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# **FLIGHT SAFETY FOR THE CANADIAN FORCES**

**March 20, 2007**

**Change #3 – March 1, 2010**







**ENDORSEMENT BY THE CHIEF OF THE DEFENCE STAFF**

The Canadian Forces' mandate is to provide combat capable, operationally effective forces for both the defence of Canada and for missions undertaken in accordance with the policies and priorities of the Canadian government on behalf of all citizens of our country. The preservation of personnel and equipment is critically important in maintaining the operational effectiveness needed to fulfill this demanding mandate.

It is clear that the Flight Safety Program plays a distinct and integral role in supporting the operational mission of the Canadian Forces through its primary tenets of promotion, education, airworthiness investigation and analysis. We must collectively ensure that our personnel and materiel are afforded the protection of the best possible safety program. Hazards that could decrease operational effectiveness through loss of personnel and equipment must be recognized and positive action taken to eliminate them.

The Flight Safety Program and airworthiness investigation activities help ensure that the air missions of the Canadian Forces are accomplished at an acceptable level of risk. I endorse a vigorous Canadian Forces FS Program and expect everyone associated with air operations to do likewise.

A handwritten signature in blue ink, appearing to read 'W.J. Natynczyk', located below the endorsement text.

W.J. Natynczyk, CMM, MSC, CD  
General  
Chief of the Defence Staff



## **FOREWORD**

1. A-GA-135-001/AA-001, Flight Safety for the Canadian Forces, is issued by the Chief of the Air Staff on the authority of the Chief of the Defence Staff.
2. A-GA-135-002/AA-001, Occurrence Investigation Techniques, is issued as a separate publication with limited distribution.
3. A-GA-135-003/AG-001, Airworthiness Investigation Manual (AIM), delineates the Airworthiness Investigative Authority's (AIA) policies with details regarding standards, procedures and instructions for investigation interaction within DND/CF and with persons, agencies, companies or authorities outside of DND/CF. It is issued electronically as a separate publication.
4. Suggestions for amendments to A-GA-135-001/AA-001 are to be forwarded through normal channels to the Director of Flight Safety, attention: DFS 3.



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## **LIST OF AMENDMENTS**

Refer to the DFS Internet and Intranet websites for the list of amendments. It is the responsibility of the owner of this publication to keep it current. Insert latest changed pages; dispose of superseded pages in accordance with applicable orders.

### **NOTE**

Zero in Change No. column of the list of effective pages indicates an ORIGINAL page.

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This publication supersedes A-GA-135-001/AA-001 dated 2002-12-02. The official and most current version of A-GA-135 is available electronically on the DFS Internet and Intranet websites. An amendment notice will be sent electronically to the distribution list and communicated via a CANFORGEN. The details of all amendments will be listed on the FS Internet and Intranet websites. Key Flight Safety staff and operational commanders or managers will probably keep an up to date hard copy or electronic copy of this publication as a handy reference manual. The owners of a non-official copy of the publication are responsible for printing and amending the publication as required or to update the electronic copy of the publication.



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## **CHAPTER 1 – PROGRAM DESCRIPTION**

### **GENERAL**

1. The Flight Safety (FS) Program is a force enabler for the Canadian Forces (CF). FS contributes to mission accomplishment in the DND / CF through the elimination of the accidental loss of aviation resources.
2. Orders and standards for operational and support personnel are, for the most part, developed out of concern for the safety of people and equipment. These standards represent levels of risk which are considered acceptable and practical for the full spectrum of DND / CF activities from peacetime training to wartime operations. It is understood that Commanders (Comds) in high intensity wartime action are likely to accept higher levels of risk than those considered acceptable in peacetime force generation activities. Risk management in the planning and execution of the DND / CF mission is fundamental to safe operations.
3. The FS Program integrates the investigation portion of the CF/DND Airworthiness Program within its activities which are detailed in Chapters 7-11 of this manual and with the occurrence investigation techniques outlined in the A-GA-135-002/AA-001. Within the Airworthiness Program, The Director of Flight Safety (DFS) is named as the Airworthiness Investigative Authority (AIA) and charged with independently investigating all matters concerning aviation safety. Details of the powers delegated from the MND, using powers within the Aeronautics Act, to the AIA and then onward to all airworthiness investigations are laid out in the A-GA-135-003/AG-001 Airworthiness Investigation Manual (AIM). Of note, all activities carried out for flight safety airworthiness investigations are carried out on behalf of the AIA / DFS.

### **DEFINITIONS**

#### **OPERATING UNIT**

4. This term refers to the unit under whose authority a flight has been authorized in accordance with B-GA-100-001/AA-000, National Defence Flying Orders.

#### **AIR WEAPONS CAPABLE WING / UNIT**

5. A wing / unit which uses ammunition, explosives and / or pyrotechnics in support of its role.

#### **AIR WEAPONS SYSTEM**

6. A system containing armament computers, mechanical, electromechanical and electronic components, that is part of the aircraft permanent equipment or installed as a mission kit and is used to suspend, launch, release or fire ammunition / explosives and / or pyrotechnics in support of the mission being flown.

#### **AIR WEAPONS**

7. Air Weapons are any ammunition, explosives and/or pyrotechnics suspended, launched, released or fired from an aircraft. It includes any aircraft store (see below) that interfaces with the Air Weapons System, it includes bombs, missiles, torpedoes, flares, pyrotechnics, SKADs (excluding the SKADs dropped as cargo), chaff and flares, releasable external fuel tanks from the time the load starts to the time it is unloaded from the aircraft, sonobuoys, and airborne targets and banners; etc. This shall apply to both live and training weapons.

## **AIRCRAFT STORE**

8.      Aircraft Store is any device intended for internal or external carriage and mounted on aircraft suspension and release equipment, whether or not the item is intended to be separated in flight from the aircraft. Aircraft stores are classified in two categories as follows:

- a.      Expendable store. Expendable store is an aircraft store normally separated from the aircraft in flight such as a missile, rocket, bomb, mine, torpedo, pyrotechnic device, sonobuoy, signal underwater sound device, survival kit (SKAD) or other similar items.
- b.      Non-expendable store. Non-expendable store is an aircraft store that is not normally separated from the aircraft in flight such as a tank (fuel or spray), pod (refueling, thrust augmentation, gun, electronic countermeasures, target designator, etc), multiple racks, target, cargo drop container, luggage/equipment carrier (Pannier), drone or other similar items.

### **NOTE**

Aircraft fire detection and extinguishing systems, ejection and escape explosive charges, shielded mild detonating cord (SMDC) lines and aircraft hoisting systems are not considered Air Weapons. Although they all contain explosives, they do not interface with the armament system and are not considered Air Weapons therefore no armament implications.

## **PYROTECHNIC**

9.      A chemical mixture of oxidizing and reducing agent capable of reacting exothermically. Such mixtures are used to produce light, heat, smoke or gas and may also be used to introduce delays into explosive trains.

## **AIM**

10.     The aim of the FS Program is to prevent accidental loss of aviation resources while accomplishing the mission at an acceptable level of risk.

## **SCOPE**

11.     The FS Program is a program of safe behaviour, education, independent airworthiness investigation, promotion and analysis of matters concerning aviation safety. It is directed at military and civilian personnel involved in CF aviation and its contracted support elements. Since understanding why safety occurrences happen is the key to an effective accident prevention program, accidents and incidents representing a risk to aviation, or which could lead to the implementation of preventive measures (PM), should be investigated.

