings;
   - Aerodrome control progress strips;
   - Area control progress strips;
   - Approach control progress strips;
   - Approach terminal progress strips;

- Radar recordings (including military recordings, if available);
- Names and files of air traffic services personnel on duty;
- Unit logs;
- Pertinent manuals and directives;
- Pertinent outage reports;
- Airport Certificate;
- Airport certification safety standards/reports;
- Braking action reports;
- Master airport plan;
- Station logs;
- Equipment inspection documents;
- Airport manager's log; and
- Names and files of airport personnel on duty.

EVENT 9. Search and rescue operations

1. Determine and record the following:
   - How and when the search operations were initiated;
   - What units or agencies participated in the search operations;
   - Search means and methods adopted, in part and such as visual, electronic, and infrared;
   - The environmental conditions at the time of the search, such as weather, ground or water conditions;
   - Any factors which facilitated or hindered the search effort; and
   - The time at which the accident site was located.

2. Review search and rescue procedure manuals, and operations logs and recordings; and

3. Determine the adequacy of the search actions.

EVENT 10. Secure pertinent cabin documents

1. Liaise with Operations, and Maintenance and Records Group Chiefs to locate and secure the following documents:
   - Air Operator Operations Manual;
   - Cabin crew training records;
   - Air operator and aircraft standard operating procedures (SOPs);
   - Cabin crew log books;
   - Pilot's flight log;
   - Cabin crew flying schedule (last six months);
   - Aircraft Journey Log;
   - Air operator dispatch logs;
   - Maintenance release forms;
   - Passenger and freight manifests;
   - Air operator's Maintenance Control Manual;
   - Air operator schedule;
   - Air operator Route Manual;
   - Record of pertinent phone calls;
   - Cabin Crew Manual;
   - Cabin Crew Emergency Manual;
   - Air operator approved aircraft Safety Announcements;
   - Air operator passenger safety briefings and video, if applicable;
   - Copy of approved Aircraft Flight Manual;

- Copy of approved Minimum Equipment List (MEL);
- Copy of the applicable Master Minimum Equipment List (MMEL);
- Cabin crew licensing and medical status;
- Copy of any civil aviation authority Policy Letters applicable to the company;
- Copy of last air operator audit by the civil aviation (regulatory) authority;
- Air operator files; and
- Civil aviation authority approved cabin crew training curriculum.

2. Locate and secure the following information:
   - The aircraft cabin furnishings;
   - Pre-flight servicing documents;
   - Snag rectification sheets;
   - Cabin-related outstanding and recurring snags and unserviceabilities; and
   - Cabin and freight configurations;

3. Obtain the autopsy results of cabin crew members and passengers; and

4. Obtain a transcript of the cockpit voice recorder and conduct a preliminary review of the recorded information for cabin-related factors.

5. Submit all original documents to the Administration Coordinator.

EVENT 11. Secure maintenance documents

1. Obtain and secure the following documents, as appropriate:
   a) From the air operator:
      - Air Operator Certificate;
      - Certificate of Airworthiness;
      - Certificate of Registration;
      - Aircraft Journey Log;
      - Aircraft Technical Log;
      - Maintenance Control Manual;
      - Maintenance Log;
      - Airframe Log;
      - Engine Log(s);
      - Propeller Log(s);
      - Pre-flight servicing logs;
      - Snag rectification sheets;
      - Airworthiness Directives records;
      - Standards and procedures;
      - Quality assurance;
      - Personnel and training;
      - Equipment and facilities;
      - Extended-range Twin-engine Operational Performance Standards (ETOPS) maintenance requirements (Annex 6, Attachment E);
      - Flight recorder files, including documents associated with flight data recorder data-frame and periodic calibrations;
      - Major repairs or alterations;
      - Major work done by approved maintenance organization or sub-contractor;
      - Hazardous material cargo records;
      - International leasing arrangements;
      - Mandatory Occurrence Reporting (trend analysis) reports; and
      - System Difficulty Reporting (SDR) reports.

b) From the pertinent civil aviation authority:
   - Technical personnel files;
   - Air Operator Certificate;
   - Aircraft files;
   - Copy of the Master Minimum Equipment List (MMEL);
   - Maintenance reliability information on aircraft fleet;
   - Mandatory Occurrence Reporting reports; and
   - System Difficulty Reporting (SDR) reports.

EVENT 12. Examination of systems

1. Prepare a checklist of systems to be investigated from the following general list:
   - Hydraulic power;
   - Flight controls;
   - Ailerons;
   - Elevators;
   - Rudder;
   - Horizontal stabilizer;
   - Trims;
   - Flaps;
   - Speed brakes;
   - Spoilers/lift dumpers;
   - Autopilot/stability augmentation/stall avoidance;
   - Landing gear/wheels/brakes;
   - Fuel;
   - Electric power distribution;
   - Aircraft computers (such as flight management systems, traffic collision avoidance system, and terrain awareness and warning system);
   - Other electronics;
   - Ice and rain protection;
   - Pneumatics;
   - Instruments/pitot-static/caution and warning (light bulb analysis);
   - Navigation systems;
   - Portable navigation systems, photo and video cameras, and cell phones;
   - Communications;
   - Emergency Locator Transmitter (ELT);
   - Fire detection and protection;
   - Air conditioning and pressurization;
   - Oxygen; and
   - Thrust reversers.

2. Locate and identify all systems and components;

3. Determine the requirements for special handling of system computers to preserve memory;

4. Record and photograph the systems and components prior to safeguarding;

5. Safeguard and deactivate hazardous systems and components;

6. Conduct a detailed examination of all systems and components, including flight controls, hydraulics, pneumatics, electrical, electronics, instruments, communication, navigation, air conditioning, pressurization, ice and rain detection, airframe, fuel, fire protection and oxygen;

7. Document all systems selections, indications, positions and condition;
8. Photograph in detail the components suspected of failure; and
9. Request special technical assistance, if required.

EVENT 13. Examination of structures

1. Conduct an overall examination of the complete airframe, including the flight control surfaces;
2. Determine the involvement of the structure in the accident;
3. Select the components that require examination and testing;
4. Prepare detailed statements of requirements for examination and testing; and
5. Assess the requirements for wreckage reconstruction.

EVENT 14. Examination of engine(s) and propeller(s)

1. Locate the engine(s) and verify make, model and serial number(s);
2. Record the position and the condition of the engine(s);
3. Determine the engine(s) pre-impact integrity;
4. Locate the propeller(s) and verify make, model and serial number(s);
5. Record the position and the condition of the propeller(s);
6. Determine the propeller(s) pre-impact integrity;
7. Locate and identify all major engine and propeller components, such as engine controls, auxiliary fuel, oil and coolant components, and instruments;
8. Record the position of engine and propeller controls, components and reading of related instruments;
9. Determine the pre-impact serviceability of the controls, components and related instruments;
10. Photograph engine(s), propeller(s), components, and instruments in situ;
11. Obtain oil and fuel samples;
12. Determine the engine power developed at impact, if feasible;
13. Select the engine(s), propeller(s) and components for examination and testing; and
14. Prepare detailed statements of requirements for examination and testing.

EVENT 15. Initial survey of the accident site

1. Determine the probable distribution of wreckage by cursory examination of angle of impact, speed and pre-impact integrity indications;

2. Delineate the area requiring search for components and evidence;

3. Determine the method and intent of search for debris;

4. Determine the material and personnel resources required;

5. Obtain the material and personnel resources;

6. Identify significant components; and

7. Mark and tag components.

EVENT 16. Site photography (Phase 1)

1. Establish photographic priorities;

2. Photograph the general wreckage from at least four directions;

3. Photograph human remains in situ in relation to other objects;

4. Photograph easily perishable evidence, in part and such as ground impact marks and the presence/absence of fire;

5. Photograph flight recorders in situ prior to removal;

6. Photograph hazardous systems and components in situ prior to deactivation or removal;

7. Photograph the terrain and general impact area;

8. Photograph the general components in part and such as wings, engine(s), and empennage;

9. Determine the requirements for photogrammetry;

10. Determine the requirements for aerial photography;

11. Elaborate photo coverage of any suspect areas or components;

12. Liaise with the Site Survey Group Chief for photographic requirements such as:
    - Significant ground features;
    - Point of initial impact;
    - Location of major components;
    - Ground fire areas;
    - Serious property damage;
    - Flight path to impact; and
    - Witness locations.

13. In conjunction with the Operations Group Chief, photograph the cockpit environment with particular attention to:
    - Instruments;

- Position of controls;
- Switch positions;
- Circuit breaker panels;
- Radio settings;
- Automatic pilot setting;
- Fuel control positions;
- Pilot seats, seat belts, harness; and
- Maps, charts.

14. Liaise with the Operations Group and Systems Group chiefs for additional specific photo requirements of the cockpit area;

15. Liaise with the Medical/Human Factors Group and Structures (Crashworthiness) Group chiefs for requirements for photos of items with possible design deficiencies such as:
    - Design/location of instruments;
    - Design/location of controls;
    - Work space incompatibility;
    - Visual restriction due to structure;
    - Lack of cockpit standardization;
    - Personal equipment interference; and
    - Seat design/configuration.

16. Liaise with the Medical/Human Factors Group and Structures (Crashworthiness) chiefs for photo requirements of:
    - Cabin environment;
    - Unsecured interior equipment;
    - Seats, seat structures;
    - Belts, seat belt anchorages;
    - Belt buckles;
    - Cabin floor;
    - Cargo restraint; and
    - Emergency exits.

17. Liaise with the Structures (Crashworthiness) Group chief for photo requirements of:
    - Terrain angle;
    - Angle of impact;
    - Width, length and depth of ground scars;
    - Depth of damage to underside of aircraft;
    - Compression of energy-attenuation devices;
    - Initiation and propagation of fire;
    - Smoke smears, soot, discoloration;
    - Surface pitting; and
    - Evidence of explosion.

18. Liaise with the Air Traffic Services and Airports Group Chief

for specific photo requirements of:

- Runway or taxiway;
- Aerodrome layout;
- Obstructions to air traffic services and airport controllers' vision;
- Aerial photo record of access routes; and
- Tower cab layout.

19. Liaise with the Powerplants Group, Systems Group and Structures Group chairpersons for specific photo requirements of selected aircraft components.

EVENT 17. Review of operations documents

Event 3 refers.

1. Review all the documents obtained from the operator and summarize the pertinent information;

2. Review all the documents obtained from the civil aviation authority and summarize the pertinent information; and

3. Compile in chronological order, the history for each flight crew member and for the operator.

EVENT 18. Crew member medical examinations

Event 4 refers.

1. Obtain the list of flight crew and cabin crew members (names and positions);

2. Determine the location and condition of the surviving flight crew members;

3. Obtain the permission of crew members to submit to medical examination;

4. Arrange for examinations of the flight crew members by a competent medical practitioner, including blood and urine samples, and obtain the following information:
   – Medical status and history, including medications;
   – Personal history, including habits; and
   – Pre-flight activities with human factors significance.

5. If relevant, arrange for examination of the cabin crew members by a competent medical practitioner, including blood and urine samples, and obtain the following information:
   – Medical status and history, including medications;
   – Personal history, including habits; and
   – Pre-flight activities with human factors significance.

EVENT 19. Plot flight path

Event 5 refers.

1. Plot the aircraft flight path from eyewitness information showing:
   – Aircraft flight direction, altitude and attitude;
   – Aircraft configuration, in part and such as position of flaps, spoilers, and gear;
   – Evidence of fire or explosion;
   – Evidence of structural failure; and
   – Point(s) of collision or impact.

EVENT 20. Read-out of flight recorders

Event 6 refers.

1. Obtain the most recent flight recorders' calibration information from the operator;

2. Copy and play back the CVR data and provide the Investigator-in-charge with an initial written précis of the information;

3. Copy all CVR channels separately and present them on a storage medium in a format applicable for the Investigator-in-charge, normally a four-channel copy;

4. Make a transcript of the CVR and transmit it to the Investigator-in-charge;

5. Contact the Investigator-in-charge to determine the gross FDR requirements;

6. Copy the FDR data and provide the Investigator-in-charge and the pertinent group chiefs with the required initial data plots, along with an appropriate written briefing;

7. Using crosschecks and data obtained from other groupchiefs, determine the reliability of the flight recorder data, and refine the FDR data and CVR transcripts;

8. Synchronize timing of the FDR and CVR records together with the air traffic services data, if possible; and

9. Forward the refined information to the Investigator-in-charge, the Operations Group Chief and other group chiefsneeding this information.

EVENT 21. Review of weather documents

Event 7 refers.

1. Review all the documents and summarize the pertinent information;

2. Arrange for a qualified meteorologist to review and analyse all the documents;

3. Consider the following hazardous phenomena:
   – Mountain wave effect;
   – Revolving storms;
   – Severe turbulence;
   – Freezing precipitation;
   – Wind shear;
   – Subsidence; and
   – Electrical storms.

EVENT 22. Review air traffic services and airport documents

Event 8 refers.

1. Review all the documents obtained from the air traffic services and airport authorities, and summarize the pertinent information;

2. Make copies of the air traffic services recorded data from the originals;

3. If air traffic services data are not available in a digital form for copy, playback and analysis, make a video copy of the air traffic services display screens for playback; and

4. Make transcripts from the air traffic services recorders (all channels).

EVENT 23. Evacuation operations

Event 9 refers.

1. From information derived from survivors' interviews and/or the cockpit voice recorder, determine and record the following pre-accident actions:
   – General briefing of the passengers regarding the various safety and rescue equipment at their disposal, in part and such as seat belt, oxygen supply, and life jacket;
   – Member(s) of the crew who gave the briefing, time of the briefing, its intelligibility and audibility (pertinent language[s]) to all passengers;
   – Special instructions given regarding the removal of dangerous articles, in part and such as spectacles, ties, and shoes; the tightening of seat belts; the cushioning of each passenger in part and such as with pillows and blankets; and clarity and understanding of these instructions;
   – Special instructions regarding emergency exits, measures taken to free the access to all emergency exits;
   – Type of the emergency equipment available, in part and such as portable fire extinguishers, axes, crow-bars, flashlights, and first-aid kits;
   – Measures taken by the crew with respect to the emergency equipment; and
   – Assistance provided by passengers, either requested, offered or given, and behaviour and morale of the passengers prior to the accident.

2. Evaluate the crew training and implementation of emergency procedures, particularly by cabin crew members, as well as the adequacy of these procedures;

3. In the case of ditching, evaluate the following:
   – Special instructions on the location, donning and use of life jackets;
   – Action by the crew to ensure that each passenger had properly donned and adjusted the life jacket;
   – Precaution to have extra life jackets available near the emergency exits; and
   – Special instructions given to the passengers regarding which life raft, when, and how to board after the ditching.

4. Determine the relationship to regulatory requirements of the following items and assess their adequacy:
   – Number, location and design of emergency exits;
   – Presence of placards near each exit;
   – Clear and readable instructions on the operation of the opening mechanisms, including location and lighting;
   – Number and location of exits used, number of persons who used each exit, and reasons for not

using a particular exit;

- The emergency equipment used, in part and such as portable extinguishers, axes, escape ropes, and chutes;
- Presence and effectiveness of instructions on how to use the equipment;
- Adequacy and functioning of the equipment; and
- Additional equipment that would have been helpful.

5. The following information should be recorded:
   - Passengers injured in relation to their location;
   - Injuries sustained during the evacuation;
   - Help provided by the crew, passengers and third parties;
   - Time required to complete the evacuation, by exit if relevant;
   - Difficulties encountered such as:
     - language problems;
     - presence of fire and smoke;
     - failure of emergency lighting;
     - abnormal position of aircraft;
     - distance from the ground;
     - aged, infirmed or infant passengers;
     - injured passengers;
     - panic among passengers or crew; and
     - debris, including luggage.
   - In the case of ditching:
     - water conditions, such as roughness and temperature;
     - light conditions;
     - type and number of life jackets available;
     - number of passengers inflating life jackets prior to egress;
     - effectiveness of life jackets;
     - difficulties in locating passengers;
     - type and number of life rafts used, including position in the aircraft, difficulties in launching, inflating, locating and boarding;
     - number of survivors in each raft;
     - adequacy of instructions on use of rafts and life-saving equipment.

6. Evaluate the effectiveness of the following:
   - Emergency escape hatches;
   - Emergency lights;
   - Fire extinguishers;
   - Fire extinguishing systems;
   - Fire detectors or alarms;
   - Megaphone(s);
   - Oxygen bottles;
   - Smoke mask(s) and oxygen bottle(s);
   - Smoke hoods and personal breathing equipment;
   - Flashlights;
   - Escape tapes/reels;
   - Vivopak/Physician's kit;
   -
   - First aid kit;
   - Resuscitation mask;
   - Protective gloves;
   - Search mirror; and
   - Portable radio beacons.

EVENT 24. Review pertinent cabin documents

Event 10 refers.

1. Review all the documents obtained from the air operator and summarize the pertinent information;

2. Review all the documents obtained from the civil aviation authority and summarize the pertinent information; and

3. Compile, in chronological order, the history for each cabin crew member and for the operator.

EVENT 25. Review of maintenance documents

Event 11 refers.

1. Review all the documents obtained from the air operator and summarize the pertinent information;

2. Review all the documents obtained from the civil aviation authority and summarize the pertinent information;

3. Compile, in chronological sequence, the history of the powerplants, airframe and their major components, complete with incorporated modifications;

4. List all outstanding powerplant and airframe modifications;

5. Record all outstanding and recurring snags and unserviceabilities;

6. Record all snags that may be related to the accident; and

7. Summarize all irregularities.

EVENT 26. Examination and testing (Systems)

Event 12 refers.

1. Select the components that require more detailed examination;

2. Prepare statements of requirements for examination and testing;

3. Arrange for the transportation of selected components to a suitable location for the required examination and testing; and

4. Arrange for investigators to be present at all examinations and testings.

EVENT 27. Fire and explosion

Event 13 refers.

1. Photograph all evidence having a direct bearing on the fire before the wreckage is removed;

2. Review maintenance and parts manuals to gain information on the aircraft structure and systems;

3. Review the following information:
   - Survivor statements;
   - Eyewitness statements;
   - Type of cargo carried;
   - Quantity and type of fuel on board;
   - Air traffic services recorded data;
   - Flight recorders information; and
   - Pathological information for evidence of smoke or soot in the respiratory system, carbon monoxide or other toxic chemicals, and indications of in-flight explosion such as ruptured eardrums or penetration by small fragments.

4. Determine the requirements for expert technical assistance;

5. Prior to removal of fire extinguishing agent, consider all options in order to reduce destroying evidence;

6. Complete a wreckage diagram including burned areas;

7. Determine if the fire was in-flight or post-impact by reviewing the following:
   - Survivor and eyewitness evidence;
   - Cockpit configuration;
   - Mishap circumstances;
   - In-flight fire effects;
   - Ground fire effects;
   - Crash dynamics, such as location of burned parts with respect to burn areas; and
   - Impact effects.

8. Determine if there was an in-flight explosion by the presence of:
   - Omnidirectional fire pattern;
   - “Opening up” effect;
   - Unusual damage to heavy structures;
   - Fragmentation of structures; and
   - High-speed penetration by fragments.

9. Reconstruct the area where the in-flight fire or explosion is suspected; and

10. Determine the point or area of origin, fuel type and ignition source.

EVENT 28. Examination and testing (Powerplants)

Event 14 refers.

1. Forward engine(s), propeller(s), components and instruments to the appropriate testing facilities;

2. Arrange for investigators to be present at all examinations and testings;

3. Monitor, photograph and film all phases of examinations and testings;

4. Determine if power was being developed at impact;

5. Select components for further examination and testing; and

6. Interview witnesses with powerplant information.

EVENT 29. Wreckage distribution plotting

Event 15 refers.