12.     One of the primary objectives of the Airworthiness Program is to establish and maintain an acceptable level of safety for military aviation. This compares favourably with the FS Program stated goal of preventing the accidental loss of aviation resources. When the roles of DFS and the AIA and the associated investigation aspects of these programs were compared the close match allowed the overlap of the investigation responsibilities to become a single CF / DND activity.

13. The whole FS Program is based on the primacy of having a “just culture”. A “just culture” lies between a non-punitive culture and one of sanction and punishment. Free and open sharing of critical safety information between managers and operational personnel, without the threat of punitive action, represents the basis of a reporting culture. Personnel are able to report occurrences, hazards or safety concerns as they become aware of them, without fear of sanction or embarrassment. However, while a non-punitive environment is fundamental for a good reporting culture, the workforce must know and agree on what is acceptable and what is unacceptable behaviour. Negligence or wilful, deliberate deviations must not be tolerated by leadership. A “just culture” recognizes that, in certain circumstances, there may be a need for punitive action and defines the line between acceptable and unacceptable actions or activities.

## **AIRWORTHINESS AND FS POLICY**

14. The CF shall conduct flying operations in accordance with this publication. A FS Program consistent with the roles and missions of the DND / CF shall be established at each level of command where flying operations are supervised or supported. Personnel at every level are required to participate in and support the program.

## **FUNDAMENTAL PRINCIPLES**

15. The FS Program is based on the following four fundamental principles:
- a. the main focus of the FS Program is on the prevention of occurrences. Although cause factors are assigned to occurrences, this is only done to assist in the development of effective PM;
  - b. personnel involved in conducting and supporting flying operations are expected to freely and openly report all FS occurrences and FS concerns;
  - c. in order to determine the cause of occurrences such that appropriate, effective PM can be developed and implemented, personnel involved in conducting and supporting flying operations are expected to voluntarily acknowledge their own errors and omissions; and
  - d. in order to facilitate free and open reporting and voluntary acknowledgement of errors and omissions, the FS Program does not assign blame. Personnel involved in a FS occurrence are de-identified in the final reports and the reports themselves cannot be used for legal, administrative, disciplinary or other proceedings.

## **FS STRATEGIC PROCESSES**

16. A strategic level conceptual model of FS-related processes for the FS Program is provided at Annex A. It describes in a comprehensive manner all the FS processes irrelevant of the organizations responsible to execute them. Many organizations or activities contribute directly or indirectly to the processes described in the Model in three management pillars in the form of Resilience Management, Risk Management and FS Program Management. DFS, as the champion of the FS Program for the MND, maintains close liaison with the organizations carrying out the strategic FS processes.

17. Resilience and Risk Management represent the pillars around which most of the critical FS processes and activities gravitate. Resilience Management is considered a more proactive form of accident prevention because it reduces the potential or severity of threats to air operations. Risk Management on the other hand is more reactive in that the associated activities are in response to newly identified hazards.

## **UNIVERSALITY OF FS PROGRAM**

18. The Chief of the Air Staff (CAS) has been designated as the Airworthiness Authority (AA) for DND / CF. CAS retains as a residual responsibility the oversight of the FS Program across the full spectrum of DND / CF operations, at home or abroad. Therefore, the FS Program is applicable to:

- a. all DND / CF units conducting flying operations or supporting flying operations;
- b. any contracted organizations conducting or supporting flying operations, be it for maintenance support, logistics support or any other support role; and
- c. independent airworthiness investigation activities as detailed in the AIM and authorized by the AIA.

19. DFS as the AIA monitors matters concerning aviation safety of all foreign military aircraft operating in Canada.

## **AIR WEAPONS SAFETY**

20. The FS Program encompasses all maintenance and operational air weapons activities, including flying operations, from the moment that air weapons are removed from storage until they are delivered on target or are returned to storage. The Safety Orders for CF Air Weapons Systems (B-GA-297-001/TS-000) remains the primary reference for all other air weapons related issues. All wings and units with an air weapons capability shall ensure that their FS Program encompasses air weapons safety (AWS) requirements.

## **RESPONSIBILITY FOR FS PROGRAM**

### **OVERALL RESPONSABILITY**

21. A large portion of the FS Program is based on the continuous monitoring of hazards, appropriate and independent investigation of aviation safety occurrences and thorough analysis of the investigation findings so that the risk of recurrence can be reduced. The complete program involves pre-occurrence activities like education and promotion for the safe behaviour activity; PM and risk management techniques designed to reduce the chances of an occurrence; and post-occurrence activities including occurrence response procedures, investigations, occurrence analysis and feedback. Early involvement in capital acquisition projects is essential to ensure FS issues are considered in major equipment procurements

22. CAS is responsible for FS policy in DND / CF. FS policy is implemented by the chain of command at wings, bases and units. This policy also applies to National Defence Quality Assurance Regions (NDQAR) and work centres at contractor facilities where CF aircraft are being manufactured, overhauled, inspected or repaired. Supervisors at all levels are responsible for establishing their own FS Programs.

### **INDIVIDUAL RESPONSIBILITIES**

23. The success of the FS Program is reliant upon “buy in” and a commitment to the program by all personnel associated with DND / CF flying operations. This commitment can only materialize if all personnel believe in the value of the program and understand that they have a responsibility to actively participate in flight safety. In order to facilitate this, the individual shall be able to report any flight activity concerns and occurrences or propose better ways of doing business without fear of retribution.



24. Personnel are responsible for:
- a. immediately ceasing unsafe activities under one's direct control;
  - b. notifying their supervisor and the FSO of the unsafe activity; and
  - c. formally identifying and reporting hazards.

#### **UNIT RESPONSIBILITIES**

25. The FS Program is designed to ensure that DND / CF flying activities remain safe while remaining operationally focused. The scope of the FS Program shall be such that individuals belonging to an organization conducting or supporting air operations will have a structured FS Program in place. Every unit conducting or supporting air operations shall have a flight safety program.

#### **MANAGEMENT RESPONSIBILITIES**

##### **NOTE**

It is the responsibility of each individual to cease unsafe activities, regardless of rank or position in the organization.

26. The management responsibilities are as follows:
- a. immediately ceasing activities that are deemed unsafe or where an UNACCEPTABLE risk exists;
  - b. notifying higher authorities of UNACCEPTABLE risks and the actions taken to mitigate them or of the need to seek additional resources to mitigate them;
  - c. reviewing and accepting / rejecting the risk as per the auth delegated from AA, OAA and TAA;
  - d. establishing the unit's risk control strategy;
  - e. measuring and reporting on the effectiveness of risk management activities within the unit; and
  - f. promoting risk management activities at the unit and formation level.

#### **FSO RESPONSIBILITIES**

27. The FSO is responsible for:
- a. consulting and being aware of the unit's risk assessment criteria;
  - b. immediately notifying the CO of any unsafe activities and unacceptable risks. In these cases the FSO must seek an order from an appropriate authority to cease the activity until the problem can be assessed and either resolved or mitigated to an acceptable level; and
  - c. carrying out independent airworthiness investigation activities as detailed in the AIM and authorized by the AIA.