1. Plot wreckage distribution to include:
   - Significant ground features;
   - Point(s) of initial impact;
   - Location of major components and pieces;
   - Impact direction;
   - Ground fire areas;
   - Ground scars;
   - Indication of serious property damage; and
   - Witness locations.

2. Determine the flight path form the first contact with a ground object, to ground contact, to position of rest; and

3. In a mid-air collision, reconstruct the path by using trajectory analysis based on radar plots, flight recorder data, satellite navigation systems data and witness statements.

EVENT 30. Site photography (Phase 2)

Event 16 refers.

1. Photograph/video wreckage recovery operations;

2. Photograph/video re-assembly operations (if applicable);

3. Photograph/video engine tear down operations (if applicable);

4. Photograph/video components under examination and testing; and

5. Provide analysis of photo/video evidence.

EVENT 31. Flight crew members interviews

Events 3 and 17 refer.

1. Obtain and review flight crew statements; and

2. Conduct individual interviews.

EVENT 32. Victim identification

Events 4 and 18 refer.

1. Collaborate with the coroner and judicial authorities in the identification of victims; and

2. As appropriate, assist in providing victim identification information, such as wallets, clothing, jewellery, age, sex, face, complexion, colour of hair and eyes, height, weight, dental records, scars, growths, skeletal deformities, medical disorders, tattoos, blood group, identification tags and medical files.

EVENT 33. Interviews of next of kin

Events 5 and 19 refer.

1. Complete interviews of next of kin of crew members, covering:
   – Personal habits;
   – Personal background;
   – Current medication; and
   – Psychological problems.

EVENT 34. Analysis of flight recorders data

Events 6 and 20 refer.

1. In concert with designated group chiefs and assigned specialists, conduct a detailed examination of the flight recorders information;

2. In coordination with the Structures Group, Systems Group and Powerplants Group determine the in-flight serviceability of the aircraft, systems and powerplants; and

3. In coordination with the Operations Group, Witness Group, and the Air Traffic Services and Airport Group, reconstruct the flight path, taking into account the satellite navigation systems data, if available.

EVENT 35. Interviews (Meteorology)

Events 7 and 21 refer.

1. Conduct interviews of witnesses, such as:
   – Eyewitnesses;
   – Other flight crews;
   – Weather forecasters or observers; and
   – Weather broadcasters.

2. Review and assess personnel qualifications;

3. Determine the accuracy of weather measuring equipment; and

4. Update the cross sectional weather profile.

EVENT 36. Interviews (Air Traffic Services and Airport)

Events 8 and 22 refer.

1. Conduct interviews with those persons directly involved with the aircraft progress, such as:
   – Ground controller;
   – Tower controller;
   – Area controller;
   – Terminal controller;
   – Radio station operator;
   – Radar operator;

- Other flight crews who may have rendered assistance;
- Other flight crews who may provide pertinent information on in-flight conditions, aircraft communications and serviceability of radio aids;
- Airport manager; and
- Other airport personnel.

EVENT 37. Rescue operations

Events 9 and 23 refer.

1. Determine and record the following:
   - Time and means of alerting rescue units, in part and such as alarm bells, and telephone;
   - First instructions given to rescue units, by whom and by what means;
   - Number and location of rescue vehicles by type on standby and in reserve, including manpower and equipment;
   - Access roads to the site;
   - Environmental conditions during the rescue operations;
   - Communications equipment on the various vehicles;
   - Time at which the rescue units arrived on site;
   - Difficulties in locating the site and bringing the injured out of the wreckage;
   - The means and personnel providing first medical assistance;
   - The arrangements to transport the injured to medical facilities, and adequacy of medical services available; and
   - Time at which the rescue operations were completed.

EVENT 38. Cabin condition

Events 10 and 24 refer.

1. Review and record (in situ) the condition of:
   - General cabin interior;
   - Cabin structure;
   - Floor structure;
   - Aircraft doors;
   - Air stairs;
   - Emergency exits;
   - Breaches of cabin structure;
   - Passenger seats;
   - Seat pitch for each class;
   - Aisle width;
   - Flight attendant seats;
   - Seat belts (passengers and flight attendants);
   - Overhead bins;
   - Galleys, including controls and circuit breaker positions;
   - Trolleys/carts;
   - Public address system, including controls and circuit breaker positions;
   - Life preservers;
   - Seat bottom cushions;
   - Safety features cards;
   - Evacuation alarm system;

   - Emergency equipment:

  - Fire extinguisher(s);
  - Fire axe;
  - Megaphone;
  - Oxygen bottles;
  - Smoke mask/oxygen bottle;
  - Smoke hoods;
  - Flashlights;
  - Escape tapes/reels;
  - Vivopak/physician's kit;
  - Medical kit;
  - First aid kit;
  - Resuscitation mask;
  - Protective gloves;
  - Search mirror;
  - Portable radio beacons;
- Cabin baggage;
- Floor level lights; and
- Seat blocking.

2. Determine the passenger/freight configuration.

EVENT 39. Interviews (Maintenance and Records)

Events 11 and 25 refer.

1. Identify personnel to be interviewed;

2. Coordinate the interviews with other groupchiefs;

3. Prepare questions;

4. Conduct the interviews; and

5. Review and examine interviews for areas of conflict, errors and inconsistencies.

EVENT 40. Interviews (Systems)

Events 12 and 26 refer.

1. Identify personnel to be interviewed;

2. Coordinate the interviews with other groupchiefs;

3. Prepare questions;

4. Conduct the interviews; and

5. Review and examine interviews for areas of conflict, errors and inconsistencies.

EVENT 41. Crashworthiness

Events 13 and 27 refer.

1. Determine the requirement for mechanical or aeronautical engineering assistance;

2. Assess the volume of liveable space remaining within the occupied section of the aircraft after impact forces had dissipated;

3. Determine the volume of liveable space which may have been compromised during the accident sequence, since ductile materials can rebound after impact forces leaving no traces of their invasion of liveable space;

4. Determine the space between seats and aircraft structures, in part and such as instrument panel, control column, seat backs, trays, and galley that may have contributed to the nature and extent of injuries;

5. Determine if the container was penetrated by objects from outside the aircraft;

6. Determine the effects of unsecured interior aircraft equipment or cargo acting as missiles, in part and such as serving carts and oxygen bottles;

7. Determine the effects of passenger luggage on liveable space;

8. Assess the adequacy of walkways and exits;

9. Record the original seating position of deceased passengers and positions where bodies came to rest after the accident;

10. Record the type of seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed in the aircraft;

11. Record the damage to each of the items in task 10 above;

12. Record the effects of webbing material on the nature and extent of injuries, in part and such as cotton/rayon, and nylon; as well as their flammability, elasticity, and adjustment-buckle slippage;

13. Record the type and load-limiting adequacy of cargo restraints, such as nets, lines and pallets;

14. Record the seat geometry for structural strength and energy absorption properties;

15. Record the seat cushions' energy absorption properties and flammability;

16. Assess the adequacy of the seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed;

17. Assess the effects of the cockpit and cabin environment on occupant survivability;

18. Record the following basic data for the determination of energy absorption:
    - Terrain angle;
    - Flight path angle;
    - Angle of impact;
    - Crash force resultant;
    - Crash force angle; and

- Aircraft attitude at impact.

19. Record the width, length, depth and orientation of all gouge marks;

20. Record the depth of damage to the underside of aircraft, extent of compression of energy-attenuation devices;

21. Record the horizontal stopping distances, length of airframe compression in the horizontal plane, backward displacement of each wing and empennage surfaces;

22. Determine the direction, magnitude and duration of G-forces;

23. Determine the acceleration forces experienced by the aircraft occupants; and

24. Estimate the impact forces survivability potential.

EVENT 42. Aircraft performance

Events 3, 17 and 31 refer.

1. Collect all information affecting aircraft performance, and review:
   - Flight crew and passenger interviews;
   - Air traffic services and cockpit voice recorder data;
   - Flight data recorder plots;
   - Flight data recorder information related to previous flights of the aircraft;
   - Eyewitness interviews;
   - Weather data;
   - Engine performance findings;
   - Structures findings; and
   - Systems findings.

2. For take-off or landing phase accidents, the following basic information is required:
   - Aircraft gross weight;
   - Aircraft configuration;
   - Airfield elevation;
   - Temperature;
   - Pressure and density altitudes;
   - Wind direction and velocity;
   - Runway slope;
   - Runway surface (type and braking action);
   - Runway length;
   - Pertinent obstacles; and
   - Engine thrust.

3. Complete a mathematical analysis of the theoretical take-off or landing performance of the aircraft;

4. Compare actual and theoretical flight path and assess the significance of differences;

5. Obtain specialist assistance as required;

6. Consider the requirement for the conduct of flight tests or simulator tests to determine the effects of various combinations of aircraft configuration, engine performance and pilot techniques; and

7. If required, assess accuracy of performance charts.

EVENT 43. Autopsies

Events 4, 18 and 32 refer.

1. Collaborate with the coroner and police authorities regarding the autopsy requirements, and specify a list of essential tissue and fluid specimens to be collected;

2. Request autopsies of the flight crew members, including the determination of the cause of death and the presence of any pre-existing disease;

3. Request autopsies of the cabin crew members and passengers, including the cause of death and the presence of any pre-existing disease;

4. For each flight crew and cabin crew member obtain the following information:
   – Position in the aircraft at impact and evidence of activity;
   – Position relative to angle of impact (to establish direction of forces on bodies);
   – Evidence of injury, incapacitation or any physiological or toxicological irregularities prior to impact;
   – Pre-impact physical or emotional stress;
   – Pre-impact impairment from disease, injury or abnormality;
   – Pre-impact impairment from alcohol, drugs, carbon monoxide, or toxic substances;
   – Pre-impact exposure to explosion and fire; and
   – Adequacy of restraint systems.

5. If feasible, for each passenger obtain the following information:
   – Position relative to angle of impact (to establish direction of forces on bodies);
   – Pre-impact injury of any kind;
   – Pre-impact exposure to explosion, fire, carbon monoxide or toxic substances;
   – Physiological or toxicological irregularities; and
   – Adequacy of seat belts.

6. Obtain the autopsy reports.

EVENT 44. Re-interviews (Eyewitnesses)

Events 5, 19 and 33 refer.

1. Compile a list of witnesses to be re-interviewed;

2. Prepare questions; and

3. Re-interview witnesses.

EVENT 45. Navigation aids and airport status

Events 8, 22 and 36 refer.

1. Obtain the appropriate navigation and approach charts;

2. Request ground and flight checks of pertinent navigation and approach aids for:
   – Location (geographic coordinates);

- Identification signal;
- Power output and supply;
- Emergency equipment;
- Radiation pattern;
- Normal level of performance; and
- Interference(s).

3. Review:
   - Operating and maintenance schedules;
   - Past complaints; and
   - Serviceability status.

4. Examine status of airport and associated facilities, such as:
   - Runway in use;
   - Apron and taxiways;
   - Lighting;
   - Rescue and firefighting services;
   - Station logs; and
   - Equipment inspection documents.

EVENT 46. Firefighting operations

Events 9, 23 and 37 refer.

1. This aspect of the investigation should, if applicable, be conducted in cooperation with the Structures Group responsible for investigating the initiation and spread of the fire;

2. Determine and record the following:
   - Time and means of alerting the various firefighting units;
   - First instructions given and how;
   - Number of vehicles by type on stand-by and in reserve;
   - Type, quantity and rate of discharge of extinguishing agents;
   - Special tools, in part axes, crow-bars, and powered tools;
   - Personnel available on each vehicle and their equipment;
   - Location of the various firefighting units that participated;
   - Route taken to the site by each vehicle and adequacy of the access roads;
   - Environmental conditions, such as weather, terrain, ground or water conditions;
   - Communications capabilities of each vehicle;
   - Time at which the firefighting vehicles arrived at the site; and
   - Difficulties encountered such as:
     - locating the site;
     - reaching the wreckage;
     - lack or poor detail of charts;
     - inadequately trained personnel;
     - intensity of the fire;
     - wind direction and strength;
     - temperature;
     - availability of water and/or extinguishing agents;
     - control and supervision;
     - precautionary measures taken to prevent spreading or restarting the fire;
     - time at which the fire was under control and completely extinguished; and
     - training and standards of rescue and firefighting personnel.

EVENT 47. Interviews (Cabin crew and passengers)

Events 10, 24 and 38 refer.

1. All cabin crew members should provide a written statement prior to the interview;

2. The cabin crew members should be questioned from a list of prepared questions covering:
   – General details of the operation;
   – Phase of flight at time of accident;
   – Weather conditions at time of accident;
   – Serviceability of aircraft;
   – Flight attendant's flying background and experience;
   – Crew rest periods;
   – Movements over the last 24 hours, and over 72 hours;
   – Post-accident activities, in part and such as physical condition, and evacuation; and
   – Any other question pertinent to the circumstances.

3. This interview could be followed at a later date by a more in-depth interview during which elements critical to the investigation should be discussed in detail;

4. Interview witnesses with cabin safety information;

5. Interview next of kin, company representatives and civil aviation authority personnel;

6. Interview as many passengers as possible; and

7. If required, mail questionnaires to surviving passengers not interviewed.

EVENT 48. Maintenance management

Events 11, 25 and 39 refer.

1. Review the following maintenance management aspects;
   – Standards and procedures;
   – Quality assurance programmes;
   – Equipment and facilities; and
   – Personnel and training.

EVENT 49. Wreckage reconstruction

Events 13, 27 and 41 refer.

1. Select a suitable re-assembly area;

2. Determine the method of reconstruction;

3. Obtain the personnel and material resources;

4. Complete the re-assembly;

5. Photograph the re-assembly operations;
6. Interview witnesses; and

7. Select components for examination and testing, if required.

EVENT 50. Analysis and report of the Operations Group

Events 3, 17, 31 and 42 refer.

1. Complete required air operator interviews;

2. Complete interviews of civil aviation authority personnel;

3. Review information from other groups;

4. Review, evaluate and analyse all information collected; and

5. Prepare and submit the group report to the Investigator-in-charge.

EVENT 51. Analysis and report of the Medical/Human Factors Group

Events 4, 18, 32 and 43 refer.

1. Assemble the medical data;

2. Review witnesses' statements;

3. Review, evaluate and analyse all information collected;

4. Prepare the group report using the following headings and sub-headings:
   - Crew:
     - personal history, including habits;
     - medical status and history, including current medication;
     - pre-flight activities having human factors significance;
     - physiological, psychological and toxicological irregularities;
     - incapacitation or injury prior to impact;
     - position in aircraft and crew activity at impact;
     - position of members relative to angle of impact; and
     - injuries resulting from the accident.
   - Passengers:
     - pre-accident physiological conditions; and
     - injuries resulting from the accident.
   - Human engineering:
     - instrumentation, controls, autopilot, crew seats, armrests, and other fatigue-combating devices.
   - Survival equipment performance:
     - seat belts and harnesses;
     - seats and anchorages;
     - escape devices;
     - dinghies;
     - food and clothing kits; and
     - medical kits; and

5. Submit the group report to Investigator-in-charge.

EVENT 52. Analysis and report of the Witness Group

Events 5, 19, 33 and 44 refer.

1. For ease of reference and if the number of interviews warrants, summarize each interview and attach a précis of the interview to the front of each interview record. Such a précis should also contain an assessment of the credibility of the information;

2. Prepare a matrix of witness testimonies that highlights critical issues; and

3. Prepare and submit the group report to the Investigator-in-charge.

EVENT 53. Analysis and report of the Flight Recorders Group

Events 6, 20, and 34 refer.

1. Review, evaluate and analyse all information collected; and

2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 54. Analysis and report of the Meteorology Group

Events 7, 21 and 35 refer.

1. Review, evaluate and analyse all information collected; and

2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 55. Analysis and report of the Air Traffic Services and Airport Group

Events 8, 22, 36 and 45 refer.

1. Review, evaluate and analyse all information collected; and

2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 56. Analysis and report of the Survivability Group

Events 9, 23, 37 and 46 refer.

1. Review, evaluate and analyse all information collected; and

2. Prepare and the submit group report to the Investigator-in-charge.

EVENT 57. Analysis and report of the Cabin Safety Group

Events 10, 24, 38 and 47 refer.

1. Review, evaluate and analyse all information collected; and
2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 58. Analysis and report of the Maintenance and Records Group

Events 11, 25, 39 and 48 refer.

1. Review, evaluate and analyse all information collected; and
2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 59. Analysis and report of the Systems Group

Events 12, 26 and 40 refer.

1. Review, evaluate and analyse all information collected; and
2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 60. Analysis and report of the Structures Group

Events 13, 27, 41 and 49 refer.

1. Review, evaluate and analyse all information collected; and
2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 61. Analysis and report of the Powerplants Group

Events 14 and 28 refer.

1. Assemble examination and testing data;
2. Review, evaluate and analyse all information collected; and
3. Prepare and submit the group report to the Investigator-in-charge.

EVENT 62. Analysis and report of the Site Survey Group

Events 15 and 29 refer.

1. Review, evaluate and analyse all information collected; and
2. Prepare and submit the group report to the Investigator-in-charge.

EVENT 63. Analysis and report of the Photo/Video Group

Events 16 and 30 refer.

1. Complete photo and video requirements;

2. Review, evaluate and analyse all information collected; and

3. Prepare and submit the group report to the Investigator-in-charge.

EVENT 64. Operations analysis and findings

1. This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2. Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3. Identify the areas requiring clarification;

4. Determine the procedure for achieving clarification;

5. Complete the operations analysis and determine findings with assistance from the technical groups;

6. Identify safety hazards and deficiencies; and

7. Suggest safety recommendations.

EVENT 65. Technical analysis and findings

1. This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties, as dictated by local regulations and procedures.

2. Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3. Identify the areas requiring clarification;
4. Determine the procedure for achieving clarification;
5. Complete the technical analysis and determine findings with assistance from the operations groups;
6. Identify safety hazards and deficiencies; and
7. Suggest safety recommendations.

EVENT 66. Report of the Investigator-in-charge

1. Organize the narrative;
2. Analyse the information;
3. Determine and assemble the findings;
4. Determine the causes;
5. Identify safety hazards and deficiencies;
6. Propose safety recommendations;
7. Organize and attach appendices;
8. Assemble the report;
9. Incorporate late information;
10. Submit report to investigation authority;
11. Following revision by the investigation authority, revise report as required; and
12. Submit the investigation report to investigation authority for approval.

Appendix 6

MAJOR ACCIDENT INVESTIGATION GUIDE

(Name of investigation authority)

ACCIDENT NUMBER _____

OPERATOR _____

AIRCRAFT TYPE/MODEL _____

AIRCRAFT REGISTRATION _____

LOCATION _____

DATE OF ACCIDENT _____

INVESTIGATOR-IN-CHARGE _____

INTRODUCTION

In order to discharge his duties effectively, the Investigator-in-charge of a major accident investigation must receive appropriate directing principles for the conduct of his investigation. This document provides the Investigator-in-charge with basic fundamentals for use as a reference. These guidelines are not exhaustive. The Investigator-in-charge and the members of the team should exercise common sense and initiative dependent on the circumstances.

The group system as represented in this document has repeatedly been demonstrated to be an excellent method of conducting a thorough investigation of a major accident. It may prove to be impractical, however, to approach each investigation with a full investigation team; consequently, some investigation groups may be combined or eliminated altogether. The final determination of the team composition rests with the Investigator-in-charge. All personnel assigned to an investigation will remain responsible to the Investigator-in-charge until released by him.

The team concept of investigations and procedures is predicated on sound working relationships between the various groups forming the investigation team. Tasks assigned to one group invariably overlap with those of other groups. This overlap of tasks may at times be a sensitive issue. In order to avoid misunderstandings and possible disruption of the investigation process, all investigation team members should ensure they have a basic understanding of the tasks and responsibilities assigned to other groups.

One of the pitfalls of major accident investigations is a potential for the breakdown of effective communications between the various groups. This document attempts to eliminate that possibility. It must be emphasized, however, that to avoid overlooking of contributory evidence, all significant findings must be shared freely with other groups.

INVESTIGATION TEAM

DEPUTY INVESTIGATOR-IN-CHARGE _____

COORDINATORS

HEAD OFFICE COORDINATOR _____

SITE SAFETY COORDINATOR _____

ADMINISTRATION COORDINATOR _____

MEDIA RELATIONS COORDINATOR _____

OPERATIONAL GROUP CHAIRPERSONS

OPERATIONS _____

MEDICAL/HUMAN FACTORS _____

WITNESS _____

FLIGHT RECORDERS _____

METEOROLOGY _____

AIR TRAFFIC SERVICES/AIRPORT _____

SURVIVABILITY _____

CABIN SAFETY _____

TECHNICAL GROUP CHAIRPERSONS

MAINTENANCE & RECORDS _____

SYSTEMS _____

STRUCTURES _____

CRASHWORTHINESS _____

POWERPLANTS _____

SITE SURVEY _____

PHOTO/VIDEO _____

ACCREDITED REPRESENTATIVES

STATE OF REGISTRY _____

STATE OF THE OPERATOR _____

STATE OF DESIGN _____

STATE OF MANUFACTURE _____

OTHER STATE _____

OTHER STATE _____

OTHER STATE _____

ADVISORS

STATE/COMPANY _____

STATE/COMPANY _____

STATE/COMPANY _____

OBSERVERS/PARTICIPANTS

STATE/COMPANY _____

STATE/COMPANY _____

STATE/COMPANY _____

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INVESTIGATOR-IN-CHARGE

The Investigator-in-charge should be authorized by, and be accountable to, the investigation authority of the State of occurrence membere of the ARCM to organize, conduct and manage the investigation. The objective should be to gather and analyse factual information, to report on the findings and causes related to the accident, to identify the safety deficiencies that contributed to the accident, and to submit recommendations that will reduce or eliminate the related safety deficiencies.

THE INVESTIGATOR-IN-CHARGE SHOULD KEEP PERSONAL NOTES OF SIGNIFICANT EVENTS THROUGHOUT THE INVESTIGATION.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. To facilitate the completion of the tasks of Event 1, the following persons should be in contact with the Investigator-in-charge at this early stage of the investigation: the Deputy Investigator-in-charge, the Head Office Coordinator, the Site Safety Coordinator, the Administration Coordinator and the Media Relations Coordinator;

2. Complete Event 1;

EVENT 1. Initial response

1) Collect as much accident-related information as practicable from the reporting source and relevant authorities;

2) Contact the local police or other authority responsible for site security to determine what actions have been taken and convey the intentions and requirements of the accident investigation authority, in particular the safeguarding of recorders and other perishable investigation evidence;

3) As appropriate, advise the coroner, the attorney-general or the police of the requirements of the investigation authority regarding the recovery and handling of the human remains, in particular the safeguarding of perishable investigation evidence;

4) Determine from the air operator if hazardous material, such as chemicals, explosives, biological and radioactive materials were carried on the aircraft;

5) Determine the composition of the investigation team, taking into account pre-assignments, such as a go-team;

6) Make arrangements for travel, accommodation, and facilities required for meetings, briefings, and other investigation activities; and

7) Complete and dispatch the notification to other States involved and to ICAO as per Chapter 4 of Annex 13.

3. When the team has been assembled and organized, convene a pre-departure briefing. A briefing guide is provided at Appendix 1 to this Section; and

4. Establish interim communications procedures for use while in transit to the site.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Complete Event 2;

EVENT 2. Initial actions at the site

Event 1 refers.

1) Review the guarding arrangements and adjust the limits of the site as required;

2) Arrange for guarding of the site for the time period envisaged for the field investigation;

3) Obtain a briefing from the local authorities on actions taken at the site; and

4) Make a preliminary survey of the site with the investigation team.

2. Liaise with the Media Relations Coordinator, in part, for the scheduling of press releases and media interviews;

3. Ensure the Administration Coordinator has initiated document control procedures;

4. As required, brief the Photo/video Group Chief on priorities for photographs, including aerial photography;

5. Convene an organizational meeting. A briefing guide is provided at Appendix 2 to this Section;

6. As time allows, conduct personal briefings with each groupchief;

7. Provide feedback to the Head Office Coordinator on the progress of the investigation;

8. Use the Investigation Management System Checklist;

9. Manage the human and material resources;

10. Conduct daily meetings with the investigation team; and

11. Conduct daily press conferences, as required.

POST-FIELD PHASE

1. Convene investigation team meetings as required;

2. Chair and complete both Events 64 and 65;

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;

- Air Traffic Services/Airport;
- Survivability;
- Cabin Safety; and
- Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chairpersons attending:
   - Maintenance and Records;
   - Systems;
   - Structures;
   - Powerplants;
   - Site Survey;
   - Photo/Video; and
   - Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

3. Complete an investigation report in accordance with Chapter 6 of Annex 13 and ARCM *Manual on aircraft accidents and incidents investigation reporting*, and complete Event 66.

EVENT 66. Report of the Investigator-in-charge

1) Organize the narrative;

2) Analyse the information;

3) Determine and assemble the findings;
4) Determine the causes;

5) Identify safety hazards and deficiencies;

6) Propose safety recommendations;

7) Organize and attach appendices;

8) Assemble the report;

9) Incorporate late information;

10) Submit report to investigation authority;

11) Following revision by the investigation authority, revise report as required; and

12) Submit the investigation report to the investigation authority for approval.

4. If required, complete a performance evaluation report for each Group Chairperson.

Appendix 1 to Section 1

INVESTIGATOR-IN-CHARGE'S PRE-DEPARTURE BRIEFING

1. ACCIDENT INFORMATION

Brief the investigation team on the nature of the accident, including:

– Type, model, nationality and registration marks of the aircraft;

– Name of owner, operator and customer, if any, of the aircraft;

– The qualification of the pilot-in-command and the other flight crew members;

– Date and time of the accident;

– Last point of departure and point of intended landing;

– Position of the accident, including specific directions on how to reach the site;

– Description of dangerous cargo (if any);

– Number of crew and passengers (if known, number killed or seriously injured);

– Nature of the accident and the extent of damage to the aircraft as far as it is known;

– Disposition of the flight recorders; and

– Physical characteristics of the accident site, the security arrangements and the on-site point of contact.

2. THE INVESTIGATION

– Assign group chiefs and group members, as required;

– Emphasize the importance of cooperation, coordination and communications, because the investigation team cannot function effectively if groups work in isolation;

– Ensure that each team member is provided with the checklist for his group responsibilities, and emphasize your expectations;

– Remind all the investigation team members to review and be familiar with the ICAO *Manual of Aircraft Accident and Incident Investigation* and the local procedures applicable to their respective assigned responsibilities;

Brief the team on:

– the expected environmental conditions, the existence of hazardous materials, the biological hazards and the general safety precautions required while on the site. This portion of the briefing may best be conducted by the Site Safety Coordinator;
– the degree of activity and possible confusion to be expected at the site. Team members should present an air of professionalism and remain calm so as to not add to the confusion;

- the roles and participation status of the accredited representatives, advisors and observers/participants; (Appendix 3 to this Section)
- the Administration Coordinator's functions acting as a process and control centre for all documents and coordinating access to the accident site;
- all the photo and video requirements to initially be coordinated through the investigation operations centre;
- the policy regarding media relations, including the pitfalls of discussing investigation issues in the presence of lawyers or insurance agents;
- the policy regarding protective clothing;
- the policy regarding discussions of the accident and the investigation in public places; and
- the travel, accommodation, administrative and financial arrangements; and, if already known, the location of the operations centre and important phone numbers.

NOTES

Appendix 2 to Section 1

ORGANIZATIONAL MEETING

1. GENERAL

– Arrange for the recording of the meeting; and

– Circulate an attendance roster (Appendix 4 to this Section).

2. OPENING OF THE MEETING

– Call the meeting to order;

– Introduce yourself;

– Excuse members of the news media, attorneys, insurers, or persons representing claimants;

– If news media are present, establish a time for a progress briefing.

3. INTRODUCTIONS

– Deputy Investigator-in-charge, Administration Coordinator and Site Safety Coordinator;

– Media Relations Coordinator;

– Groupchiefs. Each chief should introduce his group members;

– Determine the presence of and introduce members of other organizations, in part and such as local authorities, coroner, military, accredited representatives, advisors, observers and participants.

4. PROTECTED INFORMATION

– Review the restrictions regarding the disclosure of records. Refer to Chapter 5 of Annex 13, the local laws and regulations, and the investigation authorities' policies and procedures.

5. ACCIDENT INFORMATION

Brief the investigation team on the information gathered to date. The following format may be used:

– Type, model, nationality and registration marks of the aircraft;

– Name of owner, operator and hirer, if any, of the aircraft;

– Number and qualifications of aircrew (if known);

– Date and time of the accident;

– Last point of departure and point of intended landing;

- Position of the accident;
- Number of passengers (if known, number killed or seriously injured);
- Nature of the accident and the extent of damage to the aircraft as far as it is known;
- Disposition of the flight recorders; and
- Physical characteristics of the accident site including the environmental conditions which may have an effect on the investigation.

6. CONDUCT OF THE INVESTIGATION

- Ensure each group chief has been provided with a checklist appropriate for his group;
- Ensure each group chief is aware of which members, including observers/participants, are assigned to his group;
- Ensure each group chief s aware of the status and restrictions imposed upon the observers/participants;
- Request all observers/participants debrief the Investigator-in-charge prior to their departure, solicit their ideas and request copies of any reports they prepare;
- Assign the responsibility for managing the site activities to the Site Safety Coordinator;
- Stress site safety, re-introduce the Site Safety Coordinator and explain his functions;
- Brief on dangerous cargo;
- Brief on biological hazards and stress the requirements and procedures regarding the use of personal protective equipment;
- Brief on the following site security issues:
  - Site boundaries and controlled entry point(s);
  - Issue and control of identification badges;
  - Controlled access procedures;
  - Point of contact;
  - Site working hours; and
  - Responsibility of escorts;
- Brief on the time and place of future meetings and who is required to attend; and
- Brief on due dates for group reports. A written report should be prepared at the completion of the field phase and given to the Administration Coordinator.

7. OTHER/GENERAL

Safety Issues

– Group chiefs must record all perceived safety issues and advise the Investigator-in-charge.

Media Relations

– Unless advised otherwise, the Investigator-in-charge is the sole spokesperson.

Next of Kin

– The coroner or the police normally have the responsibility to notify the next of kin (NOK) of a deceased person. The Investigator-in-charge should be informed when the notification to the NOK of all deceased persons has been completed.

Documentation

– Ensure everyone understands that all original documents must be turned over to the Administration Coordinator for cataloguing and filing;

– **All** documents and correspondence must be given a file number corresponding to the Master Index - (Administration Coordinator – Appendix 1 to Section 5); and

– Stress the requirement for a thorough follow up on the movement/location of **all** documents and aircraft parts.

Information Transfer

– Stress the importance of communications within the various groups and of information flow between the groups. **No individual or group should be working in isolation.**

Appendix 3 to Section 1

GRANTING OBSERVER/PARTICIPANT STATUS LETTER

(Name of investigation authority)

Date.....

Dear (Name of Observer/Participant.....).

GRANTING OF OBSERVER/PARTICIPANT STATUS

ACCIDENT FILE NO: .....
AIRCRAFT: .....
LOCATION: .....

The (name of the investigation authority) is empowered to investigate aircraft accidents in the (name of State). The objective of the investigation is to advance aviation safety by identifying safety deficiencies and making recommendations designed to eliminate or reduce such deficiencies.

During the course of an accident investigation, the (name of the investigation authority) may authorize a person to attend as an observer when the person is designated as such by a Minister responsible for a government department having a direct interest in the investigation, or as a participant when, in the opinion of the (name of the investigation authority), the person has a direct interest in the subject-matter of the investigation and will contribute to achieving the objective of (name of the investigation authority).

By this letter, you are granted the status of an observer or a participant to this accident and, subject to any conditions that the (name of the investigation authority) may impose and under the supervision of an investigator, you may:

a) attend at the accident site;

b) examine the aircraft, its component parts and contents;

c) unless otherwise prohibited by law, examine relevant documents; and

d) attend laboratory examinations and testings.

Your attendance as an observer/participant is subject to the following conditions:

a) you shall limit your activities at the accident site to those outlined by the Investigator-in-charge;

b) you shall ensure that your activities do not restrict or otherwise interfere with the investigators in the performance of their duties; and

c) you shall ensure that the information you gain as a result of your observer/participant status is not disclosed to any unauthorized person.

Failure to comply with any of the above conditions and responsibilities could result in the immediate revocation of your observer/participant status.

You should also understand that the privileges of an observer/participant will be exercised at your own risk. Please sign and return the attached copy of this letter to the Investigator-in-charge, indicating your understanding and acceptance of the above-mentioned conditions and responsibilities.

Yours truly,

Investigator-in-charge

I understand and accept the conditions outlined above with respect to my attendance as an observer/participant at the subject investigation.

I also understand that the privileges of an observer/participant will be exercised at my own risk, and I hereby agree to indemnify and save harmless the (name of the investigation authority) for any damage or injuries I may suffer as a result of my attending the investigation as an observer.

Signed:

Appendix 4 to Section 1

(Name of the investigation authority)

ATTENDANCE RECORD

ACCIDENT:

Date:

Started/Completed:

Location:

FULL NAME	ORGANIZATION	GROUP	TELEPHONE #	SIGNATURE

Section 2

DEPUTY INVESTIGATOR-IN-CHARGE

The Deputy Investigator-in-charge assists the Investigator-in-charge in the organization, conduct and control of the investigation. He is required to provide continuity in the investigation process during the absence of the Investigator-in-charge and is also expected to assist in the flow of information to the various groups of the investigation team.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Assist the Investigator-in-charge in establishing the investigation team and its organizational structure;

2. Ensure that all group chief positions are accounted for and that each group chief is provided with a copy of the Investigation Management System Event Checklist and the Major Accident Investigation Guide;

3. Assist the Investigator-in-charge in preparing for the pre-departure briefing of the investigation team;

4. Assist the Administration Coordinator with the following:

   – arranging transport for the investigation team to the accident site;

   – arranging ground transportation at the accident site;

   – requesting advances for the investigation team;

   – making accommodation arrangements;

   – obtaining appropriate office spaces; and

   – making arrangements for the transportation of the readiness and toxicological kits.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Assist the Investigator-in-charge in preparing for the organizational meeting;

2. Ensure a copy of the Investigation Management System Event Checklist and Major Accident Investigation Guide is available in the operations centre;

3. Forward further information required to update the notification to the Head Office Coordinator;

4. Ensure the Investigation Management System Event Checklist is being adhered to and that activities are recorded;

5. Insure that sufficient administrative support is available to effect proper document control;

6. Maintain radio or telephone communications with the team members at the accident site;

7. Provide the investigation team with technical, administrative and financial support;
8. Maintain a written log of daily activities; and

9. Assist the Investigator-in-charge with contact with the media, as required.

POST-FIELD PHASE

1. Attend meetings Events 64 and 65; and

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

2. Assist the Investigator-in-charge for Event 66.

EVENT 66. Report of the Investigator-in-charge

1) Organize the narrative;

2) Analyse the information;

3) Determine and assemble the findings;

4) Determine the causes;

5) Identify safety hazards and deficiencies;

6) Propose safety recommendations;

7) Organize and attach appendices;

8) Assemble the report;

9) Incorporate late information;

10) Submit report to investigation authority;

11) Following revision by the investigation authority, revise report as required; and

12) Submit the investigation report to the investigation authority for approval.

Section 3

HEAD OFFICE COORDINATOR

The Head Office Coordinator provides the Investigator-in-charge with related assistance, informs various agencies of the accident, and acts as the point of contact between the Investigator-in-charge and the investigation authority senior management.

1. Advise:

   – All appropriate Directors;

   – Media relations;

   – Civil aviation authority;

   – State of Registry;

   – State of the Operator;

   – State of Manufacture;

   – State of Design;

   – Aircraft/Engine Manufacturer; and

   – Owner/Operator of the aircraft.

2. Request all the pertinent documents from the civil aviation authority, the owner/operator of the aircraft and air traffic services;

3. Ensure that all pertinent documents, recordings and data/media are secured;

4. Record names and phone numbers of persons advised, including date and time;

5. Inform the Investigator-in-charge of the persons contacted and which parties have requested observer/participant status;

6. Attend the Investigator-in-charge's pre-departure briefing;

7. Promulgate the initial notification when the information has been received from the Investigator-in-charge;

8. Assist the Deputy Investigator-in-charge; and

9. Assist the Investigator-in-charge by coordinating the Head Office investigation activities during the field phase.

Section 4

SITE SAFETY COORDINATOR

The Site Safety Coordinator ensures that all activities at the accident site are properly coordinated, with specific emphasis on site security and site safety. The Site Safety Coordinator is responsible to the Investigator-in-charge and coordinates his activities with the whole investigation team.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Establish communications with the agency responsible for site security;

2. Determine if there was any hazardous cargo on the aircraft;

3. Determine the environmental conditions that investigators will be subjected to on the site;

4. Attend the Investigator-in-charge's pre-departure briefing;

5. Brief the investigation team on the expected environmental conditions and existence of hazardous materials on the site (if any); and

6. Coordinate with the Investigator-in-charge to ensure that the site-safety and site-security requirements specified in Event 1 are completed;

EVENT 1. Initial response

1) Contact the local police or other authority responsible for site security to determine what actions have been taken and convey the intentions and requirements of the accident investigation authority, in particular the safeguarding of recorders and other perishable investigation evidence;

2) As appropriate, advise the coroner, the attorney-general or the police of the requirements of the investigation authority regarding the recovery and handling of the human remains, in particular the safeguarding of perishable investigation evidence;

3) Determine from the air operator if hazardous material, such as chemicals, explosives, biological and radioactive materials were carried on the aircraft;

AFTER ARRIVING AT THE ACCIDENT SITE

1. Coordinate with the Investigator-in-charge to ensure that the site-safety and site-security requirements specified in Event 2 are completed;

EVENT 2. Initial actions at the site

Event 1 refers.

1) Review the guarding arrangements and adjust the limits of the site as required;
2) Arrange for guarding of the site for the time period envisaged for the field investigation;

3) Obtain a briefing from the local authorities on actions taken at the site; and

4) Make a preliminary survey of the site with the investigation team.

2. Initial coordination

- Contact the person responsible for the site security;

- Confirm the existence/nonexistence of hazardous materials on the site. The following should be considered:
  - chemical;
  - explosive;
  - biological; and
  - radioactive.

- If the responsibility for the site security will remain with an agency other than the investigation authority, ensure that agency is aware of the possible hazards to personnel posed by various aircraft components, in part and such as pressure vessels, fuel tanks, and tires;

- Ensure security guards are properly briefed to:
  - protect the public;
  - protect property;
  - prevent disturbance of wreckage;
  - protect and preserve ground marks made by the aircraft; and
  - admit only those persons with the required passes to the site.