#### **AIRWORTHINESS RISK MANAGEMENT**

##### **FS RISK DEFINITION**

28. A FS risk is defined as a possibility of injury, illness or loss measured according to the probability and severity of an adverse effect on health, property or safety of flight.

#### **AIRWORTHINESS PROGRAM PRINCIPLES**

29. The DND / CF Airworthiness Program is based on the fundamental principles that airworthiness-related activities are:

- a. completed to accepted standards;
- b. performed by authorized individuals;
- c. accomplished within accredited organizations; and
- d. performed using approved procedures.

#### **AIRWORTHINESS PROGRAM ROLES**

30. A regulatory approach is the most common method employed to implement. A regulatory approach means to control by rule and involves using regulations, orders, directives and standards to control airworthiness-related activities. A regulatory approach for controlling airworthiness activities has the following three distinct roles:

- a. Regulator. The regulator develops the airworthiness instrument (rules and standards) for the engineering, manufacture, maintenance, materiel support and operation of aeronautical products and ensures compliance (e.g. Transport Canada for civil aviation);
- b. Implementer. The implementer conducts the aviation activities associated with the engineering, manufacture, maintenance, materiel support and operation of aeronautical products (e.g. airlines, manufacturers and maintenance organizations for civil aviation); and
- c. Investigator. The investigator investigates airworthiness-related safety occurrences and aviation safety issues. The investigator is normally independent from the regulator and implementer. The investigator is also empowered to investigate the role that the regulator and implementer may have had in any aviation occurrence (e.g. Transportation Safety Board (TSB) for civil aviation). DFS is the designated Airworthiness Investigative Authority (AIA) for this program and fulfils the investigator role as described.

31. Unlike civil aviation, where the airworthiness regulator, implementer and investigator are totally independent, the Aeronautics Act has assigned DND a self-regulating and self-investigating responsibility for airworthiness.

#### **RESPONSIBILITY FOR ACCEPTING RISKS**

32. The ARM process ensures that conflicts between aviation safety mission accomplishment and resource expenditures are balanced. As promulgated in A-AG-005-000/AG-001 – DND / CF Airworthiness Program overall responsibility for managing risks rests with COs, DND / CF managers at all levels, and designated contractor representatives. The identification / recognition of hazards is a responsibility shared by all DND / CF personnel or supporting personnel.

33. Due to the inherent dangers associated with operating military aircraft, a certain acceptance of safety risks is often required. The decision to accept risk must be controlled, balanced and approved at the appropriate level. The airworthiness risk management (ARM) process provides a logical and systematic means of identifying and controlling safety risks in the decision-making process.

34. Aviation safety-related risk is a primary concern of the Airworthiness Program. Other forms of risk, such as operational, financial and legal, may also be factors in any decision-making process and may at times conflict with aviation safety goals. The ARM process provides a means to assess and proactively balance airworthiness risk against both mission accomplishment and available financial resources. All personnel associated with aviation - from the pilot-in-command (PIC) of an aircraft to the technician troubleshooting an unserviceability on the hangar floor - will be required to make a decision, at some point, involving some degree of airworthiness risk assessment. Adoption of a standardized ARM methodology enhances the quality of these decisions.

#### **AIRWORTHINESS PROGRAM AUTHORITIES**

35. The Airworthiness Program contributes to aviation safety by influencing areas related to aeronautical products and their operation. The DND / CF Airworthiness Program is mandated by the Minister of National Defence (MND) as detailed in DAOD 2015-0 and DAOD 2015-1 and amplified in A-GA-005-000/AG-001 – DND / CF Airworthiness Program. The elements of an effective airworthiness program consist of a full range of aviation activities including design, manufacture, maintenance, materiel support, facilities, personnel and operations.

36. Under the provisions of the Aeronautics Act, the MND delegates powers and responsibilities to the Airworthiness Authority, Technical Airworthiness Authority, Operational Airworthiness Authority and Airworthiness Investigative Authority. These roles and responsibilities are described in A-GA-005-000/AG-001 – DND / CF Airworthiness Program. Their roles and responsibilities are summarized below.

#### **AIRWORTHINESS AUTHORITY (AA)**

37. The AA is responsible for the development, promotion, supervision and management of an Airworthiness Program for the DND / CF. This includes the appointment of competent individuals to fill the positions of Operational Airworthiness Authority and Investigative Airworthiness Authority, described below, and in consultation with the Assistant Deputy Minister (Materiel) (ADM (Mat)), the appointment of a competent individual as Technical Airworthiness Authority. The CAS is the AA for DND / CF. Of note, the AA is charged with ensuring the AIA is not impeded in any way in the investigation of matters concerning aviation safety.

#### **TECHNICAL AIRWORTHINESS AUTHORITY (TAA)**

38. The TAA is responsible for the regulation of the technical airworthiness aspects of the design, manufacture, maintenance and materiel support of aeronautical products and the determination of the airworthiness acceptability of those products prior to operational service. The Director General of Aerospace Equipment and Program Management (DGAEPM) is the TAA for DND / CF.

#### **OPERATIONAL AIRWORTHINESS AUTHORITY (OAA)**

39. The OAA is responsible for the regulation of all flying operations. This includes responsibility for operational procedures; flight standards; operator training, qualification and licensing; aerospace control operations; and operational airworthiness clearance of aeronautical products prior to operational service. The Comd of 1 Canadian Air Division (Comd 1 Cdn Air Div) is the OAA for DND / CF.

AIRWORTHINESS INVESTIGATIVE AUTHORITY (AIA)

40. The AIA is responsible for regulating the airworthiness investigation aspects of the FS Program. The AIA is responsible for investigations. The AIA is also responsible for monitoring the Technical and Operational Airworthiness Programs to identify deficiencies. DFS is the AIA for DND / CF. Of note, the AA is charged with ensuring the AIA is not impeded in any way in the investigation of matters concerning aviation safety.

Annex A  
Chapter 1  
A-GA-135-001/AA-001

## **ANNEX A – FS STRATEGIC BUSINESS MODEL**

### **INTRODUCTION**

1. A strategic business model provides a high level framework that describes the strategic business of managing the flight safety program in terms of the activities.

### **COMPONENTS OF BUSINESS MODEL**

2. The two components of a business model are the business processes and the information model.
- a. Business Processes. Business processes consist of one or more activities that lead to a specific result. The term “business process” is used to describe work that is done. These processes can be decomposed into specific tasks and sub-tasks as required.
  - b. Information Model. The Information Model represents the various types of information gathered as part of business processes and their relationship between them.. Different types of information are represented as entities. The information model is built according to an understanding of the various data elements and their relationships with each other.

### **FS BUSINESS PROCESSES**

3. Appendix 1 to this annex is a graphical depiction of the FS business processes. They are re-grouped as follows:
- a. Resilience Management. Resilience management is the process of modelling, measuring and improving the adaptive capacity of an organization as it confronts disruptions, change, and pressures.
    - (1) Equipment Resilience Activities. CF airworthiness organizations employ tools and methods to ensure aircraft and related equipment are acceptable for the operations and flying environment. FS data is provided to improve Design, Modification, and Maintenance airworthiness on current and new aircraft so that the flying operations can better withstand unknown hazards.
    - (2) Procedures Resilience Activities. CF flying procedures are monitored to ensure that air operations are being conducted in a safe manner. Safety audits are conducted, rules and regulations are reviewed, and periodic inspections are performed in order to continually improve all associated procedures.
    - (3) Personnel Resilience Activities. Personnel are trained to be capable of dealing with known and unknown threats to flight safety. Occurrences, hazards, trends, and many other forms of flight safety data are disseminated to all personnel involved with the support or conduct of air operations so they can better understand the situations and circumstances that can compromise flight safety. This is supported by a comprehensive awards program to encourage safe behaviour throughout the organization.
  - b. Program Management. The FS Program provides the administrative framework for the Resilience and Risk Management processes. Program Management includes development

of the FS Program, policies and procedures, relevant training and education, and activities that provide feedback to the chain of command.