- Conduct a preliminary survey of the site and make an assessment of the physical limits to be established as the site boundaries;

- Establish site limits;

- Attend the Investigator-in-charge's organizational meeting;

- Ensure the investigation team is briefed on the existence and location of any known or suspected hazards on the site and that all team members are aware of their responsibilities with respect to their personal safety while working on the site;

- Ensure all personnel seeking access to the site have the proper site access passes;

- Ensure compliance with site opening/closing times;

- Maintain a record of personnel on the site; and

- Maintain a log of all significant site activities.

3. First aid

- Ensure an adequate first-aid kit is available at the site, including a stretcher;

- Maintain a list of first aid trained personnel;

- Maintain an accurate record of injuries and first-aid treatment provided; and
- Ensure that a vehicle is available at the site for medical evacuations.

4. Communications

   – If practicable, arrange for telephone installation at the site;

   – Maintain a ready reference list of emergency phone numbers including:
     – Police;
     – Ambulance;
     – Doctors;
     – Poison centre; and
     – Operations centre.

   – In the absence of telephone capabilities, arrange for practical radio communications with the operations centre.

5. Hazards

   – Seek expert assistance for the safe handling of hazardous materials;

   – Identify and arrange for the elimination of potential hazards such as:
     – Fuel;
     – Inflated tires;
     – Pressure vessels;
     – Compressed air;
     – Compressed springs;
     – Hydraulics;
     – Oleos;
     – Batteries;
     – Igniters;
     – Oxygen system;
     – Oxygen bottles;
     – Aerosol containers;
     – Fire extinguishers;
     – Evacuation chutes;
     – Flares;
     – Life rafts/jackets; and
     – Composite materials.

   – Ensure an accurate record is kept, including photographs, of the “as found” condition of the hazards prior to neutralizing.

6. Firefighting

   – Ensure all fires are extinguished;

   – Ensure fire extinguishers are available at the site;

   – Ensure the investigation team members are aware of hazardous areas; and

   – Designate smoking areas away from the site.

7. Site command post

   - Consider and arrange for the following, as required:
     - Shelter;
     - Sleeping quarters;
     - Lighting;
     - Heating;
     - Washing facilities;
     - Drinking water;
     - Meals; and
     - Sanitation.

8. Site safety

   - Establish site working hours, in collaboration with the Investigator-in-charge and the groupchiefs;

   - Ensure personnel on the site are adequately equipped with personal protection equipment, such as:
     - Head protection;
     - Eye protection;
     - Face protection;
     - Hearing protection;
     - Protective footwear;
     - Protective clothing; and
     - Hand protection.

   - Liaise with the Administration Coordinator for the procurement of the personal protective equipment described in item 7 above.

9. Helicopter operations

   - If helicopter support is required, the following should be considered:
     - Rotorcraft type suitability;
     - Requirement for a helipad;
     - Removal of obstructions;
     - Air traffic services implications;
     - Availability of aviation fuel; and
     - Availability of fire extinguishers.

   - Ensure the flight crew are thoroughly briefed on the operation required, and that flight safety is paramount;

   - Ensure ground crews are briefed and properly equipped to conduct the operation safely;

   - Consider the following major contributing factors in helicopter mishaps:
     - Obstacles in the area, on approach and departure;
     - Snagged sling gear;
     - Poorly prepared and maintained landing pad;
     - Incorrectly rigged slung loads;
     - Overloading; and
     - Improperly trained/briefed personnel.

10. Transportation of material and site clean-up

- Assist the technical group persons in the packaging and shipment of aircraft parts and components; and

- Locate required equipment and personnel for the clean-up of the accident site.

POST-FIELD PHASE

1. Prepare a report to the Investigator-in-charge outlining the site activities including appropriate recommendations to address any deficiencies.

Section 5

ADMINISTRATION COORDINATOR

The Administration Coordinator provides administrative support to the investigation team and establishes a secure on-site office for the collection, retention, distribution and follow-up of material collected during the on-site investigation.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Coordinate necessary pay advances;

2. Ensure that the finance section is aware of the Responsibility Code (RC) for the pay advances;

3. Coordinate transportation arrangements of Head Office personnel;

4. Coordinate living accommodation arrangements and obtain meeting facilities;

5. Obtain a series of Purchase Order (PO) numbers from the Head Office Administration;

6. Obtain a petty cash advance from the finance section;

7. Ensure completeness of the Head Office readiness kit;

8. Arrange for the transportation and security of the Head Office readiness kit, including but not limited to the following:
   - Laptop computer;
   - Printer and paper for the printer;
   - Supplies of paper, pens, pencils, rulers, tape measures, instant markers;
   - Audio recorders;
   - On-site communication radios, mobile phones and satellite phones;
   - CDs, DVDs, flash memory sticks, and other data storage media;
   - Batteries;
   - Satellite navigation devices;
   - Flashlights;
   - Camera equipment; and
   - Environmental clothing and biohazard clothing and supplies.

9. Attend the Investigator-in-charge's pre-departure briefing and inform the investigation team on travel, pay advance and accommodation arrangements.

AFTER ARRIVING AT ACCIDENT SITE

1. Secure office facilities, equipment and meeting room;

2. Hire additional office support staff as required and ensure affirmation of secrecy forms are signed;

3. Arrange for the installation of telephones in the operations centre. It is recommended that a minimum of three phone lines be established: one private line for the Investigator-in-charge, a second for general use, and a third for public relations. Post the investigation team telephone list in the operations centre;

4. Arrange for the rental of motor vehicles as required, and obtain local maps;

5. Distribute radios to group chiefs and retain a record of distribution;

6. Maintain control of identification cards;

7. Assign a Purchase Order Number for each financial transaction conducted in support of the investigation;

8. Maintain a record of each financial transaction, and inform the Investigator-in-charge on a daily basis of funds expended;

9. Maintain a record of petty cash expenditures;

10. If required, arrange for the transcription of recorded interviews;

11. Arrange for the transportation and security of privileged information;

12. Establish and maintain a catalogue of all incoming information from interviews and documents;

13. Retain and file original copies of all documents. Refer to the attached Appendix 1 for suggested file numbers;

14. Take minutes of daily meetings; and

15. Secure all documents at the end of each day.

AT CONCLUSION OF THE FIELD PHASE

1. Arrange with telephone company for the termination of services;

2. Write thank you letters, for the Investigator-in-charge's signature, to all companies for services rendered;

3. Ensure all identification cards as well as all radios are returned and secured;

4. Ensure all documents are secured; and

5. Arrange for return transportation of the investigation team.

POST-FIELD PHASE

1. Consolidate a report of funds expended during the investigation;

2. Ensure that all investigation documents gathered during the field phase of the investigation are properly secured;

3. Coordinate the production of head office file covers and arrange for the filing of all documents gathered to date; and

4. Submit recommended improvements to the Administration Coordinator’s duties as well as recommended amendments to this checklist.

Appendix 1 to Section 5

MAJOR ACCIDENT INVESTIGATION FILE NUMBERS

SUFFIX	SUBJECT
-0	INDEX
-1	GENERAL
-2	SAFETY ISSUES
-3	SITE SAFETY
-4	MEDIA
-5	OPERATIONS
-6	AIRCRAFT PERFORMANCE
-7	MEDICAL/HUMAN AND ORGANIZATIONAL FACTORS
-8	WITNESS
-9	FLIGHT RECORDERS
-10	METEOROLOGY
-11	ATS/AIRPORTS
-12	SURVIVABILITY
-13	CABIN SAFETY
-14	MAINTENANCE & RECORDS
-15	SYSTEMS
-16	STRUCTURES
-17	CRASHWORTHINESS
-18	POWERPLANTS
-19	SITE SURVEY
-20	PHOTO/VIDEO
-21	ACCREDITED REPRESENTATIVES, ADVISORS, OBSERVERS and PARTICIPANTS
-22	INFORMATION REQUESTS
-23	UNSOLICITED SUBMISSIONS
-24	ORAL REPRESENTATIONS
-25	EXHIBITS
-26	FINANCE
-27	ADMINISTRATION

Section 6

MEDIA RELATIONS COORDINATOR

The Media Relations Coordinator:

a) Provides specific expertise and advice to the Investigator-in-charge in handling the media and their requests, as well as provides advice on community relations;

b) Assures that media requests and community queries are followed up; and

c) Promotes a positive public image for the Investigation Authority.

Note.— The Investigator-in-charge is the spokesperson throughout the investigation process. Arrangements may be entered into by the Investigator-in-charge for the Media Relations Coordinator to take some of the Investigator-in-charge's media workload. The Media Relations Coordinator will provide only that information as agreed to by the Investigator-in-charge.

Some States may assign the responsibility of investigation spokesperson to a senior manager of the investigation authority.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Prepare and issue a news release stating that the investigation authority is sending a team to the accident site. The release should contain only factual information known to that point, a contact phone number, as well as the name of the Investigator-in-charge and of the Media Relations Coordinator at the site;

2. Liaise with the Administration Coordinator to ensure that arrangements are made for a telephone line for exclusive use of the Media Relations Coordinator at the operations centre;

3. Document all media calls before departure (for callback purposes), and ensure that the media is called after arriving on site;

4. Make a list, with telephone numbers and city, of all the media expected to arrive in the area or that will have a direct interest in the accident investigation;

5. Brief the Investigator-in-charge regarding media attention on his arrival at the accident site;

6. Ensure that the following equipment is packed for the use of the Media Coordinator at the site:

   – Portable computer;
   – Printer;
   – Paper for printer;
   – Portable audio recording device;
   – Portable radio;
   – Business cards;
   – Paper and pens;
   – Tapes and batteries;
   – Camera equipment; and
   – Proper environmental clothing.

7. Attend the Investigator-in-charge's pre-departure briefing and advise the team of the type of media coverage that might be expected at the accident site.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Initial coordination

   – Determine which media are on site;

   – Find a proper location for news conferences;

   – Brief the Investigator-in-charge and coordinate arrangements for the initial news conference;

   – Contact all media in the area to let them know who the contact is and when and where the first news conference will be held;

   – Prepare a facts sheet of all the factual information known at that time;

   – Contact the media and get a feel for the types of questions that the journalists may be asking. Use this information for the facts sheet;

   – Prepare a questions sheet and brief the Investigator-in-charge before the first news conference; and

   – Record interviews, organizational meetings and news conferences.

2. First news conference

   – If the news conference is to be held indoors, ensure that the location has adequate power facilities;

   – Ensure that the media are aware of the news conference;

   – Brief the Investigator-in-charge on probable questions and responses;

   – The following information should be provided to the media:
     – The purpose of the conference;
     – How the investigation authority operates;
     – The factual information known at that time;
     – Any other releasable information known to date;
     – The type of information which will not be released by the Investigation Authority;
     – How the investigation will be carried out;
     – Time and place of accident site tours, if feasible;
     – Name of contact person and telephone numbers; and
     – Time of next news conference.

   – Obtain the names and contact points of the journalists for callback purposes;

   – Debrief the Investigator-in-charge;

   – Brief the Head Office Coordinator on the situation; and

   – Guide the media through the accident site, as briefed by the Investigator-in-charge.

3. Continuing services

   – Maintain a list of updated factual information;

   – Make arrangements for site tours with the Investigator-in-charge;

   – Pick up copies of all local media releases;

   – Liaise with Head Office Coordinator;

   – Arrange interviews between the Investigator-in-charge and the media;

   – Prepare statements and speech notes, as required;

   – Maintain contact with the media while on site;

   – Assure follow-up questions are answered;

   – Keep a log of your activities;

   – Arrange for public radio/television announcement, in part to locate witnesses and advise the public of hazards;

   – Arrange continuing news conferences as needed;

   – Assist the Investigator-in-charge in the procurement of media photo/video coverage that may be useful for the conduct of the investigation; and

   – Advise the Investigator-in-charge, as necessary.

POST-FIELD PHASE

1. Submit a consolidated report to the Investigator-in-charge on the media-related activities during the investigation.

Section 7

OPERATIONS GROUP CHIEF

The Operations Group Chief is responsible for all facts concerning the history of the flight and flight crew members' activity. This includes flight planning, dispatching, weight and balance, radio communications, navigation and approach aids, en-route stops, refuelling, aeronautical experience, flight checks and general information about the flight crew members.

The medical history of the crew members should be determined in cooperation with the Medical/Human Factors Group. The final flight path should be determined in cooperation with the Witness, Flight Recorder and Site Survey groups. Other information relating to the history of the flight should be determined in cooperation with the Meteorology and Air Traffic Services/ Airport groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing; and

2. Initiate Event 3.

EVENT 3. Secure flight operations documents

1. Obtain and secure the following documents, as appropriate:

a) From the operator/company:
- Air Operator Certificate;
- Air Operator Operations Manual;
- Flight Manual (FM);
- Flight crew and cabin crew members training records;
- Aircraft Operating Manual (standard operation procedures [SOPs]);
- Copy of current cockpit checklists (normal, abnormal and emergencies);
- Pilot log books;
- Pilots flight log;
- Pilot flying schedule for the last six months;
- Aircraft Journey Log Book;
- Minimum Equipment List (MEL);
- Air Operator dispatch logs;
- Daily dispatch logs, including the week prior to and the day of the accident;
- Mass and balance and centre of gravity calculations for the accident flight and previous flight;
- Passenger and freight manifest;
- Air Operator schedules and aircraft schedules;
- Air Operator Route Manual;
- National and international agreements associated with the transfer some or all of the State of Registry's responsibilities (if applicable)
- Refuelling documentation; and
- Record of pertinent communications.

b) From the pertinent civil aviation authority:
- Flight crew personnel licensing files;
- Copy of approved Flight Manual (FM);
- Copy of approved Minimum Equipment List (MEL);

- Copy of company Master Minimum Equipment List (MMEL);
- Files on chief pilot, chief inspector, cabin crew, chief flight engineer, and chief of maintenance;
- Copy of in-flight inspections covering the last six months;
- Documentation in support of applications for the Air Operator Certificate;
- Copy of any civil aviation authority Policy Letters applicable to the company;
- National and international agreements associated with the transfer some or all of the State of Registry's responsibilities (if applicable);
- Copy of the last air operator audit conducted by the authority; and
- Air Operator files.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Brief the Operations Group members;

3. Liaise with Medical/Human Factors Group Chief regarding the interview of any surviving aircrew members (refer to Appendix 1 of this Section);

4. Ensure appropriate liaison is maintained with all group chiefs in order to reduce duplication;

5. Conduct an initial survey of the accident site in order to get a feel for the dynamics of the accident sequence, in part and such as impact angles, impact attitude, velocity, power, fire, and configuration;

6. Advise Photo/Video Group Chief of requirements;

7. Liaise with Systems GroupChief, in part to review and record (in situ) position of cockpit controls, instruments, switches, circuit breakers, approach charts, and seat belts;

   Note.— Most of the above evidence is perishable. This phase of the investigation is critical and must be carefully recorded.

8. Complete Event 3;

9. Submit all original documents to the Administration Coordinator;

10. Initiate and complete Event 17;

    EVENT 17. Review of operations documents

    Event 3 refers.

    1) Review all the documents obtained from the operator and summarize the pertinent information;
    2) Review all the documents obtained from the civil aviation authority and summarize the pertinent information; and
    3) Compile in chronological order, the history for each flight crew member and for the operator.

11. Obtain CVR data/transcript and FDR data plots and conduct preliminary review of recorded information for operational factors;

12. Maintain close liaison with Witness Group Chief and police for coordination of a list of potential witnesses

and for the establishment of possible questions;

13. As operational information is collected, inform the appropriate group chief regarding aircraft systems that may be suspect;

14. Gather information required for computation of the aircraft mass and balance and centre of gravity. Have baggage weighed, if necessary;

15. Determine requirements for an Aircraft Performance Sub-Group. If required, initiate Event 42;

EVENT 42. Aircraft performance

This aspect of the investigation is normally the responsibility of the Operations Group. Under certain circumstances, it is desirable to establish an investigation group tasked specifically to conduct a detailed examination of the aircraft performance characteristics which may have been causal to the accident.

Events 3, 17 and 31 refer.

1. Collect all information affecting aircraft performance, and review:
   - Flight crew and passenger interviews;
   - Air traffic services and cockpit voice recorder data;
   - Flight data recorder plots;
   - Flight data recorder information related to previous flights of the aircraft;
   - Eyewitness interviews;
   - Weather data;
   - Engine performance findings;
   - Structures findings; and
   - Systems findings.

2. For take-off or landing phase accidents, the following basic information is required:
   - Aircraft gross weight;
   - Aircraft configuration;
   - Airfield elevation;
   - Temperature;
   - Pressure and density altitudes;
   - Wind direction and velocity;
   - Runway slope;
   - Runway surface (type and braking action);
   - Runway length;
   - Pertinent obstacles; and
   - Engine thrust.

3. Complete a mathematical analysis of the theoretical take-off or landing performance of the aircraft;

4. Compare actual and theoretical flight path and assess the significance of differences;

5. Obtain specialist assistance as required;

6. Consider the requirement for the conduct of flight tests or simulator tests to determine the effects of various combinations of aircraft configuration, engine performance and pilot techniques; and

7. If required, assess accuracy of performance charts

16. Attend interviews of key witnesses with operational information;

17. Commence preparations for interviews of flight crew members;

Note.- Interviews of flight crew members should be planned and conducted in consultation with the Witness and Medical/Human Factors groupchiefs, and in consideration of their requirements.

18. Initiate Event 31;

EVENT 31. Flight crew members interviews

Events 3 and 17 refer.

1) Obtain and review flight crew statements; and

2) Conduct individual interviews.

19. Commence preparations for interviews of next of kin and air operator representatives;

Note.— To avoid duplication, it is imperative that these interviews of next of kin be conducted in concert with the Witness and Medical/Human Factors groupchiefs. Similarly, interviews with other individuals may be of interest to other groupchiefs, such as interviews with company management personnel which may also be required by the Powerplant, Systems, and Maintenance and Records groupchiefs. These interviews should be planned and conducted with consideration of the requirements of other groups.

20. Gather pertinent data from other group chiefs prior to departing the site;

21. If required, conduct a familiarization ride on the same route and on the same aircraft type, preferably with the same operator;

22. If required, arrange for a simulator programme; and

23. Complete Events 31 and 42.

POST FIELD PHASE

1. Complete Event 50;

EVENT 50. Analysis and report of the Operations Group

Events 3, 17, 31 and 42 refer.

1) Complete required air operator interviews;

2) Complete interviews of civil aviation authority personnel;

3) Review information from other groups;

4) Review, evaluate and analyse all information collected; and

5) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Appendix 1 to Section 7

FLIGHT CREW MEMBERS INTERVIEW

The initial interview should be restricted to the events associated with the occurrence flight. All flight crew members should provide a written statement.

The crew members should be questioned from a list of prepared questions covering:

- general details of the operation;
- phase of flight at time of accident;
- weather conditions at time of accident;
- similarity between actual weather and forecast;
- radio and navigation aids used;
- serviceability of aircraft;
- pilot's flying background and experience;
- crew rest periods;
- movements in the last 24 hours;
- post-accident activities;
- physical condition and evacuation; and
- any other question pertinent to the circumstances.

Crew members will be re-interviewed as circumstances dictate.

Note.— Relate pertinent factual information to the Investigator-in-charge and appropriate group chairpersons.

Section 8

MEDICAL/HUMAN AND ORGANIZATIONAL FACTORS CHIEF

Support regarding the investigation of medical and human factors issues normally would be achieved by assigning the subject-matter experts to the investigation group(s) requiring such assistance. A separate Medical/Human Factors Group would only be formed when there is a requirement to conduct an in-depth examination of the aero medical, crash injury, and/or human performance issues.

For human factors issues, this group will gather and analyse evidence on the general physical, physiological and psychological conditions, the environmental factors, and the organizational and management factors that might have adversely affected the crew or other individuals in the performance of their duties. The investigations of human factors should be conducted whenever human performance may have contributed to the occurrence, which could include, among others, cabin crew, air traffic controllers, maintenance crew, engineers, regulatory officials, decision-makers and management. The human factors investigation must go beyond determining what individuals did and must also include the systematic search for the probable reasons why they acted in a certain manner.

For medical factors issues, this group will gather and analyse the evidence associated with the pathological, aviation-medical and crash injury aspects of the investigation, including the identification of the crew, their location at the time of the accident, and by reviewing their injuries, their position and their activity in the cockpit at the time of the impact. This group will cover matters involving autopsies of crew and passengers, as appropriate, not only to identify the victims and to assist in legally determining the cause of death, but also to obtain all possible medical evidence that may be of assistance in the investigation. The group will also investigate the design factors related to human engineering that may have contributed to the causes of the accident, the survival aspects and the crashworthiness of the aircraft leading to the injury or death of the occupants.

The functions of this group must be closely coordinated with the Operations Group, Air Traffic Services and Airports Group, Witness Group, Recorders Group, Maintenance and Records Group, Structures Group and Crashworthiness Group.

CAUTION

The procedures of the investigation authority often overlap with those of police and coroners. Sound working relationships should have been pre-established with these authorities.

The overlap of investigations and procedures with these groups is a sensitive issue. In order to avoid misunderstandings and possible disruption of the investigation process, the Medical/Human Factors Group Chief should be familiar with this issue prior to commencing his investigation.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Consult with the Investigator-in-charge to determine what arrangements may have been concluded with the coroner, the attorney-general or the police;

2. Consult with the Investigator-in-charge and the chairpersons of the other groups to determine what medical and/or human factors expertise is required on their groups;

3. Allocate Medical/Human Factors Group resources as required to other investigation groups;

4. Conclude an agreement with medical authorities on the time and method of recovering human remains, autopsies and physical examinations of surviving crew members;

5. If required, advise the medical authorities of the specific accident investigation requirements (Appendices 1 and 2 of this Section);

6. Obtain the crew members medical file(s) and review as required (coordinate with the Operations Group Chief);

7. Consider the requirement for a review of the personal physician files and medicare records;

8. Attend the Investigator-in-charge's pre-departure briefing; and

9. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Contact the local coroner or appropriate medical authority to determine the progress at the accident site;

2. Conduct a preliminary survey of the accident site in order to get a feel for the dynamics of the accident;

3. Attend the Investigator-in-charge's organizational meeting;

4. Obtain the passenger manifest;

5. Initiate Event 4;

EVENT 4. Human remains recovery

1) Coordinate with forensic personnel for human remains recovery

2) During the recovery, photograph the remains and record their location; and

3) Prepare a plot of the locations of the human remains.

6. Complete Event 4;

7. Initiate Event 18;

EVENT 18. Crew members medical examinations

Event 4 refers.

1) Obtain the list of flight crew and cabin crew members (names and positions);
2) Determine the location and condition of the surviving flight crew members;
3) Obtain the permission of crew members to submit to medical examination;
4) Arrange for examinations of the flight crew members by a competent medical practitioner, including blood and urine samples, and obtain the following information:
   – Medical status and history, including medications;
   – Personal history, including habits; and
   – Pre-flight activities with human factors significance.

5) If relevant, arrange for examination of the cabin crew members by a competent medical practitioner, including blood and urine samples, and obtain the following information:
   – Medical status and history, including medications;
   – Personal history, including habits; and
   – Pre-flight activities with human factors significance.

Note 1.- The human factors investigation should go beyond examining the actions of the aircrew and include a review of the actions of any individual participating in a flight's operation and whose performance may have contributed to the occurrence.

Note 2.- The Investigator-in-charge should have the power to require such medical examinations of aircraft crew members if he believes on reasonable grounds that such examinations may be relevant to the investigation.

No medical examination shall be made that involves surgery, perforation of skin or external tissue or the entry into the body of any drug or other foreign substance.

8. Coordinate the participation of human performance specialist(s) at interviews of involved personnel, to include among others surviving flight crew and cabin crew, air traffic services and airport controllers, maintenance technicians, regulatory officials, and management;

9. Coordinate and attend interviews of flight crew members with the Operations Group Chief (Appendix 1 to Section 7);

10. Complete Event 18;

11. Assist the coroner in carrying out his duties;

12. Complete Event 32;

EVENT 32. Victim identification

Events 4 and 18 refer.

1) Collaborate with the coroner and police authorities in the identification of victims; and

2) As appropriate, assist in providing victim identification information such as wallets, clothing, jewellery, age, sex, face, complexion, colour of hair and eyes, height, weight, dental records, scars, growths, skeletal deformities, medical disorders, tattoos, blood group, identification tags and medical files.

13. Refer to Appendix 1 of this Section for post-mortem examination requirements;

14. Consult with medical authorities regarding the location and time of autopsies;

15. Advise coroner or attorney general of tests required on remains, including human fluids and tissue specimen requirements (Appendix 2 of this Section);

16. Initiate Event 43.

EVENT 43. Autopsies

Events 4, 18 and 32 refer.

1) Collaborate with the coroner and police authorities regarding the autopsy requirements, and specify a list of essential tissue and fluid specimens to be collected;

2) Request autopsies of the flight crew members, including the determination of the cause of death and the presence of any pre-existing disease;

3) Request autopsies of the cabin crew members and passengers, including the cause of death and the presence of any pre-existing disease;

4) For each flight crew and cabin crew member obtain the following information:
   – Position in the aircraft at impact and evidence of activity;
   – Position relative to angle of impact (to establish direction of forces on bodies);
   – Evidence of injury, incapacitation or any physiological or toxicological irregularities prior to impact;
   – Pre-impact physical or emotional stress;
   – Pre-impact impairment from disease, injury or abnormality;
   – Pre-impact impairment from alcohol, drugs, carbon monoxide, or toxic substances;
   – Pre-impact exposure to explosion and fire; and
   – Adequacy of restraint systems.

5) If feasible, for each passenger obtain the following information:
   – Position relative to angle of impact (to establish direction of forces on bodies);
   – Pre-impact injury of any kind;
   – Pre-impact exposure to explosion, fire, carbon monoxide, or toxic substances;
   – Physiological or toxicological irregularities; and
   – Adequacy of seat belts.

6) Obtain the autopsy reports.

17. Forward specimens to laboratory for examination (refer to Appendix 2 to this Section);

18. Review and analyse, in concert with the Operations Group Chief and Flight Recorders GroupChief, the information contained on the cockpit voice recorder (CVR) and flight data recorder (FDR) plots;

19. As human performance factor issues emerge, contact the Witness Group Chief for the introduction of questions on human factors aspects;

20. Complete Event 43;

21. When practicable, coordinate with the Witness Chief for interviews with next of kin (NOK) and personal physicians covering the victims':

    – personal habits;

    – personal background;

    – current medication; and

    – psychological problems.

POST-FIELD PHASE

1. Complete Event 51;

EVENT 51. Analysis and report of the Medical/Human and Organizational Factors Group

Events 4, 18, 32 and 43 refer.

1) Assemble the medical data;

2) Review witnesses' statements;

3) Review, evaluate and analyse all information collected;

4) Prepare the group report using the following headings and sub-headings:
   - Crew:
     - personal history, including habits;
     - medical status and history, including current medication;
     - pre-flight activities having human factors significance;
     - physiological, psychological and toxicological irregularities;
     - incapacitation or injury prior to impact;
     - position in aircraft and crew activity at impact;
     - position of members relative to angle of impact; and
     - injuries resulting from the accident.
   - Passengers:
     - pre-accident physiological conditions; and
     - injuries resulting from the accident.
   - Human engineering:
     - instrumentation, controls, autopilot, crew seats, armrests, and other fatigue-combating devices.
   - Survival equipment performance:
     - seat belts and harnesses;
     - seats and anchorages;
     - escape devices;
     - dinghies;
     - food and clothing kits; and
     - medical kits; and

5) Submit the group report to Investigator-in-charge.

2. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   - Operations;
   - Medical/Human and Organizational Factors;
   - Witness;
   - Flight Recorders;
   - Meteorology;
   - Air Traffic Services/Airport;
   - Survivability;

- Cabin Safety; and
- Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Appendix 1 to Section 8

POST-MORTEM EXAMINATIONS

The general purpose of an aviation post-mortem examination consists of the following three elements:

IDENTIFICATION OF THE HUMAN REMAINS

Sources of identification include, in part, wallets, clothing, jewellery, age, sex, face, race, hair, eyes, height, weight, dental records, scars, growths, resections, skeletal deformities, medical disorders, tattoos, blood group, and dog tags.

AETIOLOGY

Determination of the cause of death and the presence of any pre-existing disease rated as causal, contributory or incidental to the occurrence; includes the evaluation of possible human incapacitation, intoxication or use of drugs, equipment failure, and environmental factors.

DETERMINATION OF SEQUENTIAL FACTORS

Sequential factors: gravitational, chemical, thermal, circulatory or respiratory, ante-mortem, agonal, and post-mortem.

Appendix 2 to Section 8

INSTRUCTIONS FOR PRESERVATION AND CONTINUITY OF SPECIMEN COLLECTION

The tissue and fluid samples submitted will be used for an extensive variety of tests. For the best possible results, generous, well preserved and labelled specimens should be sent. Specimens should be transmitted in a toxicology kit.

Fluid specimens are the most important samples. Twenty (20) ml samples of blood and urine would be ideal, but samples of any volume would be acceptable, even if the quality of the specimen is poor. Diluted, coagulated or dried blood can be used for a number of tests. Three (3) blood samples should be obtained, if possible, and identify the sample sites. Submit any volume of vitreous humour and bile that can be recovered. Seal all vials.

Tissue specimens should measure about 3 x 2 x 1 cm or weigh about 50 grams. Tissues required are: heart, lung, liver, kidney, spleen, skeletal muscle and brain, or if not available, spinal cord or peripheral nerve. For tests regarding pesticides/herbicides send fat tissue. Place the tissues in ziploc plastic bags as quickly as possible with a minimum of handling. Squeeze out the surrounding air and close the ziploc plastic bag. Put the specimen in a second ziploc plastic bag, with a number identification label. The specimens should be placed in a large plastic bag, with salt-ice mixture to freeze the tissues. Seal the bag for legal continuity and to prevent leakage during transit. Make every effort to ensure this bag does not leak.

Two larger plastic containers should be included in the kit. One is to be used for about 100-150 grams of liver tissue required for a drug screen. The other is to be used for a sample of stomach contents. These specimens do not require freezing. The containers should be taped closed, sealed and labelled.

A small plastic container should be provided for specimens for histological identification. Samples approximately 2 x 1 x 1 cm from brain, heart, lung, liver and kidney, as well as any lesion which may assist in identifying, should be placed in 10 per cent buffered formalin solution. These specimens should not be frozen. Indicate what tissues are included and seal the cap securely with tape to prevent leakage.

Freezing the specimens for shipment stabilizes them and prevents degradation. If convenient, pre-freeze the tissues and maintain their temperature with freezer packs. If it is necessary to use a salt-ice mixture, prevent leakage by securely tying and taping the plastic lining bag.

Ensure the legal continuity of the specimens. Place a seal over the lid opening, so that any tampering with the kit would result in breakage of the seal.

To facilitate handling at the airport, label the container as follows:

SHIPPING INSTRUCTIONS

FROZEN SPECIMENS FOR BIOCHEMICAL ANALYSIS.
PLEASE REFRIGERATE AND HOLD FOR PICK-UP.

Section 9

WITNESS GROUP CHIEF

The Witness Group Chief is responsible for contacting and interviewing all survivors of the flight, as well as all persons who may have seen or heard some portion of the flight, or who may have knowledge concerning the flight or of the weather conditions at the time of the accident.

Close coordination must be maintained with all groups, but particularly with the Investigator-in-charge and the Operations and Medical/Human factors groups.

Note.– The timely dissemination to other group chiefs of information gathered during the course of interviews may be critical to the success of the investigation. Therefore, it is crucial that the Witness Group Chief maintain close liaison with all members of the group and must then relay all pertinent information to the appropriate group chiefs as soon as possible.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Liaise with the Investigator-in-charge or Deputy Investigator-in-charge for assignment of additional investigators to the witness group;

3. If possible, all witness group members should visit and walk the accident site prior to commencing interviews;

4. Request a list of all possible witnesses from, in part, the Investigator-in-charge and police agencies;

5. Request copies of statements and interview reports that may have been conducted by other agencies, in part and such as the operator, police, and media;

6. If appropriate, request the Media Relations Coordinator to approach local media for assistance in locating possible eyewitnesses;

7. Thoroughly brief each group member and provide each one with a list of questions that may have been provided by other groupchiefs;

8. In the event that there is a large number of witness and survivor interviews required, consider coordinating these interviews from the operations centre. Consider forming two witness interview subgroups: one for survivor interviews; and one for eyewitness interviews;

9. Arrange for the interview of all eyewitnesses as soon as possible. The interviews should cover the following points:

   – Personal information (names, home address, phone number, email address);

- Time of observation;
- Location of witness;
- Weather conditions;
- Photographs or videos taken;
- Course and altitude of aircraft;
- Configuration (in part, flaps and gear);
- Evidence of fire or explosion;
- Evidence of structural failure; and
- Anything heard or observed concerning the aircraft.

10. Complete Event 5;

EVENT 5. Eyewitness interviews

1) Search for eyewitnesses;
2) Interview eyewitnesses, at their location of observation, if feasible;
3) Obtain photographs and videos taken by witnesses, and those recorded by security or operations monitoring devices; and
4) Develop an initial plot of aircraft flight path.

11. If a delay in conducting the above interviews is anticipated, request that eyewitnesses complete and submit a written account of their observations;
12. Ensure that the applicable group chiefs are informed of the proposed interviews of key witnesses;
13. Attend interviews of key witnesses;
14. Arrange for the transcript of interview records through the Administration Coordinator;
15. Ensure that the Investigator-in-charge and other group chairpersons are regularly informed of interview activities and of information gathered that may be pertinent to the various aspects of the investigation;
16. Submit all original written statements, documents and photographs to the Administration Coordinator;
17. Complete Event 19;

EVENT 19. Plot flight path

Event 5 refers.

1) Plot the aircraft flight path from eyewitness information showing:
   - Aircraft flight direction, altitude and attitude;
   - Aircraft configuration, in part and such as position of flaps, spoilers, and gear;

- Evidence of fire or explosion;
- Evidence of structural failure; and
- Point(s) of collision or impact.

18. Submit copies of the plot to the Investigator-in-charge, Operations Group and Structures Group chairpersons;

19. Complete Event 33;

EVENT 33. Interviews of next of kin

Events 5 and 19 refer.

1) Complete interviews of next of kin of crew members, covering:
   - Personal habits;
   - Personal background;
   - Current medication; and
   - Psychological problems.

20. Review all interview reports;

21. Re-interview eyewitness as required to resolve conflicting testimonies, errors or irregularities. Other group members should be present if evidence is relevant to their component of the investigation; and

22. Complete Event 44.

EVENT 44. Re-interviews (eyewitnesses)

Events 5, 19 and 33 refer.

1) Compile a list of witnesses to be re-interviewed;
2) Prepare questions; and
3) Re-interview witnesses.

POST-FIELD PHASE

1. Complete Event 52;

EVENT 52. Analysis and report of the Witness Group

Events 5, 19, 33 and 44 refer.

1) For ease of reference and if the number of interviews warrants, summarize each interview and attach a précis of the interview to the front of each interview record. Such a précis should also contain an assessment of the credibility of the information;

2) Prepare a matrix of witness testimonies that highlights critical issues; and

3) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 10

FLIGHT RECORDERS GROUP CHIEF

The Flight Recorder Group Chairperson is responsible for the location, retrieval and transportation of the aircraft flight recorders to the flight recorder playback facility, as well as for the extraction, calibration and technical analysis of the data contained on these recorders.

The Flight Recorders Group may also be responsible for recovery and analysis of information contained on other aircraft computers (for example flight management systems, traffic collision avoidance system, and terrain awareness and warning system); on memory units containing satellite navigation information; and on other portable electronic recording devices that can store some data related to the accident. The group may also be responsible for collecting and synchronizing flight data, audio and video information stored on ground-based devices.

In concert with the Investigator-in-charge, the Operations Group Chief and other group chiefs and specialists designated by the Investigator-in-charge, the Flight Recorders Group will also assist in the operational, technical and human performance analysis of the information derived from the aircraft flight recorders.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Consult with the Investigator-in-charge to determine an appropriate method of ensuring the locating and securing of the recorders;

3. Brief the personnel, as required, on the appropriate measures required for the preservation of data contained in the recorders;

4. Arrange to obtain the most recent flight data recorder calibration information from the operator;

5. Determine the location of a suitable readout facility; and

6. Coordinate the method of recovery and transportation of the flight recorders to the playback facility.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Conduct an initial survey of the accident site;

3. Complete Event 6;

EVENT 6. Flight recorder recovery

1) Locate the flight recorders, as well as any other recorders such as standby recorders and quick-access recorders;

2) Photograph the flight recorders in situ;

3) Examine and record the condition of the flight recorders;

4) Recover the flight recorders;

5) Prepare the flight recorders for transportation;

6) Arrange for the timely and secure transport of the flight recorders to the playback facility; and

7) Carry the flight recorders by hand to the readout facility.

Note.— Due to the importance of flight recordings, the recorders must be handled with extreme care to prevent damage. Only fully qualified personnel should be assigned to recover and handle the recorders. A member of the investigation authority should handle and transport the flight recorders from the accident site to the read-out facilities.

4. Submit all original documents and flight recorders information to the Administration Coordinator.

POST-FIELD PHASE

1. Determine and brief the members of the Flight Recorders Group on their respective assignments;

   Note. — Flight recorder information SHALL NOT be released.

2. Complete Event 20;

   EVENT 20. Read-out of flight recorders

   Event 6 refers.

   1) Obtain the most recent flight recorders' calibration information from the operator;

   2) Copy and playback the CVR data and provide the Investigator-in-charge with an initial written précis of the information;

   3) Copy all CVR channels separately and present them on a storage medium in a format applicable for the Investigator-in-charge, normally, a four-channel copy;

   4) Make a transcript of the CVR and transmit it to the Investigator-in-charge;

   5) Contact the Investigator-in-charge to determine the gross FDR requirements;

   6) Copy the FDR data and provide the Investigator-in-charge and the pertinent group chairpersons with the required initial data plots along with an appropriate written briefing;

   7) Using crosschecks and data obtained from other groupchiefs, determine the reliability of the flight recorder data, and refine the FDR data and CVR transcripts;

   8) Synchronize timing of the FDR and CVR records together with the air traffic services data, if possible; and

   9) Forward the refined information to the Investigator-in-charge, the Operations Group Chief and other group chiefs needing this information.

3. Complete Event 34;

EVENT 34. Analysis of flight recorders data

Events 6 and 20 refer.

1) In concert with designated group chiefs and assigned specialists, conduct a detailed examination of the flight recorders information;

2) In coordination with the Structures Group, Systems Group and Powerplants Group determine the in-flight serviceability of the aircraft, systems and powerplants; and

3) In coordination with the Operations Group, Witness Group, and the Air Traffic Services and Airport Group, reconstruct the flight path, taking into account the satellite navigation systems data, if available.

4. Complete Event 53; and

EVENT 53. Analysis and report of the Flight Recorders Group

Events 6, 20, and 34 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

5. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 11

METEOROLOGY GROUP CHIEF

The Meteorology Group Chief is responsible for the collection, compilation and analysis of all factual meteorological data pertinent to the accident. This group would also be responsible for investigating the systems, sensors, equipment and processes used to generate and provide weather information.