- (1) Manage Safety Plan. The A-GA-135-001/AA-001 Flight Safety for the CF and other manuals detail flight safety procedures. This documentation is made readily available electronically and usable for anyone involved in air operations. It is amendable so that it reflects current processes and procedures.
  - (2) Manage FS Organization. The FS Program employs a wide range of specially trained personnel. It is important that the names, positions, and qualifications of Flight Safety Officers (FSOs) are documented and readily available to all involved with flight safety operations.
  - (3) Manage Safety Publications: FS is governed through the Aeronautics Act, DAODs, and Airworthiness documents as well as the A-GA-135. FS governing documentation is made available to all involved in aircraft operations.
  - (4) Conduct Program Performance Monitoring. The flight safety program is monitored and evaluated in order to gauge its effectiveness and determine whether changes or adjustments are required to improve safety. The Chain of Command is provided with flight safety, personnel and costing information to determine if sufficient resources are being allocated to the program, or if allocated resources could be reassigned to achieve better results.
  - (5) Conduct FS Training. Specialized safety training is conducted internally at 1 Cdn Air Division by the Division FSO staff, and at other locations in Canada and abroad. Access to flight safety information and training versions of the flight safety database are employed to ensure that personnel have the requisite knowledge and experience to act as FSO and conduct specific classes of investigations once they get back to their Wing/Unit/Employer.
  - (6) Maintain Liaison with National/International Organizations. Close ties with other flying organizations facilitates CF investigations in other countries, and provides a broader understanding of the issues that affect flight safety. Awareness of accidents external to the CF improves the resilience of our organization, and can trigger hazard investigations. Links to external flying agencies are maintained for the use of all CF FSOs. Ultimately, exchange of real-time flight safety data would be beneficial.
- c. Risk Management. Risk management is the systematic process of identifying risks, assessing their implications, deciding on a course of action, and evaluating the results. Known risks are those that have been identified and analyzed. Unknown risks, by their nature, cannot be managed, and thus are addressed through resilience management.
- (1) Identify Hazards. The principle means of identifying hazards is through occurrence investigation, hazard reporting, and trend analysis.
    - (a) Occurrence Reports. The primary vehicle for identifying validated hazards is through occurrence investigations. When an air or ground occurrence happens it must be communicated to the proper authorities in order to begin investigation processes. Subsequent occurrence investigation will



require determination of investigation requirements, obtaining investigation resources, gathering occurrence information, analyzing occurrence information, then identifying of hazards (cause factors, contributing factors, etc). The team will then complete the Investigate Hazard process.

- (b) Hazard Reports. When a hazard, or the suspicion of a hazard, is discovered it must be communicated to the proper authorities in order for it to be properly managed. Hazards can be discovered through the investigation of an occurrence, by the casual observer, or by several activities associated with improving flight safety. These can include: walkthrough surveys and inspections, review of operational and technical information and manuals, analyzing unsafe incidents, accidents, and injury data, analyzing work processes, consultation with employees, review of material safety data sheets for hazardous materials, and consultation with specialists and practitioners. The activities of this business process are primarily concerned with capturing the preliminary details of a hazard.
  - (c) Trend Analysis Reports. Hazards and occurrences can be examined in groups having (one or more) common features that may lead to more effective flight safety measures. For example, foreign object debris that reoccur on a regular basis at a particular runway may have a common source. FS PM that address the source of the debris might have a more effective and longer lasting effect than simply removing each piece of debris on an individual basis.
  - (d) Other Program Reports. Other safety-related programs within and external to the CF FS Program also identify FS Hazards. Examples include the Bird Strike program, FS surveys, FS Meeting minutes, TSB investigations, foreign military investigations, airworthiness maintenance bulletins, or any other programs related to aircraft operations.
- (2) Investigate Hazards. Based on the preliminary information captured when the hazard or occurrence was reported, the nature of the hazard and its severity will be used to determine the level of the investigation and resources that should be employed. This process decomposes into the following sub-processes:
- (a) Determine Investigation Requirements. The investigation requirements are based on the preliminary assessment of the potential risk that the hazard poses to future flight operations.
  - (b) Obtain Investigation Resources. People, equipment, and money are acquired in order to conduct the investigation into the hazard.
  - (c) Gather Hazard Information. Data related to the hazard is collected and may include: photographs, interview notes, video and audio recordings, samples, flight recordings, log books, and so forth. Items associated with an occurrence are quarantined.
  - (d) Evaluate Hazard Information. Hazard information is analyzed in order to evaluate its severity and probability of adversely affecting future support and conduct of air operations.

- (e) Propose Immediate FS PM. Deliberation on proposed FS measures may occur in order to reach a consensus on what best meets the requirements. More than one flight safety measure can be implemented in order to address the hazard.
  - (f) Report Hazard. A formal report is initially developed to capture the relevant details such as the nature of the hazard, how it was reported, the individuals associated to the hazard, the location, date and time, and so forth. As the investigation of the hazard progresses more information is gathered and added to the report. If a FS PM is implemented to address the hazard, that information, including its effectiveness, is also added to the report.
  - (g) Track Investigation Progress. The progress of an investigation is tracked to ensure that it is completed in a timely manner.
- (3) Analyze Risk. All available information is systematically reviewed to determine how often specified events may occur and the magnitude of their consequences. Commanders at all levels review investigations within their sphere of responsibility, the associated proposed PM, then make documented decisions on how they will address the hazards.
- (4) Mitigate Risk. Hazards, whenever possible, are corrected by implementing one or more FS PM. This process of correcting hazards decomposes into the following sub-processes:
- (a) Track FS PM. Once a FS PM is proposed, it is critical that the various stages and levels of implementation be tracked and monitored to ensure complete staffing, either full implementation, partial implementation or no implementation (refusal). The latter two options must be endorsed at the proper level in the chain of command and supported by an appropriate record of Airworthiness Risk Management.
  - (b) Evaluate Effectiveness of PM. Flight safety measures are reviewed for effectiveness and either closed, adjusted, or changed completely. They may be re-evaluated at a future point in time.
  - (c) Document Risk Assessment. When preventive measures are not implemented, the mitigating actions and risk acceptance are documented to ensure that PM are given due consideration.

## **FS INFORMATION FLOW**

4. Appendix 2 describes the interrelationship between the individuals involved in FS and the FS information flow. It represents the major types of information used for flight safety management (Hazards, Risk, PM, etc.) and the relationships that the entities have with each other as the data / information flows through the FS system.

5. The information model descriptors are:

- a. Persons Involved in Air Operations. These personnel include aircrew, groundcrew, maintainers, air traffic personnel, contractors, as well as any other Air Force, Navy, or Army personnel involved with flying operations. They are responsible for identifying and reporting any hazard to flight safety that they find.