Close coordination must be maintained with other groups, particularly the Operations, Air Traffic Services and Airport, Systems and Witness groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Determine the most appropriate location from which to begin gathering weather-related information; and

3. Inform the Investigator-in-charge and the Operations Group –Chief of your planning.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Conduct an initial survey of the accident site;

3. Complete Event 7; and

EVENT 7. Secure weather documents

1) Determine where the flight crew obtained a weather briefing;

2) Interview the individual(s) who provided the weather briefing;

3) Secure copies of briefings and other weather documentation given to the flight crew;

4) Obtain and secure the following documents, as appropriate:
   - The actual and forecast weather conditions for the route, area, terminal, destination, alternate and site of the accident;
   - Hourly and special reports;
   - Weather radar reports;
   - Pilot weather reports (PIREP);
   - Surface observations, logs and records;
   - Precipitation records;
   - Barograph records;
   - Wind records;
   - Synoptic charts;
   - Upper air charts;
   - Runway Visual Range (RVR) records;
   - Radiosonde observations;
   - Satellite pictures;
   - Conditions of natural light and sunrise/sunset;

- Special weather observations;
- Significant Meteorological Information (Sigmets) weather advisories; and
- Witness weather reports.

4. Submit all original documents to the Administration Coordinator.

POST-FIELD PHASE

1. Complete Event 21;

EVENT 21. Review of weather documents

Event 7 refers.

1) Review all the documents and summarize the pertinent information;

2) Arrange for a qualified meteorologist to review and analyse all the documents;

3) Consider the following hazardous phenomena:
   - Mountain wave effect;
   - Revolving storms;
   - Severe turbulence;
   - Freezing precipitation;
   - Wind shear;
   - Subsidence; and
   - Electrical storms.

2. Submit pertinent weather information to the Investigator-in-charge, Operations Group and Systems Group Chairpersons;

3. If weather appears to be a contributing factor, consider utilizing the forecast and en-route weather, and plotting a cross sectional flight profile showing actual weather encountered at the departure point, en-route and at destination;

4. The cross sectional flight profile should depict:

   - Cloud formations;
   - Precipitation areas;
   - Turbulence areas;
   - Wind shear areas;
   - Freezing level; and
   - Storm activity.

5. Submit copies of the pertinent weather and cross sectional flight profile to the Investigator-in-charge and Operations GroupChief, indicating those problem areas that may have had a direct bearing on the accident;

6. Liaise with the Witness Group Chief for the conduct of interviews of witnesses having weather testimony; and

7. Complete Event 35;

EVENT 35 Interviews (Meteorology)

Events 7 and 21 refer.

1) Conduct interviews of witnesses, such as:
   – Eyewitnesses;
   – Other flight crews;
   – Weather forecasters or observers; and
   – Weather broadcasters.

2) Review and assess personnel qualifications;

3) Determine the accuracy of weather measuring equipment; and

4) Update the cross sectional weather profile.

8. Complete Event 54;

EVENT 54. Analysis and report of the Meteorology Group

Events 7, 21 and 35 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

9. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 12

ATS AND AIRPORTS GROUP CHIEF

The ATS and Airport Group Chief is responsible for the review of the original records of the ATS units concerned including when available, radar screen recordings, the monitoring of any original voice recordings, and verification that written transcripts of voice communications are consistent with the recordings. In addition, this group will provide, when appropriate, a reconstruction of the history of the flight based on ATS information.

This group will also determine the operational status, in part, of the airport, pertinent navigation aids, communications equipment, radar, transponder equipment and computers; and provide technical data on all such equipment and its operation, whenever it is deemed necessary.

This group must coordinate its activities with the Operations GroupChief.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Conduct an initial survey of the accident site;

3. Complete Event 8;

EVENT 8. Secure ATS and airport documents

1) Obtain and secure the following documents, as appropriate:
   - Flight plan;
   - Flight plan message;
   - Departure message;
   - Notices to Airmen (NOTAMs);
   - Pertinent air traffic services and airport recordings;
   - Aerodrome control progress strips;
   - Area control progress strips;
   - Approach control progress strips;
   - Approach terminal progress strips;
   - Radar recordings (including military recordings, if available);
   - Names and files of air traffic services personnel on duty;
   - Unit logs;
   - Pertinent manuals and directives;
   - Pertinent outage reports,
   - Airport Certificate;
   - Airport certification safety standards/reports;
   - Braking action reports;
   - Master airport plan;
   - Station logs;
   - Equipment inspection documents;

- Airport manager's log; and
- Names and files of airport personnel on duty.

4. Submit all original documents to the Administration Coordinator;

5. Complete Event 22;

EVENT 22. Review air traffic services and airport documents

Event 8 refers.

1) Review all the documents obtained from the air traffic services and airport authorities, and summarize the pertinent information;

2) Make copies of the air traffic services recorded data from the originals;

3) If air traffic services data are not available in a digital form for copy, playback and analysis, make a video copy of the air traffic services display screens for playback; and

4) Make transcripts from the air traffic services recorders (all channels).

6. Provide all pertinent information and air traffic services data to the Investigator-in-charge;

7. Direct pertinent information to Operations Group Chief as soon as it becomes available;

8. Direct all original documents and media to the Administration Coordinator;

9. Commence preparations for interviews with air traffic services and airport personnel;

Note.— Interviews with air traffic services and airport personnel should be planned and conducted in consultation with the Operations, Witness and Medical/Human Factors groupchiefs, and in consideration of their requirements.

10. Complete Event 36;

EVENT 36. Interviews (Air Traffic Services and Airport)

Events 8 and 22 refer.

1) Conduct interviews with those persons directly involved with the aircraft progress, such as:
   - Ground controller;
   - Tower controller;
   - Area controller;
   - Terminal controller;
   - Radio station operator;
   - Radar operator;
   - Other flight crews who may have rendered assistance;
   - Other flight crews who may provide pertinent information on in-flight conditions, aircraft communications and serviceability of radio aids;
   - Airport manager; and
   - Other airport personnel.

11. Complete Event 45.

EVENT 45. Navigation aids and airport status

Events 8, 22 and 36 refer.

1) Obtain the appropriate navigation and approach charts;

2) Request ground and flight checks of pertinent navigation and approach aids for:
   – Location (geographic coordinates);
   – Identification signal;
   – Power output and supply;
   – Emergency equipment;
   – Radiation pattern;
   – Normal level of performance; and
   – Interference(s).

3) Review:
   – Operating and maintenance schedules;
   – Past complaints; and
   – Serviceability status.

4) Examine status of airport and associated facilities, such as:
   – Runway in use;
   – Apron and taxiways;
   – Lighting;
   – Rescue and firefighting services;
   – Station logs; and
   – Equipment inspection documents.

POST-FIELD PHASE

1. Complete Event 55; and

EVENT 55. Analysis and report of the Air Traffic Services and Airport Group

Events 8, 22, 36 and 45 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;

- Cabin Safety; and
- Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 13

SURVIVABILITY GROUP CHIEF

The Survivability Group Chairperson is responsible for investigating the crash response, firefighting, egress, survival, and rescue issues. The group's inputs are invaluable in the final human factors analysis. Under certain circumstances, this group could be a sub-group of the Medical/Human factors group.

This segment of the investigation should be conducted in close cooperation with the chiefs of the Operations, Structures, Medical/Human Factors, Cabin Safety and Witness groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Walk the site in order to get an initial feel for the dynamics of the accident sequence;

3. Complete Event 9;

EVENT 9. Search and rescue operations

1) Determine and record the following:
   - How and when the search operations were initiated;
   - What units or agencies participated in the search operations;
   - Search means and methods adopted, in part and such as visual, electronic, and infrared;
   - The environmental conditions at the time of the search, such as weather, ground or water conditions;
   - Any factors which facilitated or hindered the search effort; and
   - The time at which the accident site was located.

2) Review search and rescue procedure manuals, and operations logs and recordings; and

3) Determine the adequacy of the search actions.

4. Submit all original documents to the Administration Coordinator;

5. Complete Event 23;

EVENT 23. Evacuation operations

Event 9 refers.

1) From information derived from survivors' interviews and/or the cockpit voice recorder, determine and record the following pre-accident actions:
   - General briefing of the passengers regarding the various safety and rescue equipment at their disposal, in part and such as seat belt, oxygen supply, and life jacket;

- Member(s) of the crew who gave the briefing, time of the briefing, its intelligibility and audibility (pertinent language[s]) to all passengers;
- Special instructions given regarding the removal of dangerous articles in part and such as spectacles, ties, and shoes; the tightening of seat belts; the cushioning of each passenger in part and such as with pillows and blankets; and clarity and understanding of these instructions;
- Special instructions regarding emergency exits, measures taken to free the access to all emergency exits;
- Type of the emergency equipment available, in part and such as portable fire extinguishers, axes, crow-bars, flashlights, and first aid kits;
- Measures taken by the crew with respect to the emergency equipment; and
- Assistance provided by passengers, either requested, offered or given, and behaviour and morale of the passengers prior to the accident.

2) Evaluate the crew training and implementation of emergency procedures, particularly by cabin crew members, as well as the adequacy of these procedures;

3) In the case of ditching, evaluate the following:
   - Special instructions on the location, donning and use of life jackets;
   - Action by the crew to ensure that each passenger had properly donned and adjusted the life jacket;
   - Precaution to have extra life jackets available near the emergency exits; and
   - Special instructions given to the passengers regarding which life raft, when and how to board after the ditching.

4) Determine the relationship to regulatory requirements of the following items and assess their adequacy:
   - Number, location and design of emergency exits;
   - Presence of placards near each exit;
   - Clear and readable instructions on the operation of the opening mechanisms, including location and lighting;
   - Number and location of exits used, number of persons who used each exit, and reasons for not using a particular exit;
   - The emergency equipment used, in part and such as portable extinguishers, axes, escape ropes, and chutes;
   - Presence and effectiveness of instructions on how to use the equipment;
   - Adequacy and functioning of the equipment; and
   - Additional equipment that would have been helpful.

5) The following information should be recorded:
   - Passengers injured in relation to their location;
   - Injuries sustained during the evacuation;
   - Help provided by the crew, passengers and third parties;
   - Time required to complete the evacuation, by exit if relevant;
   - Difficulties encountered such as:
     - language problems;
     - presence of fire and smoke;
     - failure of emergency lighting;
     - abnormal position of aircraft;
     - distance from the ground;
     - aged, infirmed or infant passengers;
     - injured passengers;
     - panic among passengers or crew; and
     - debris, including luggage.

- In the case of ditching:
  - water conditions, such as roughness and temperature;
  - light conditions;
  - type and number of life jackets available;
  - number of passengers inflating life jackets prior to egress;
  - effectiveness of life jackets;
  - difficulties in locating passengers;
  - type and number of life rafts used, including position in the aircraft, difficulties in launching, inflating, locating and boarding;
  - number of survivors in each raft;
  - adequacy of instructions on use of rafts and life-saving equipment.

6) Evaluate the effectiveness of the following:
   - Emergency escape hatches;
   - Emergency lights;
   - Fire extinguishers;
   - Fire extinguishing systems;
   - Fire detectors or alarms;
   - Megaphone(s);
   - Oxygen bottles;
   - Smoke mask(s) and oxygen bottle(s);
   - Smoke hoods and personal breathing equipment;
   - Flashlights;
   - Escape tapes/reels;
   - Vivopak/Physician's kit;
   - Medical kit;
   - First aid kit;
   - Resuscitation mask;
   - Protective gloves;
   - Search mirror; and
   - Portable radio beacons.

Note. — A plan of the aircraft indicating each exit, the location of each crew member and passenger prior to the crash, and the exit used by each person is of great assistance. Photographs are also recommended.

6. Complete Event 37;

EVENT 37. Rescue operations

Events 9 and 23 refer.

1) Determine and record the following:
   - Time and means of alerting rescue units, in part and such as alarm bells, and telephones;
   - First instructions given to rescue units, by whom and by what means;
   - Number and location of rescue vehicles by type on standby and in reserve, including manpower and equipment;
   - Access roads to the site;
   - Environmental conditions during the rescue operations;
   - Communications equipment on the various vehicles;
   - Time at which the rescue units arrived on site;
   - Difficulties in locating the site and bringing the injured out of the wreckage;
   - The means and personnel providing first medical assistance;

   - The arrangements to transport the injured to medical facilities, and adequacy of medical

services available; and
- Time at which the rescue operations were completed.

Note.— The following event should, if applicable, be investigated in cooperation with the group responsible for investigating the initiation and spread of fire (Structures Group).

7. Complete Event 46.

EVENT 46. Firefighting operations

Events 9, 23 and 37 refer.

1) This aspect of the investigation should, if applicable, be conducted in cooperation with the Structures Group responsible for investigating the initiation and spread of the fire;

2) Determine and record the following:
   - Time and means of alerting the various firefighting units;
   - First instructions given and how;
   - Number of vehicles by type on stand-by and in reserve;
   - Type, quantity and rate of discharge of extinguishing agents;
   - Special tools, in part axes, crow-bars, and powered tools;
   - Personnel available on each vehicle and their equipment;
   - Location of the various firefighting units which participated;
   - Route taken to the site by each vehicle and adequacy of the access roads;
   - Environmental conditions, such as weather, terrain, ground or water conditions;
   - Communications capabilities of each vehicle;
   - Time at which the firefighting vehicles arrived at the site; and
   - Difficulties encountered such as:
     - locating the site;
     - reaching the wreckage;
     - lack or poor detail of charts;
     - inadequately trained personnel;
     - intensity of the fire;
     - wind direction and strength;
     - temperature;
     - availability of water and/or extinguishing agents;
     - control and supervision;
     - precautionary measures taken to prevent spreading or restarting the fire;
     - time at which the fire was under control and completely extinguished; and
     - training and standards of rescue and firefighting personnel.

POST-FIELD PHASE

1. Complete Event 56;

EVENT 56. Analysis and report of the Survivability Group

Events 9, 23, 37 and 46 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;
   – Flight Recorders;
   – Meteorology;
   – Air Traffic Services/Airport;
   – Survivability;
   – Cabin Safety; and
   – Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 14

CABIN SAFETY GROUP CHIEF

The Cabin Safety Group Chief is responsible for investigating all aspects of the accident related to the actions of the passengers and cabin crew members. This will normally include the following general elements:

- Passenger/crew member survivability factors;
- Company policies and procedures as they relate to passenger/crew member safety;
- Industry policies, procedures and regulations as they relate to passenger/crew member safety; and,
- Cabin crew training with respect to operational safety issues.

This group must coordinate its activities with other groups, particularly Operations, Medical/Human Factors, Witness, Recorders, Survivability, Maintenance and Records, Systems, and Structures groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;
2. Determine materiel/personnel resources required and advise the Investigator-in-charge;
3. Allocate materiel/personnel resources; and
4. Complete Event 10.

EVENT 10. Secure pertinent cabin documents

1) Liaise with Operations, and Maintenance and Records group chiefs to locate and secure the following documents:
   - Air Operator Operations Manual;
   - Cabin crew training records;
   - Air operator and aircraft standard operating procedures (SOPs);
   - Cabin crew log books;
   - Pilot's flight log;
   - Cabin crew flying schedule (last six months);
   - Aircraft Journey Log;
   - Air operator dispatch logs;
   - Maintenance release forms;
   - Passenger and freight manifests;
   - Air operator's Maintenance Control Manual;
   - Air operator schedule;
   - Air operator Route Manual;
   - Record of pertinent phone calls;
   - Cabin Crew Manual;
   - Cabin Crew Emergency Manual;
   - Air operator approved aircraft Safety Announcements;
   - Air operator passenger safety briefings and video, if applicable;

- Copy of approved Aircraft Flight Manual;
- Copy of approved Minimum Equipment List (MEL);
- Copy of the applicable Master Minimum Equipment List (MMEL);
- Cabin crew licensing and medical status;
- Copy of any civil aviation authority Policy Letters applicable to the company;
- Copy of last company audit by Civil Aviation Authority;
- Air operator files; and
- Civil aviation authority approved cabin crew training curriculum.

2) Locate and secure the following information:
   - The aircraft cabin furnishings;
   - Pre-flight servicing documents;
   - Snag rectification sheets;
   - Cabin-related outstanding and recurring snags and unserviceabilities; and
   - Cabin and freight configurations.

3) Obtain the autopsy results of cabin crew members and passengers; and

4) Obtain a transcript of the cockpit voice recorder and conduct a preliminary review of the recorded information for cabin-related factors.

5) Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational briefing;

2. Conduct an initial survey of the accident site in order to get a 'feel' for the dynamics of the accident sequence, in part and such as impact angles, impact attitude, velocity, power, and fire (pre-impact/post-impact) propagation;

3. Complete Event 24;

EVENT 24. Review pertinent cabin documents

Event 10 refers.

1) Review all the documents obtained from the air operator and summarize the pertinent information;

2) Review all the documents obtained from the civil aviation authority and summarize the pertinent information; and

3) Compile, in chronological order, the history for each cabin crew member and for the operator.

4. The investigation and analysis of the failure of the aircraft structure is the responsibility of the Structures Group, while the investigation and analysis of the failure of the aircraft systems is the responsibility of the Systems Group;

5. The investigation and analysis of the effects of these systems and structural failures on flight attendant and passenger performance is, however, the responsibility of the cabin safety group. Close cooperation with other groups involved is essential; and

6. Liaise with Systems, Structures, Medical/Human Factors, and Photo/Video group chiefs for the following event.

Note.— Most of the following evidence is perishable and may be critical to the success of the cabin safety investigation. This phase of the investigation should not be rushed and must be carefully recorded.

7. Complete Event 38;

EVENT 38. Cabin condition

Events 10 and 24 refer.

1) Review and record (in situ) the condition of:
   - General cabin interior;
   - Cabin structure;
   - Floor structure;
   - Aircraft doors;
   - Air stairs;
   - Emergency exits;
   - Breaches of cabin structure;
   - Passenger seats;
   - Seat pitch for each class;
   - Aisle width;
   - Flight attendant seats;
   - Seat belts (passengers and flight attendants);
   - Overhead bins;
   - Galleys, including controls and circuit breaker positions;
   - Trolleys/carts;
   - Public address system, including controls and circuit breaker positions;
   - Life preservers;
   - Seat bottom cushions;
   - Safety features cards;
   - Evacuation alarm system;
   - Emergency equipment:
     - Fire extinguisher(s);
     - Fire axe;
     - Megaphone;
     - Oxygen bottles;
     - Smoke mask/oxygen bottle;
     - Smoke hoods;
     - Flashlights;
     - Escape tapes/reels;
     - Vivopak/physician's kit;
     - ;
     - First aid kit;
     - Resuscitation mask;
     - Protective gloves;
     - Search mirror; and
     - Portable radio beacons;
   - Cabin baggage;
   - Floor level lights; and
   - Seat blocking.

2) Determine the passenger/freight configuration.

8. Maintain close liaison with the Witness Group Chief and the police for coordination of a list of potential witnesses and for the introduction of possible questions for eyewitnesses;

9. Commence preparations for interviews with air traffic services and airport personnel;

Note.- Interviews with cabin crews and passengers should be planned and conducted in consultation with the Operations, Witness and Medical/Human Factors groupchiefs, and in consideration of their requirements.

10. Under certain circumstances, it may be desirable to restrict the initial interview with the cabin crews to the time frame of the accident;

11. This interview may then be followed by a more in-depth interview during which elements critical to the investigation may be discussed in detail;

12. Review the "Sample Passenger Questionnaire Form" in Appendix 1 to the section;

13. Complete Event 47;

EVENT 47. Interviews (cabin crew and passengers)

Events 10, 24 and 38 refer.