- b. Hazards. Hazards have the potential to interfere with the safe operation of aircraft. They can be identified through occurrences, trend analysis, from occurrences experienced by different countries, by FS surveys, through FS committee meetings, and by the observations of anyone involved in air operations. Hazards are brought to the attention of FSOs. Once validated, hazard information is disseminated to all involved in flying operations.
- c. FS Staff. FS Staff include Unit Flight Safety Officers (UFSOs), Wing Flight Safety Officers (WFSOs), Division Flight Safety Officers (Div FSOs), DFS Flight Safety Officers, and deputies at all levels. They are responsible for validating and investigating reported hazards, for analyzing the hazard risk potential and for proposing possible PM. Flight Safety Officers and their assistants (FS Non-Commissioned Members, FSO Specialist (Weapons) (FSOS (W) Weapons Officers, etc.) operate within a FS functional chain of command. As advisors to their respective supervisors, all tiers of FS (deployments, unit, Wing, Air Div and DFS, contracted unit) work in a cooperative and functional Chain of Command IAW direction set in the A-GA-135-001/AA-001 Flight Safety for the Canadian Forces.
- d. Risk. Risk potential is decomposed into specific accident probabilities and associated accident severities. This potential may be further analyzed through formal risk analysis by the chain of command.
- e. Chain of Command. Chain of command include Unit Commanding Officers, Wing Commanders, Division Commander, and supervisors at all levels. These persons are responsible for evaluating the hazards within their organizations, and either formally accepting the risk, or mitigating the risk by implementing PM. By extension, the senior management of contracted organizations have an equivalent chain of command.
- f. PM. Although they are proposed by FS Staff, implementation of PM is the responsibility of the appropriate Chain of Command. These measures are tracked to completion in order to ensure that they are completed in a timely fashion, and so that there is a record of completion or risk acceptance / mitigation.
- g. Action Agencies. Once the Chain of Command has confirmed the risks associated with certain hazards, they will task Action Agencies to complete PM. These Action Agencies will notify FS Staff when their assigned PM have been completed, as well as provide status reports along the way.

## **FS BUSINESS MODEL AND FSOMS**

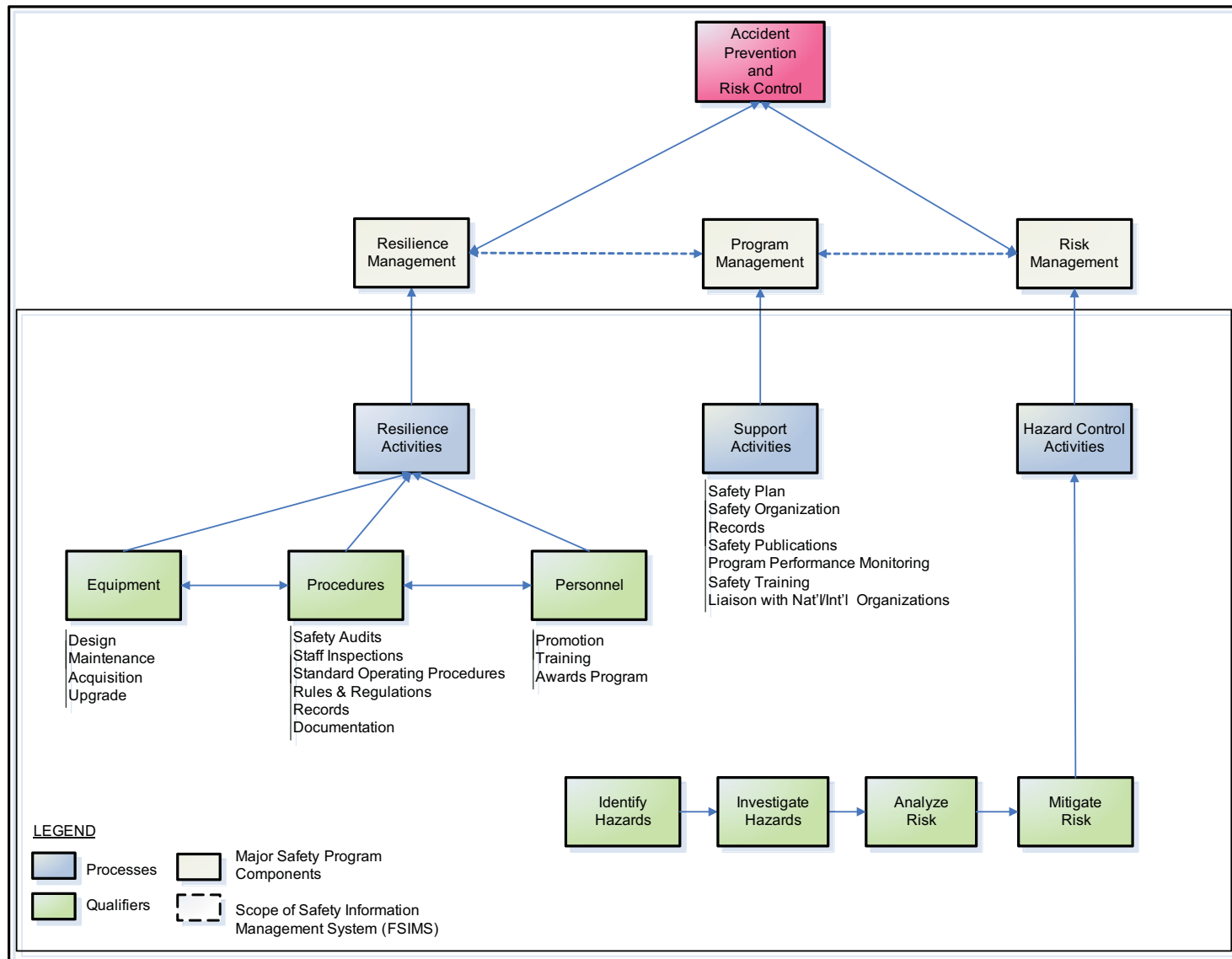
6. The FS Program achieves the aim of preventing accidental loss of aviation resources while accomplishing the mission at an acceptable level of risk. This is done by managing the risks associated with air operations, and by making the organization resilient to unknown hazards. Some of the FS processes in the FS business model are the direct responsibility of the Airworthiness Investigative Authority while others are the responsibility of organizations and personnel directly and indirectly supporting air operations.

7. The FS Occurrence Management System (FSOMS) supports the FS Program by recording all factual data related to FS occurrences and hazards. It details investigation results including assigned cause factors, recommended PM and disposition of these PM. The collection of data and its systematic analysis helps in the prevention of accidents and the control of risk in a manner that is measurable.



Appendix 1  
Annex A  
Chapter 1  
A-GA-135-001/AA-001

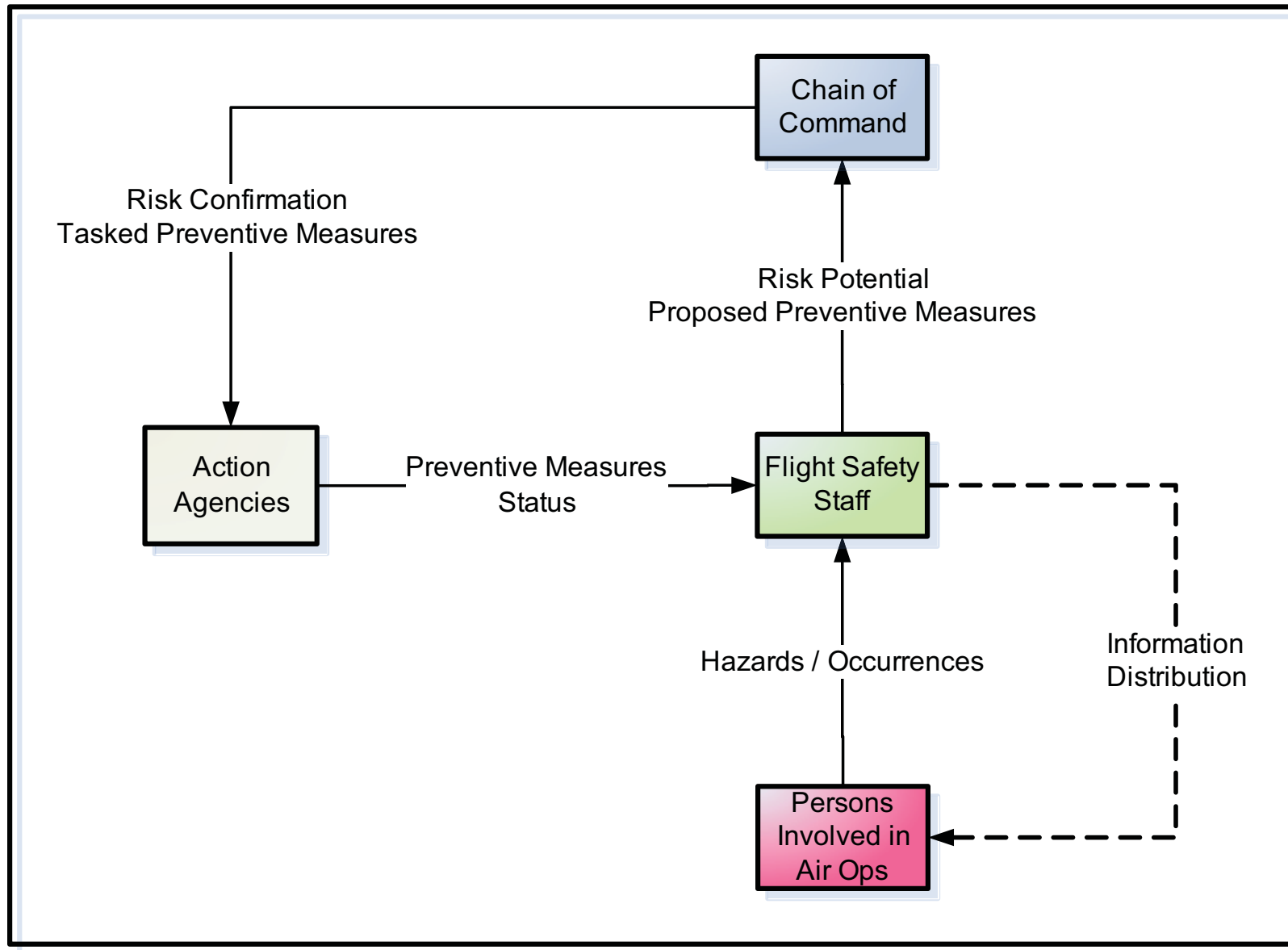
## **APPENDIX 1 – FS BUSINESS PROCESSES**





Appendix 2  
Annex A  
Chapter 1  
A-GA-135-001/AA-001

## **APPENDIX 2 – FS INFORMATION MODEL**





## **CHAPTER 2 – ORGANIZATION**

### **GENERAL**

1. The accidental loss of aviation resources can be prevented if hazards are identified and, whenever possible, eliminated. The achievement of this objective requires an effective FS Program that is proactive, adaptable, relevant and highly visible to all members of the organization. This, in turn, requires a dedicated staff of highly motivated, trained FS professionals to develop, revise and administer the FS Program on behalf of the chain of command. In the case of airworthiness investigations, these professionals perform their duties on behalf of the MND through delegated responsibilities to the AIA. Therefore, FS professionals are required at all levels of the organization (tactical, operational and strategic) in order to optimize the effectiveness of the program.

### **FS TEAM ESTABLISHMENT**

2. As a minimum, the unit CO or the manager of a contracted unit is required to form a dedicated FS team comprised of an FS Officer (FSO) and a Deputy FS Officer (D/FSO). Besides the obvious HQs, wings, squadrons and units, this includes shipborne helicopter detachments, contracted flying training establishments, NDQARs and work centres at all contractor facilities where CF aircraft are manufactured, overhauled, inspected or repaired.

### **FS STRUCTURE**

3. Table 1 below shows the different organizations and the corresponding appointed FSOs.

<b>ORGANIZATIONAL LEVEL</b>	<b>FSO STAFF</b>
<b>STRATEGIC</b>	
NDHQ (MND / CDS / VCDS / CAS / ADM (Mat))	Director of FS (DFS)
<b>OPERATIONAL</b>	
Comd 1 CDN AIR DIV / CANR	1 Div FSO
Comd 2 CDN AIR DIV	2 Div FSO
Canada Com Comd	1 Div FSO
CANSOFCOM Comd	1 Div FSO
CEFCOM Comd	1 Div FSO
CANOSCOM Comd	1 Div FSO
Region Comd (for Cadet operations)	FSO as per A-GA-135-001/AA-001 Chapter 2, Annex A, Table 2
Contracted Maintenance Organizations (Third Line)	Assigned Wing FSO as per <a href="http://airforce.mil.ca/fltsafety/fsoms/rpt_relationships_e.htm">http://airforce.mil.ca/fltsafety/fsoms/rpt_relationships_e.htm</a>
<b>TACTICAL</b>	
Wing Comd	Wing FSO
Region Cadet Air Ops Officer	Assigned Wing FSO as per A-GA-135-001/AA-001 Chapter 2, Annex A, Table 2
AETE	4 Wing FSO
ATESS	8 Wing FSO
427 Tac Hel Sqn	1 Wing FSO
Deployed Unit Det Comd	Lead Wing FSO as per Tasking Order

ORGANIZATIONAL LEVEL	FSO STAFF
<b>TACTICAL (Cont'd)</b>	
Unit / Cadet Gliding Centre Comd	Unit FSO (UFSO)
Contracted Maintenance Flights (Sqns)	Unit FSO (through contractor FSO)
Deployed sub-unit	Assigned Lead Wing FSO as per Tasking Order

**Table 1 – Command levels and Corresponding FSOs**

4. For Canada Command, Comd 1 Cdn Air Div is the CF Air Component Commander and therefore is responsible for FS. For CEFCON, CANSOFCOM, FS is a residual responsibility that is not relinquished by the CAS even when detachments are under comd to these commands.
5. For non-Air Force units, the appointment of a dedicated FSO will be based on the unit's level of involvement in flying operations or support to air operations.

#### **INTERACTION WITH OTHER ORGANIZATIONS**

##### **AEROSPACE ENGINEERING TEST ESTABLISHMENT (AETE)**

6. AETE, an ADM (Mat) unit, is accountable to CAS for their FS Program. Their FS Program is monitored by 1 Cdn Air Div through 4 Wing. The flying and maintenance standards of AETE are the responsibility of 1 Cdn Air Div, which exercises this supervisory role on behalf of CAS.