1) All cabin crew members should provide a written statement prior to the interview;

2) The cabin crew members should be questioned from a list of prepared questions covering:
   – General details of the operation;
   – Phase of flight at time of accident;
   – Weather conditions at time of accident;
   – Serviceability of aircraft;
   – Flight attendant's flying background and experience;
   – Crew rest periods;
   – Movements over the last 24 hours, and over 72 hours;
   – Post-accident activities, in part and such as physical condition and evacuation; and
   – Any other question pertinent to the circumstances.

3) This interview could be followed at a later date by a more in-depth interview during which elements critical to the investigation should be discussed in detail;

4) Interview witnesses with cabin safety information;

5) Interview next of kin, company representatives and civil aviation authority personnel;

6) Interview as many passengers as possible; and

7) If required, mail questionnaires to surviving passengers not interviewed.

14. Commence preparations for interviews with next of kin and company representatives;

Note.- To avoid duplication, it is imperative that these interviews be planned and conducted in consultation with the Operations, Witness and Medical/Human and Organizational Factors groupchiefs, and in consideration of their requirements. Similar coordination with the Powerplant, Systems, and Maintenance and

Records group chairpersons should take place prior to conducting interviews with air operator management personnel.

15. Relate pertinent factual information gathered to the Investigator-in-charge and appropriate GroupChiefs; and

16. Gather pertinent data from other groupchiefs.

POST-FIELD PHASE

1. Review and evaluate the data collected at the accident site;

2. Review the pertinent documents;

3. Review all cabin-safety-related documentation, including witness interviews, gathered by other team members and by other groups;

4. Review post-mortem examination reports and specimen analysis reports;

5. Review and analyse, in concert with the Operations and Recorders groupchiefs, the information contained on the cockpit voice recorder;

6. Consult with Operations, Medical/Human Factors, Survivability, Structures and Systems group chiefs on cabin safety findings;

7. Consider the requirement for a review of, in part, the cabin crews personal physician files, and medicare records;

8. Complete any additional interviews of cabin crews or passengers;

9. If required, conduct a familiarization ride on the same route and on the same aircraft type, and preferably with the same operator;

10. Complete Event 57;

EVENT 57. Analysis and report of the Cabin Safety Group

Events 10, 24, 38 and 47 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

11. Participate in Event 64.

EVENT 64. Operations analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Operations;
   – Medical/Human Factors;
   – Witness;

- Flight Recorders;
- Meteorology;
- Air Traffic Services/Airport;
- Survivability;
- Cabin Safety; and
- Other parties, as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the operations analysis and determine findings with assistance from the technical groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Appendix 1 to Section 14

SAMPLE PASSENGER QUESTIONNAIRE FORM

(Name of the investigation authority)
Preliminary collection of information from passengers

Occurrence Information (airline, flight number, date)

The (name of the investigation authority) is responsible for investigating aircraft occurrences in (name of the State). The purpose of the investigation is to make flying safer. The first step of our accident investigation is to collect information from crew and passengers. To ensure that details are not forgotten **please complete and return this form to the address below as soon as possible**. Thank you for helping to advance aviation safety.

Note 1.— Because this is a generic form, some questions may not be applicable. For those questions, please write N/A.
Note 2.— Your response is voluntary. The information you provide is confidential and will be protected in accordance with (name of the State) law.

Contact Information

In order for us to contact you for additional follow-up later, if necessary, please provide the following information:
Full Name: .....
Please write the name and age of people travelling with you:
……..……
……..……
Mailing Address:
……
……..…
……..…
……..…
Email Address: ……..
Phone (day): …….....….....…
Phone (evening): .....

Return Information

Please return your completed form to (name of the investigation authority) personnel before you depart for home or continue on your trip.

If this is not possible, please mail it to:

The (name of the investigation authority)
(address – line 1)
(address – line 2)
(city, state)
(country, postal code)

If you have any questions, or a point you would like to discuss, please contact us at:
Phone: (authority phone number)
Email: (authority email address)

Location immediately prior to the occurrence
If you were in a passenger-seat, what was your:
Seat row number: ..... Seat letter: ..... ?
Was this the seat listed on your boarding card? Yes / No
Which way was your seat facing? Forward / Rearward / Side facing
If you do not recall your seat number / letter, please indicate the area where you sat. (Circle one response for each category)
Ticket class: First / Business / Economy
Area of cabin: Forward / Mid / Rear
Seat type: Aisle / Centre / Window

If you were not in a passenger-seat at the time of the accident, where were you located?
……
If you were travelling with a child under 2 years of age, was the child: In a car seat/ Wearing a supplemental loop belt/ Sitting, unrestrained in your lap
Was there a seat on your left? : Yes / No
Was it occupied?: Yes / No Gender: Male/Female
Approximate age..... Name: .....
Was there a seat on your right? : Yes / No
Was it occupied: Yes / No Gender: Male/Female
Approximate age..... Name: .....

Aircraft cabin
Please draw a sketch of the cabin indicating where..:
– you were located
– you exited the aircraft
– the location of any fire, inside or outside the aircraft
– the location of smoke inside the aircraft

What did you see, hear and do during the occurrence?
Were you injured during the occurrence? Yes/No (provide brief details)

……..
……..
At the time of the occurrence, were you: Awake/Asleep
How and when did you first realize something was wrong?
……..
……..
……..
……..
……..
Were you wearing a seat belt? (Yes/No)
Type of seat belt worn: Lap belt only / Lap and shoulder belt

Overhead stowage bins/carry-on items
Did the overhead stowage bins open? Yes/No
Did carry-on items fall out of the overhead stowage bins? Yes/No
Did any of these items strike you, or anyone else? Yes/No
Did any of these items land in the passenger aisles? Yes/No
Cabin/aircraft lighting
Please indicate which of the following, if any, were illuminated during the occurrence. Circle as many responses as is appropriate: Normal lighting / Emergency ceiling lights / Floor path escape lighting / Emergency exit signs / Escape slide lights
Crew instructions (inside the cabin)
Did the crew make announcements or provide instructions for the passengers during the occurrence? Yes/No
Could you clearly hear the announcements/instructions? Yes/No
Please list any announcements/instructions that you heard.
.....
.....
.....
Did you fully understand the announcements/instructions provided by the crew? Yes/No
Were you able to follow the instructions given by the crew? Yes/No – If no, describe why:
.....
.....
.....

Fire/smoke
Was there any smoke in the cabin? Yes/No
If possible describe where it was coming from; what part of the cabin it was in, what colour it was, how high it rose, what effect it had on you, etc.
.....
.....
.....
Was there any fire? Yes/No
If possible, describe its location; if anything was melting; how the fire affected you; etc.
.....
.....
.....

Evacuating
Was an evacuation required? Yes/No
How and when did you realize you had to evacuate the aircraft?
.....
.....
.....
Were you injured during the occurrence? Yes/No
Were you injured during: Turbulence / On impact / Evacuating / Outside the aircraft?
Briefly describe your injuries and how you were injured
:.....
.....
.....
Did your injuries affect your ability to evacuate the aircraft quickly? Yes/No If yes, please elaborate
.....

.....
.....
.....
Following the accident, were you taken to a hospital? Yes/No
If yes, which hospital? .....
Were you admitted to hospital? Yes/No

General comments
Do you have any additional information or comments that might help us with our investigation?
.....
.....
.....
.....

Personal information
Research has shown that an individual's gender, age, height, weight, occupation, life experiences, etc., can affect how they respond in an emergency. Please supply the following personal information:
Male/Female. Age: ..…….. Height: ……. Weight: ……. Occupation: …….
Aviation experience: Yes/No If yes, please explain
.....
.....
.....
Do you have any experience dealing with emergency situations?: Yes/No If yes, please explain.
.....
.....
.....

Thank you for taking the time to help us with our investigation. Please return your completed form to the (name of the investigation authority) to the Return-Information address shown on page 1.

Section 15

MAINTENANCE AND RECORDS GROUP CHIEF

The Maintenance and Records Group Chief is responsible for locating and reviewing all maintenance records and appropriate flight documents to ascertain the maintenance history of the aircraft in respect to adequacy of inspections, malfunctions that might be related to the accident, time on the aircraft, engines and components, and the time since overhaul.

This group is also responsible for determining background data relative to manufacture, possible design deficiencies, maintenance practices, inspection procedures, and servicing of the aircraft involved.

This group must coordinate its activities with the Operations, Structures, Powerplants, Systems and Recorders GroupChiefs.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Determine materiel/personnel resources required and advise the Investigator-in-charge; and

3. Complete Event 11.

EVENT 11. Secure maintenance documents

1) Obtain and secure the following documents, as appropriate:
   a) From the air operator:
      – Air Operating Certificate;
      – Certificate of Airworthiness;
      – Certificate of Registration;
      – Aircraft Journey Log;
      – Aircraft Technical Log;
      – Maintenance Control Manual;
      – Maintenance Log;
      – Airframe Log;
      – Engine Log(s);
      – Propeller Log(s);
      – Pre-flight servicing logs;
      – Snag rectification sheets;
      – Airworthiness Directives records;
      – Standards and procedures;
      – Quality assurance;
      – Personnel and training;
      – Equipment and facilities;
      – Extended-range Twin-engine Operational Performance Standards (ETOPS) maintenance requirements (Annex 6, Attachment E);
      – Flight recorder files, including documents associated with flight data recorder data-frame and periodic calibrations;
      – Major repairs or alterations;
      – Major work done by approved maintenance organization or sub-contractor;
      – Hazardous material cargo records;

- International leasing arrangements;
- Mandatory Occurrence Reporting (trend analysis) reports; and
- System Difficulty Reporting (SDR) reports.

b) From the pertinent civil aviation authority:
- Technical personnel files;
- Air Operator Certificate;
- Aircraft files;
- Copy of the Master Minimum Equipment List (MMEL);
- Maintenance reliability information on aircraft fleet;
- Mandatory Occurrence Reporting reports; and
- System Difficulty Reporting (SDR) reports.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Conduct an initial survey of the accident site;

3. Submit all original documents to the Administration Coordinator;

4. Complete Event 25;

EVENT 25. Review of maintenance documents

Event 11 refers.

1) Review all the documents obtained from the air operator and summarize the pertinent information;

2) Review all the documents obtained from the civil aviation authority and summarize the pertinent information;

3) Compile, in chronological sequence, the history of the powerplants, airframe and their major components complete with incorporated modifications;

4) List all outstanding powerplant and airframe modifications;

5) Record all outstanding and recurring snags and unserviceabilities;

6) Record all snags that may be related to the accident; and

7) Summarize all irregularities.

5. Complete Event 39;

EVENT 39. Interviews (Maintenance and Records)

Events 11 and 25 refer.

1) Identify personnel to be interviewed;

2) Coordinate the interviews with other groupchiefs

;

3) Prepare questions;

4) Conduct the interviews; and

5) Review and examine interviews for areas of conflict, errors and inconsistencies.

6. Pass pertinent information to the Operations, Structures, Powerplant, Systems and Flight Recorder group chiefs;

7. Complete Event 48;

EVENT 48. Maintenance management

Events 11, 25 and 39 refer.

1) Review the following maintenance management aspects;
   – Standards and procedures;
   – Quality assurance programmes;
   – Equipment and facilities; and
   – Personnel and training.

8. Ascertain whether or not the maintenance system has been followed correctly and record any discrepancies or omissions.

POST-FIELD PHASE

1. Complete Event 58;

EVENT 58. Analysis and report of the Maintenance and Records Group

Events 11, 25, 39 and 48 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and

inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 16

SYSTEMS GROUP CHIEF

The Systems Group Chief is responsible for the detailed examination of all systems and components, among others hydraulics, pneumatics, electrical and electronics, radio communication and navigation equipment, air conditioning and pressurization, ice and rain protection, cabin fire extinguisher, and oxygen. The examinations will include determination of the condition and operational capabilities of components. The examination includes determination of the positions of associated controls and switches, as well as the identification and downloading of built-in test equipment. It is important that all system components be accounted for, within reason.

The Systems Group must coordinate its activities with the Flight Recorders, Operations, Site Survey, Maintenance and Records, Structures and Powerplants groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Collect basic information on the aircraft involved;

3. Obtain the Maintenance and Parts Manuals of the aircraft; and

4. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational briefing;

2. Identify and brief all Systems Group members;

3. Conduct an initial walk-through of the accident site with group members in order to get a feel for the dynamics of the accident sequence;

4. Take action necessary to safeguard and deactivate hazardous systems/components, in part and such as pressure vessel and batteries in coordination with the Site Safety Coordinator;

5. Coordinate with the Site Survey Group Chief to identify and tag systems components as required;

6. Liaise with the Operations Group Chief for a cockpit evaluation;

7. Advise the Investigator-in-charge of special photographic requirements;

8. Complete Event 12;

EVENT 12. Examination of systems

1) Prepare a checklist of systems to be investigated from the following general list:
   - Hydraulic power;
   - Flight controls;

- Ailerons;
- Elevators;
- Rudder;
- Horizontal stabilizer;
- Trims;
- Flaps;
- Speed brakes;
- Spoilers/lift dumpers;
- Autopilot/stability augmentation/stall avoidance;
- Landing gear/wheels/brakes;
- Fuel;
- Electric power distribution;
- Aircraft computers (such as flight management systems, traffic collision avoidance system, and terrain awareness and warning system);
- Other electronics;
- Ice and rain protection;
- Pneumatics;
- Instruments/pitot-static/caution and warning (Light bulb analysis);
- Navigation systems;
- Portable navigation systems, photo and video cameras, and cell phones;
- Communications;
- Emergency Locator Transmitter (ELT);
- Fire detection and protection;
- Air conditioning and pressurization;
- Oxygen; and
- Thrust reversers.

2) Locate and identify all systems and components;

3) Determine the requirements for special handling of system computers to preserve memory;

4) Record and photograph the systems and components prior to safeguarding;

5) Safeguard and deactivate hazardous systems and components;

6) Conduct a detailed examination of all systems and components, including flight controls, hydraulics, pneumatics, electrical, electronics, instruments, communication, navigation, air conditioning, pressurization, ice and rain detection, airframe, fuel, fire protection and oxygen;

7) Document all systems selections, indications, positions and condition;

8) Photograph in detail the components suspected of failure; and

9) Request special technical assistance, if required.

9. Consult with other group chiefs to ensure interface of Systems Group investigation with Powerplants and Structures groups is complete;

10. Advise the Investigator-in-charge of other required technical specialist assistance;

11. Complete Event 26;

EVENT 26. Examination and testing (Systems)

Event 12 refers.

1) Select the components that require more detailed examination;

2) Prepare statements of requirements for examination and testing;

3) Arrange for the transportation of selected components to a suitable location for the required examination and testing; and

4) Arrange for investigators to be present at all examinations and testings.

12. Review witness statements to identify areas for supplementary interviews and conduct or arrange for required interviews with the Witness GroupChief; and

13. Complete Event 40.

EVENT 40. Interviews (Systems)

Events 12 and 26 refer.

1) Identify personnel to be interviewed;

2) Coordinate the interviews with other groupchiefs;

3) Prepare questions;

4) Conduct the interviews; and

5) Review and examine interviews for areas of conflict, errors and inconsistencies.

POST-FIELD PHASE

1. Evaluate the information collected to assess the contribution of the aircraft systems to the accident;

2. Advise the appropriate group chiefs of any pertinent information;

3. Complete Event 59;

EVENT 59. Analysis and report of the Systems Group

Events 12, 26 and 40 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

4. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   - Maintenance and Records;
   - Systems;
   - Structures;
   - Powerplants;
   - Site Survey;
   - Photo/Video; and
   - Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 17

STRUCTURES GROUP CHIEF

The Structures Group Chief is responsible for the overall examination of the airframe, including the flight control surfaces, and for determining the involvement of the structure in the cause of the accident. Responsibilities also include assessing the pre-impact flight path, speed at impact and impact angle.

This group will locate and identify the parts to be plotted for the wreckage distribution diagram produced by the Site Survey Group. A wreckage distribution diagram is especially helpful in accidents in which an in-flight breakup or in-flight fire is suspected.

At the discretion of the Investigator-in-charge, this group may also be tasked to conduct related portions of the investigation, such as fire and explosion, and crashworthiness.

Close coordination with the Site Survey, Systems, Powerplants and Survivability groups is essential.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;
2. Collect basic information on the aircraft involved; and
3. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;
2. Conduct an initial survey of the accident site;
3. Mark and store coordinates of the accident site basic points as precisely as possible;
4. Prepare a rough sketch of the accident site;
5. Determine the probable distribution of all wreckage from cursory examination of angle of impact, speed and pre-impact integrity;
6. Submit photo requirements to the Investigator-in-charge;
7. Photograph the wreckage with position reference markers in place;
8. Identify, tag and catalogue pieces of wreckage;
9. Photograph detached items of wreckage in situ;
10. Obtain from Witness, Operations and Flight Recorders group chiefs information pertinent to the final flight path;
11. Plot the aircraft path from first contact with a ground object, to ground impact, to rest;

12. In the case of a mid-air collision or an in-flight structural breakup:

    – Reconstruct the flight path by trajectory analysis;

    – Delineate the area requiring a search;

    – Determine the method and extent of the search;

    – Determine the requirement for, and request, material and personnel resources; and

    – Brief searchers on method of marking and fixing wreckage positions.

13. Complete Event 13;

    EVENT 13. Examination of structures

    1) Conduct an overall examination of the complete airframe, including the flight control surfaces;

    2) Determine the involvement of the structure in the accident;

    3) Select the components that require examination and testing;

    4) Prepare detailed statements of requirements for examination and testing; and

    5) Assess the requirements for wreckage reconstruction.

14. In coordination with the Survivability Group, conduct a detailed analysis of a fire and explosion;

15. Complete Event 27;

    EVENT 27. Fire and explosion

    Event 13 refers.

    1) Photograph all evidence having a direct bearing on the fire before the wreckage is removed;

    2) Review maintenance and parts manuals to gain information on the aircraft structure and systems;

    3) Review the following information:
       – Survivor statements;
       – Eyewitness statements;
       – Type of cargo carried;
       – Quantity and type of fuel on board;
       – Air traffic services recorded data;
       – Flight recorders information; and
       – Pathological information for evidence of smoke or soot in the respiratory system, carbon monoxide or other toxic chemicals, and indications of in-flight explosion such as ruptured eardrums or penetration by small fragments.

    4) Determine the requirements for expert technical assistance;

    5) Prior to removal of fire extinguishing agent, consider all options in order to reduce destroying evidence;

6) Complete a wreckage diagram including burned areas;

7) Determine if the fire was in-flight or post-impact by reviewing the following:
   – Survivor and eyewitness evidence;
   – Cockpit configuration;
   – Mishap circumstances;
   – In-flight fire effects;
   – Ground fire effects;
   – Crash dynamics, such as location of burned parts with respect to burn areas; and
   – Impact effects.

8) Determine if there was an in-flight explosion by the presence of:
   – Omnidirectional fire pattern;
   – "Opening up" effect;
   – Unusual damage to heavy structures;
   – Fragmentation of structures; and
   – High-speed penetration by fragments.

9) Reconstruct the area where the in-flight fire or explosion is suspected; and

10) Determine the point or area of origin, fuel type and ignition source.

16. In consultation with the Medical/Human Factors, Survivability and Cabin Safety groupchiefs, determine crashworthiness and impact forces;

17. Complete Event 41; (or this could be a assigned to a separate Crashworthiness Group)

EVENT 41. Crashworthiness

Events 13 and 27 refer.

1) Determine the requirement for mechanical or aeronautical engineering assistance;

2) Assess the volume of liveable space remaining within the occupied section of the aircraft after impact forces had dissipated;

3) Determine the volume of liveable space which may have been compromised during the accident sequence, since ductile materials can rebound after impact forces, thus leaving no traces of their invasion of liveable space;

4) Determine the space between seats and aircraft structures, in part and such as instrument panel, control column, seat backs, trays, and galley that may have contributed to the nature and extent of injuries;

5) Determine if the container was penetrated by objects from outside the aircraft;

6) Determine the effects of unsecured interior aircraft equipment or cargo acting as missiles, in part and such as serving carts and oxygen bottles;

7) Determine the effects of passenger luggage on liveable space;

8) Assess the adequacy of walkways and exits;

9) Record the original seating position of deceased passengers and positions where bodies came to rest after the accident;

10) Record the type of seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed in the aircraft;

11) Record the damage to each of the items in task 10 above;

12) Record the effects of webbing material on the nature and extent of injuries, in part and such as cotton/rayon and nylon; as well as their flammability, elasticity, and adjustment-buckle slippage;

13) Record the type and load-limiting adequacy of cargo restraints, such as nets, lines and pallets;

14) Record the seat geometry for structural strength and energy absorption properties;

15) Record the seat cushions' energy absorption properties and flammability;

16) Assess the adequacy of the seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed;

17) Assess the effects of the cockpit and cabin environment on occupant survivability;

18) Record the following basic data for the determination of energy absorption:
   - Terrain angle;
   - Flight path angle;
   - Angle of impact;
   - Crash force resultant;
   - Crash force angle; and
   - Aircraft attitude at impact.

19) Record the width, length, depth and orientation of all gouge marks;

20) Record the depth of damage to the underside of aircraft, extent of compression of energy-attenuation devices;

21) Record the horizontal stopping distances, length of airframe compression in the horizontal plane, backward displacement of each wing and empennage surfaces;

22) Determine the direction, magnitude and duration of G-forces;

23) Determine the acceleration forces experienced by the aircraft occupants; and

24) Estimate the impact forces survivability potential.

18. Assess the requirements for wreckage reconstruction and advise the Investigator-in-charge of the requirements; and

19. Complete Event 49.

EVENT 49. Wreckage reconstruction

Events 13, 27 and 41 refer.

1) Select a suitable re-assembly area;

2) Determine the method of reconstruction;

3) Obtain the personnel and material resources;

4) Complete the re-assembly;

5) Photograph the re-assembly operations;

6) Interview witnesses; and

7) Select components for examination and testing, if required.

POST-FIELD PHASE

1. Evaluate the information collected to assess the contribution of the aircraft structure to the accident;

2. Advise the appropriate group chiefs of any pertinent information;

3. Complete Event 60; and

EVENT 60. Analysis and report of the Structures Group

Events 13, 27, 41 and 49 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

4. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 18

CRASHWORTHINESS GROUP CHIEF

The Crashworthiness Group Chief is responsible for the investigation of crash survivability issues for all aircraft occupants. This group's activities will overlap to a great extent with those of the Systems, Structures, Powerplants, Site Survey, Survivability and Witness groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Collect basic information on the aircraft involved; and

3. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational briefing;

2. Establish communications with the Site Survey, Structures, Survivability and Witness groupchiefs;

3. Conduct an initial survey of the accident site;

4. Determine the photographic requirements and advise the Investigator-in-charge;

5. Discuss your plan of action and requirements with the group chiefs of the aforementioned groups and request their assistance as required;

6. Determine the requirement and availability of mechanical or aeronautical engineering assistance and advise the Investigator-in-charge;

7. Complete Event 41;

EVENT 41. Crashworthiness

Events 13 and 27 refer.

1) Determine the requirement for mechanical or aeronautical engineering assistance;

2) Assess the volume of liveable space remaining within the occupied section of the aircraft after impact forces had dissipated;

3) Determine the volume of liveable space which may have been compromised during the accident sequence, since ductile materials can rebound after impact forces, thus leaving no traces of their invasion of liveable space;

4) Determine the space between seats and aircraft structures, in part and such as instrument panel, control column, seat backs, trays, and galley that may have contributed to the nature and extent of injuries;

5) Determine if the container was penetrated by objects from outside the aircraft;

6) Determine the effects of unsecured interior aircraft equipment or cargo acting as missiles, in part and such as serving carts and oxygen bottles;

7) Determine the effects of passenger luggage on liveable space;

8) Assess the adequacy of walkways and exits;

9) Record the original seating position of deceased passengers and positions where bodies came to rest after the accident;

10) Record the type of seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed in the aircraft;

11) Record the damage to each of the items in task 10 above;

12) Record the effects of webbing material on the nature and extent of injuries, in part and such as cotton/rayon and nylon; and their flammability, elasticity, and adjustment-buckle slippage;

13) Record the type and load-limiting adequacy of cargo restraints, such as nets, lines and pallets;

14) Record the seat geometry for structural strength and energy absorption properties;

15) Record the seat cushions' energy absorption properties and flammability;

16) Assess the adequacy of the seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages, and floor installed;

17) Assess the effects of the cockpit and cabin environment on occupant survivability;

18) Record the following basic data for the determination of energy absorption:
   – Terrain angle;
   – Flight path angle;
   – Angle of impact;
   – Crash force resultant;
   – Crash force angle; and
   – Aircraft attitude at impact.

19) Record the width, length, depth and orientation of all gouge marks;

20) Record the depth of damage to the underside of aircraft, extent of compression of energy-attenuation devices;

21) Record the horizontal stopping distances, length of airframe compression in the horizontal plane, backward displacement of each wing and empennage surfaces;

22) Determine the direction, magnitude and duration of G-forces;

23) Determine the acceleration forces experienced by the aircraft occupants; and

24) Estimate the impact forces survivability potential.

8. Utilize the acronym "CREEP" for the main tasks:

C – Container;
R – Restraints;
E – Environment;
E – Energy absorption; and
P – Post-crash factors.

9. Container

- Assess the volume of liveable space remaining within the occupied section of the aircraft after impact forces had dissipated;
- Analyse the volume of liveable space that may have been compromised during the occurrence sequence. Ductile materials can rebound after impact forces leaving no traces of their invasion of liveable space;
- Consider the space between seats and aircraft structures, in part and such as instrument panel, control column, seat backs, trays, and galley that may have contributed to the nature and extent of injuries;
- Determine if the container was penetrated by objects from outside the aircraft;
- Determine the effects of unsecured interior aircraft equipment or cargo acting as missiles, in part and such as serving carts and oxygen bottles;
- Determine the effects of passenger luggage on liveable space; and
- Assess the adequacy of walkways and exits;

10. Restraints

- Record the original seating position of deceased passengers and positions where bodies came to rest after the occurrence;
- Record the type of seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages and floor installed in the occurrence aircraft;
- Record the damage to each of the above;
- Consider the effects of webbing material on the nature and extent of injuries, in part and such as cotton/rayon and nylon fabrics and their flammability, elasticity, and adjustment-buckle slippage;
- Consider the type and adequacy of cargo restraint, in part and such as nets, lines, pallets, location of personnel, and load-limiting devices;
- Consider the seat geometry for both crew and passengers, for structural strength and energy absorption properties;
- Consider the seat cushions, in part for energy absorption properties and flammability; and
- Assess the adequacy of the seat belt, seat belt anchorage, shoulder harness and anchorage, seat structure and anchorages and floor.

11. Environment

- Assess the effects of the aircraft cockpit/cabin environment on occupant survivability;

12. Energy Absorption

- Record the following:
  - Terrain angle;
  - Flight path angle;
  - Angle of impact;
  - Crash force resultant;
  - Crash force angle; and
  - Aircraft attitude at impact.

- Determine and record the width, length, depth and orientation of all gouge marks;

- Determine and record the depth of damage to the underside of aircraft, extent of compression of energy-attenuation devices;

- Determine and record the horizontal stopping distances, length of airframe compression in the horizontal plane, backward displacement of each wing, empennage surfaces;

- Determine the direction, magnitude and duration of G-forces;

- Determine the acceleration forces experienced by the aircraft occupants; and

- Estimate the impact forces survivability potential.

13. Post-Crash Factors

- Consider the following:
  - How and why of the fire;
  - Combustibles: fuel/oil/hydraulics, upholstery/cargo/etc.;
  - Ignition sources: flames/hot surfaces, electrical/friction/static sparks;
  - Accident dynamics; occupiable area, fuel tanks/fuel lines/breakaway fittings, oil tanks/hydraulic tanks;
  - Control of the fire; and
  - Human tolerance to fire: heat/toxicity/other.

Note.— The Structures Group may be conducting a detailed investigation of the initiation and propagation of the fire. Close cooperation and collaboration with the Structures Group is therefore essential.

14. Evaluate all information gathered in the context of human survivability;

15. Review, evaluate and analyse all information collected; and

16. Prepare and submit the group report to the Investigator-in-charge.

POST-FIELD PHASE

1. Evaluate the information collected to assess the survivability issues for all aircraft occupants;

2. Advise the appropriate group chiefs of any pertinent information;

3. Complete Event 41;

4. Review, evaluate and analyse all information collected;

5. Prepare and submit to the Investigator-in-charge either an individual Crashworthiness Group report or integrate the crashworthiness factors and analysis into the Structures Group report; and

6. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 19

POWERPLANTS GROUP CHIEF

The Powerplants Group Chief is responsible for the investigation of the engine(s), auxiliary power unit (APU), including fuel and oil systems to the firewall, propeller(s) and engine and powerplant controls. This group is also responsible for investigating the type of fuel, the possibility of fuel contamination and the effectiveness of the powerplant(s).

The functions of this group must be coordinated with the Site Survey, Structures, Systems, Flight Recorders and Operations groups.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Contact the powerplant manufacturer to determine whether it will participate in the investigation and, if so, the expected time of arrival of its representative (Coordinate with the Head Office Coordinator);

2. Obtain the powerplant parts catalogue;

3. Assess the requirement to obtain fuel samples;

4. Attend the Investigator-in-charge's pre-departure briefing; and

5. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Conduct a preliminary survey of the site to get a feel for the dynamics of the accident;

Note.— It is preferable to wait until the arrival of the manufacturer's representative before conducting a detailed examination of the powerplant(s), which may result in disturbing evidence.

3. Complete Event 14;

EVENT 14. Examination of engine(s) and propeller(s)

1) Locate the engine(s) and verify make, model and serial number(s);

2) Record the position and the condition of the engine(s);

3) Determine the engine(s) pre-impact integrity;

4) Locate the propeller(s) and verify make, model and serial number(s);

5) Record the position and the condition of the propeller(s);

6) Determine the propeller(s) pre-impact integrity;

7) Locate and identify all major engine and propeller components, such as engine controls, auxiliary fuel, oil and coolant components, and instruments;

8) Record the position of engine and propeller controls, components and reading of related instruments;

9) Determine the pre-impact serviceability of the controls, components and related instruments;

10) Photograph engine(s), propeller(s), components, and instruments in situ;

11) Obtain oil and fuel samples;

12) Determine the engine power developed at impact, if feasible;

13) Select the engine(s), propeller(s) and components for examination and testing; and

14) Prepare detailed statements of requirements for examination and testing.

4. Prepare statements of requirements for the examination and testing;

5. Direct pertinent information to the Operations and Records groupchiefs;

6. Arrange for and monitor the testing of the components; and

7. Complete Event 28.

EVENT 28. Examination and testing (Powerplants)

Event 14 refers.

1) Forward engine(s), propeller(s), components and instruments to the appropriate testing facilities;

2) Arrange for investigators to be present at all examinations and testings;

3) Monitor and photograph all phases of examinations and testings;

4) Determine if power was being developed at impact;

5) Select components for further examination and testing; and

6) Interview witnesses with powerplant information.

POST-FIELD PHASE

1. Complete Event 61;

EVENT 61. Analysis and report of the Powerplants Group

Events 14, and 28 refer.

1) Assemble examination and testing data;

2) Review, evaluate and analyse all information collected; and

3) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 20

SITE SURVEY GROUP CHIEF

The Site Survey Group Chief is responsible for producing, in pictorial and graphic format, a description of the accident site, showing the location and distribution of the wreckage, human remains and other associated items, such as impact marks. This group must establish a probable flight path, an impact angle and impact speed.

The activities of this group are linked to the Aircraft Performance Group, Structures Group, Flight Recorders Group, and the Site Safety Coordinator.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing; and

2. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Attend the Investigator-in-charge's organizational meeting;

2. Coordinate all site activities with the Site Safety Coordinator;

3. Assess the requirement for a personal overflight of the accident site and review with the Investigator-in-charge. The objective of the flight includes the determination of:

   – pre-impact swath through trees, obstructions, and ground scars;

   – approximate location of all aircraft debris;

   – orientation of wreckage trail;

   – available site access routes;

   – prominent terrain features surrounding the site;

   – post-impact swath; and

   – the preparing of a rough sketch of the accident area for team briefing.

4. Assess the requirement for, and request, detailed aerial photographs of the site, consider photogrammetry;

5. Advise the Structures GroupChief on defining limits of the accident site;

6. Request general ground-level photographs;

7. Ensure that explosives, hazardous cargo and pressure systems have been safetied prior to commencing the survey;

8. Arrange, with the assistance of the Site Safety Coordinator, for the preservation and subsequent restoration of severely soaked or burned documents found in or near the wreckage;

9. Complete Event 15;

EVENT 15. Initial survey of the accident site

1) Determine the probable distribution of wreckage by cursory examination of angle of impact, speed and pre-impact integrity indications;

2) Delineate the area requiring search for components and evidence;

3) Determine the method and intent of search for debris;

4) Determine the material and personnel resources required;

5) Obtain the material and personnel resources;

6) Identify significant components; and

7) Mark and tag components.

10. Complete Event 29.

EVENT 29. Wreckage distribution plotting

Event 15 refers.

1) Plot wreckage distribution to include:
   – Significant ground features;
   – Point(s) of initial impact;
   – Location of major components and pieces;
   – Impact direction;
   – Ground fire areas;
   – Ground scars;
   – Indication of serious property damage; and
   – Witness locations.

2) Determine the flight path from the first contact with a ground object, to ground contact, to rest; and

3) In a mid-air collision, reconstruct the path by using trajectory analysis based on radar plots, flight recorder data, satellite navigation systems data and witness statements.

POST-FIELD PHASE

1. Complete Event 62;

EVENT 62. Analysis and report of the Site Survey Group

Events 15 and 29 refer.

1) Review, evaluate and analyse all information collected; and

2) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

Section 21

PHOTO/VIDEO GROUP CHIEF

The Photo/Video Group Chief is to ensure that a systematic photographic record of the accident is created.

Photography in general should be commenced without delay in order to obtain a good coverage of the wreckage and the condition in which it is found. Whenever appropriate to the type of accident, aerial photography should be arranged.

Coordination with the Investigator-in-charge and all the group chairpersons is required.

BEFORE LEAVING FOR THE ACCIDENT SITE

1. Attend the Investigator-in-charge's pre-departure briefing;

2. Determine the photographic equipment requirements;

3. In consultation with the Deputy Investigator-in-charge, establish tentative photographic priorities;

4. Determine the requirements for aerial photography and inform the Investigator-in-charge of the anticipated requirements for an overflight of the accident site; and

5. Submit all original documents to the Administration Coordinator.

AFTER ARRIVING AT THE ACCIDENT SITE

1. Proceed directly to the accident site, commence photographing the site and reassess photographic priorities;

2. Ensure that each roll of film or digital storage device, and all photographs are identifiable by date, photographer, and subject;

3. Maintain a frame-by-frame photographic log;

4. Maintain a record, when required, of the location from where the photo/video evidence was taken; and

5. Complete Event 16;

EVENT 16. Site photography (Phase 1)

1) Establish photographic priorities;

2) Photograph the general wreckage from at least four directions;

3) Photograph human remains in situ in relation to other objects;

4) Photograph easily perishable evidence, in part and such as ground impact marks and the presence/absence of fire;

5) Photograph flight recorders in situ prior to removal;

6) Photograph hazardous systems and components in situ prior to deactivation or removal;

7) Photograph the terrain and general impact area;

8) Photograph the general components, in part and such as wings, engine(s), and empennage;

9) Determine the requirements for photogrammetry;

10) Determine the requirements for aerial photography;

11) Elaborate photo coverage of any suspect areas or components;

12) Liaise with the Site Survey Group Chief for photographic requirements such as:
    - Significant ground features;
    - Point of initial impact;
    - Location of major components;
    - Ground fire areas;
    - Serious property damage;
    - Flight path to impact; and
    - Witness locations.

13) In conjunction with the Operations Group Chief, photograph the cockpit environment with particular attention to:
    - Instruments;
    - Position of controls;
    - Switch positions;
    - Circuit breaker panels;
    - Radio settings;
    - Automatic pilot setting;
    - Fuel control positions;
    - Pilot seats, seat belts, harness; and
    - Maps, charts.

14) Liaise with the Operations Group and Systems Group chiefs for additional specific photo requirements of the cockpit area;

15) Liaise with the Medical/Human Factors and Structures (Crashworthiness) Group chiefs for requirements for photos of items with possible design deficiencies such as:
    - Design/location of instruments;
    - Design/location of controls;
    - Work space incompatibility;
    - Visual restriction due to structure;
    - Lack of cockpit standardization;
    - Personal equipment interference; and
    - Seat design/configuration.

16) Liaise with the Medical/Human Factors and Structures (Crashworthiness) chiefs for photo requirements of:
    - Cabin environment;
    - Unsecured interior equipment;
    - Seats, seat structures;
    - Belts, seat belt anchorages;

- Belt buckles;
- Cabin floor;
- Cargo restraint; and
- Emergency exits.

17) Liaise with the Structures (Crashworthiness) Group Chief for photo requirements of:
    - Terrain angle;
    - Angle of impact;
    - Width, length and depth of ground scars;
    - Depth of damage to underside of aircraft;
    - Compression of energy-attenuation devices;
    - Initiation and propagation of fire;
    - Smoke smears, soot, discoloration;
    - Surface pitting; and
    - Evidence of explosion.

18) Liaise with the Air Traffic Services and Airports Group Chief for specific photo requirements of:
    - Runway or taxiway;
    - Aerodrome layout;
    - Obstructions to air traffic services and airport controllers' vision;
    - Aerial photo record of access routes; and
    - Tower cab layout.

19) Liaise with the Powerplants Group, Systems Group and Structures Group chiefs for specific photo requirements of selected aircraft components.

6. Complete Event 30.

EVENT 30. Site photography (Phase 2)

Event 16 refers.

1) Photograph wreckage recovery operations;

2) Photograph re-assembly operations (if applicable);

3) Photograph engine tear down operations (if applicable);

4) Photograph components under examination and testing; and

5) Provide analysis of photo/video evidence.

POST-FIELD PHASE

1. Complete Event 63;

EVENT 63. Analysis and report of the Photo/Video Group

Events 16 and 30 refer.

1) Complete photo and video requirements;

2) Review, evaluate and analyse all information collected; and

3) Prepare and submit the group report to the Investigator-in-charge.

2. Participate in Event 65.

EVENT 65. Technical analysis and findings

1) This event should be chaired by the Investigator-in-charge with the following group chiefs attending:
   – Maintenance and Records;
   – Systems;
   – Structures;
   – Powerplants;
   – Site Survey;
   – Photo/Video; and
   – Other parties as dictated by local regulations and procedures.

2) Review all group findings to determine adequacy of information, areas of conflict, errors and inconsistencies;

3) Identify the areas requiring clarification;

4) Determine the procedure for achieving clarification;

5) Complete the technical analysis and determine findings with assistance from the operations groups;

6) Identify safety hazards and deficiencies; and

7) Suggest safety recommendations.

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