##### **AEROSPACE AND TELECOMMUNICATIONS ENGINEERING SUPPORT SQUADRON (ATESS)**

7. ATESS is accountable to CAS for their FS Program, which is monitored by 1 Cdn Air Div through 8 Wing.

##### **AIR CADET FS PROGRAM**

8. The Air Cadet Flying Program, comprising the Air Cadet Gliding Program and the Air Cadet Powered Flight Program, must also comply with this publication. Specific arrangements and associated responsibilities are detailed at Annex A.

- a. The Air Cadet Gliding Program is a national program consisting of familiarization flights and glider pilot flying training; and
- b. The Air Cadet Powered Flight Program is a national program consisting of familiarization flights and pilot ab-initio flight training.

#### **IMPLEMENTATION OF FS PROGRAM**

9. Every organization who is assigned or tasked to facilitate the employment of air assets must implement a FS Program overseen by an FSO. The latter shall be a trained FS specialist who advises the unit CO or manager on FS and AWS Program issues. Being familiar with the full spectrum of operations in the organization, the FSO provides expert advice on both accident prevention and hazardous conditions.



#### **ASSIGNMENT OF FSO RESPONSIBILITIES**

10. A Comd / manager normally assigns responsibility to the FSO for devising, revising, promoting and administering the FS Program including:

- a. disseminating FS educational material;
- b. administering FS Committee meetings;
- c. researching and staffing airworthiness investigation activities on behalf of the AIA to determine PM;
- d. conducting AWS surveys;
- e. conducting informal FS surveys;
- f. implementing a bird strike prevention program;
- g. correcting hazardous conditions;
- h. advising on FS matters; and
- i. participating as a team member in formal FS surveys.

11. Accident prevention is the responsibility of commanders at all levels and involves monitoring the control, conduct and support of air operations. Commanders are assisted by FSOs who provide specialist advice on the FS Program.

#### **FSO ACCESS TO COMD**

12. An FSO, whether employed full-time on FS duties or not, must have direct access to the comd. Although reporting directly to the comd, FSOs normally present their observations or recommendations to the officer who has the authority to take corrective action. Recommendations prepared by the FSO must be constructive, well thought out and tactfully presented.

#### **MANAGEMENT LEVEL OF THE FSO**

13. An FSO should be of at least captain rank, or in the case of civilian contractors, a mid-level manager. Senior positions at CAS, 1 Cdn Air Div and wing level are established at the rank of captain/major through colonel. FSOs and D/FSOs must have experience in the related operational roles and should have completed formal FS training (Basic or Advanced FS Course) (Basic Investigator (BI) 2 or 3). In cases where an individual has not received formal FS training prior to their appointment, they should complete this training as soon as possible. Aircrew shall maintain flying currency wherever feasible. The DFS / AIA and the 1 Div FSO shall be advised of FSO and D/FSO appointments and qualifications. Candidates nominated for unit positions shall be able to occupy the position for 18–24 months. Candidates nominated for wing positions shall be able to occupy the position for a minimum of 36 months.

#### **LIMITATIONS ON FSO SECONDARY DUTIES**

14. Although units vary in size, composition and role, it is expected that the FSO will have sufficient time to complete their duties during a normal workday. The FSO is expected to maintain professional qualifications and categories commensurate with the unit's role(s). However, the FSO should be actively involved in the stewardship of the unit FS Program, and as such, FSO duties are normally to be considered the only individual's secondary duty. The CO should avoid assigning duties / assignments (i.e. secondary duties) that require full-time attention, particularly on a regular basis should be avoided. If a unit

CO considers it necessary to assign additional duties / assignments that may conflict with FSO duties, then the CO must obtain written approval from the WComd for a UFSO and the WComd must obtain approval from the Comd 1 Cdn Air Div for a WFSO. The written request shall outline the circumstances, mitigation and / or period required. The request and authorization shall be held on file with the WFSO for UFSOs, and Div FSO for WFSOs for the duration of the approved period.

#### **TECHNICAL AND ADMINISTRATIVE SUPPORT**

15. FSOs shall be given the technical and administrative assistance necessary to perform their duties.

#### **UNIT FS TEAM MEMBERS**

##### **D/FSO**

###### **APPOINTMENT**

16. One or more D/FSOs shall be appointed, as required, at all units and sub-units with established FS Programs. They are employed as assistants to the FSO and may act as the FS representative for a sub-unit. For military units the D/FSO should be an NCM. As a minimum, a D/FSO should have completed the Basic FS Course (BI 3). Candidates nominated for unit positions shall be able to occupy the position for 18–24 months.

###### **ROLE**

17. The role of the D/FSO is to assist the FSO in administering an effective FS Program.

###### **DUTIES**

18. It is the duty of a D/FSO to:
- a. complete tasks assigned by the FSO; and
  - b. act as FSO during the absence of the latter.

##### **FSO SPECIALIST**

###### **ROLE**

19. The role of the appointed FSO Specialist (FSOS) is to provide specific FS expertise to the FSO and D/FSO in order to help them administer a more effective FS Program.

##### **FSOS WEAPONS (FSOS (W))**

###### **APPOINTMENT**

20. An FSOS (W) shall be appointed in any unit utilizing air weapons. The FSOS (W) should be an AERE Officer or Senior NCM qualified in aerospace armament , engineering and maintenance (course code SS ADOT).

###### **ROLE**

21. The role of the FSOS (W) is to assist the FSO on matters affecting air weapons safety (AWS).

## DUTIES

22. It is the duty of the FSOS (W) to:
- a. develop the unit AWS Program;
  - b. take the necessary actions to correct hazardous conditions;
  - c. advise on AWS matters;
  - d. liaise with the wing / unit Air Weapons Officer (appointed IAW B-GA-297-001/TS-000) on matters affecting AWS;
  - e. assist in the research and staffing of occurrence reports with air weapons implications;
  - f. assist the UFSO in the conduct of internal AWS surveys;
  - g. assist in implementing and conducting AWS awareness training; and
  - h. participate as a member of the wing / unit FS Committee.

## FORMATION FSO

### CF, AIR FORCE AND ADM (MAT) FSO

23. DFS is the FSO assigned to the CDS, CAS and ADM (Mat). On behalf of the CAS, the DFS shall:
- a. provide advice on all FS and AWS matters;
  - b. devise, implement and monitor the FS and AWS Programs as detailed in this publication;
  - c. independently investigate and analyse matters concerning aviation safety occurrences when required;
  - d. delegate investigation responsibility to qualified personnel as required to conduct airworthiness investigations;
  - e. monitor and facilitate follow-up action to all aviation safety occurrences;
  - f. act as a staff advisor for all FS matters at NDHQ, including acting as FSO to ADM (Mat) in his capacity as comd of a Command;
  - g. advise on the adequacy and suitability of policies, procedures and standards for AWS;
  - h. collect, maintain and analyze FS and AWS statistics for prevention purposes;
  - i. promote AWS awareness;
  - j. monitor and participate in an educational program for the training of FS personnel;
  - k. produce and distribute educational and promotional material;
  - l. monitor the FS Program for air cadet glider and tow plane operations;
  - m. recommend nominations for FS awards and approve, as applicable;
  - n. represent the CF at international FS conferences;
  - o. conduct annual FS briefings at wings, units and contractor facilities; and
  - p. participate in and / or conduct formal and informal surveys of wings and units and conduct surveys of contractor facilities.

### 1 CANADIAN AIR DIVISION FSO

24. The Division FSO (1 Div FSO) is the FSO assigned to Comd 1 Cdn Air Div. On behalf of Comd 1 Cdn Air Div, the 1 Div FSO shall:

- a. provide the Air Div chain of command with specialist advice on FS matters;
- b. liaise with DFS on FS and AWS related matters;
- c. liaise with the unit to monitor, advise and promote the FS and AWS Programs;
- d. advise on the adequacy and suitability of policies, procedures and standards for FS and AWS;
- e. promote safety practices within the Air Force by maintaining effective feedback loops amongst the wings, 1 Cdn Air Div and the CAS;
- f. review FS and AWS occurrences;
- g. review FS award nominations;
- h. conduct FS surveys and AWS surveys of all Air Force wings and deployed units on a 24 month cycle;
- i. prepare survey reports, including recommendations for improvement, for review by the chain of command;
- j. represent Comd 1 Cdn Air Div at FS conferences and meetings; and
- k. conduct FS education by coordinating the administrative aspects of safety courses (Basic FS Course (BFSC) and Advanced Flight Safety Course (AFSC)), providing instructors for selected course serials, identifying FS training needs of wings / units, and ensuring sufficient numbers of trained FSOs / D/FSOs are available for units and contractors.

#### WING FSO

25. On behalf of the WComd, the Wing FSO (WFSO) liaises with the flying units and all of the support functions of a base. It is the WFSO's responsibility to:

- a. advise the WComd on all FS and AWS matters;
- b. establish and implement FS and AWS Programs that encompass all aspects of wing operations;
- c. on behalf of the AIA and as laid out in the AIM, ensure that all occurrences are reported, appropriate occurrences are investigated and that proper PM are identified to the chain of command;
- d. liaise with unit comds to conduct FS and AWS surveys;
- e. monitor all safety aspects of flying operations and air weapons operations;
- f. confirm that aircraft publications are up to date;
- g. develop methods for detecting hazardous conditions;
- h. be the focal point for all FS and AWS activities at the wing;
- i. provide advice and assistance to the appropriate 1 Cdn Air Div staff officer;
- j. monitor air cadet flying operations in accordance with this publication and A-CR-CCP-242/PT-001 – Air Cadet Gliding Manual; and
- k. review supplementary reports (SR) from lodger units.

#### FSO FOR ASSIGNED / ATTACHED AIR ASSETS

26. The FS Program shall be promulgated through local flying orders, operations orders, standing orders and equivalent regulatory documents.

27. Comds shall appoint a dedicated FSO (e.g. BFSO, ship FSO) and / or utilize FS personnel within attached flying units (e.g. Sqn/Detachment FSO) to provide FS expertise and advice. This is an overarching requirement, separate from wing / unit programs and procedures that are specific to lodger or detached flying units and their chain of command.

28. For deployed operations, Comd 1 Cdn Air Div will appoint an Air Force wing to provide administrative support (e.g. FSOMS data entry) and quality control to the deployed unit for its FS Program and occurrence handling. If more than one aircraft type is involved, Comd 1 Cdn Air Div may designate additional wings to provide this technical support and assistance.

## **FS COMMITTEE**

### **PURPOSE**

29. In order to remain relevant, visible and adaptable to changes, unit / formation FS Programs must be periodically reviewed and reassessed. This is the objective of the unit / formation FS Committee. The committee should focus on the three pillars of the FS Program: promotion, education and analysis. In addition, the committee should use the minutes of their meetings to direct necessary changes to the FS Program.

### **ESTABLISHMENT OF FS COMMITTEE**

30. An FS Committee shall be established either independently, or as part of a safety council. FS Committee requirements will be met as follows:

- a. CAS – this function is satisfied by the Airworthiness Advisory Board (AAB);
- b. 1 Cdn Air Div / CANR Headquarters – this function is satisfied by attendance at the Comd's senior staff meetings; and
- c. units or long-term deployments associated with flying operations.

### **GENERAL MEMBERSHIP**

31. The FS Committee will be chaired by an individual who has executive authority, since it is expected to put in place concrete PM and get things done in a timely manner. An FS Committee shall include a qualified representative from each major agency involved in the control, conduct or support of air operations. It should normally include:

- a. the comd, CO or manager of the formation responsible for flying operations, who shall be the committee chair;
- b. representatives of flight safety (WFSO, UFSO), operations, technical, support and medical services; and
- c. other representatives as required whenever the agenda for a meeting includes items relating to their specialties.

### **FREQUENCY OF MEETING**

32. Ideally, FS committees should meet several times a year, but not less than twice per year.

### **CONDUCT OF MEETING**

33. The committee should examine and consider:

- a. action items from previous minutes;

- b. FS and AWS surveys;
- c. feedback from FS and AWS occurrences;
- d. necessary corrective action;
- e. topical items related to present and upcoming operations;
- f. items for the next FS committee meeting;
- g. reports of subcommittees;
- h. emerging trends (i.e. what happened last year over the same period); and
- i. awareness training on relevant safety issues.

#### **ADDITIONAL RESPONSIBILITIES**

34. The FS Committee should also:
- a. monitor implementation of PM within their authority;
  - b. recommend to higher authority measures beyond local capability and monitor the progress of such recommendations; and
  - c. maintain minutes of the committee's proceedings.

#### **WING FS COMMITTEE COMPOSITION**

35. The Wing FS Committee should include the following, or their equivalent:
- a. the WComd, who acts as the chairperson;
  - b. the comd of each unit involved in flying operations, including lodger units;
  - c. the Wing Logistics Officer (WLogO) or his equivalent;
  - d. the CO AMS;
  - e. the Wing Surgeon or Flight Surgeon;
  - f. the Wing Air Traffic Control Officer (WATCO);
  - g. the FOD Committee chairperson;
  - h. the WFSO;
  - i. the D/WFSO; and
  - j. staff specialists (i.e. Air Weapons Officer and / or Air Weapons Safety Technical Member) whenever an agenda item requires their presence or additional members as prescribed by the WComd.
36. The WComd will designate who will act as the secretary.

#### **RECORDS OF DISCUSSION**

- I 37. Minutes of FS Committee meetings shall be officially recorded. The WFSO is responsible for tracking the progress of action items.

#### **DISTRIBUTION OF MINUTES**

38. Distribution of the minutes shall include one copy each for CAS/DFS2, 1 Div FSO and the WFSO if the minutes are from a unit. These copies should be sent simultaneously to the addressees, so that there is minimum delay. The comments of each level may still be sent through normal channels. Distribution of the minutes to common users should also be considered. Minutes shall be transmitted electronically to speed delivery.

## **FOREIGN OBJECT DAMAGE (FOD) COMMITTEE**

39. Each unit associated with flying operations must establish a FOD committee in accordance with C-05-005-P10/AM-001. This committee should be set up as a sub-committee of the FS Committee.

## **OTHER FS COMMITTEES**

40. The FSO shall also serve on committees dealing with issues that impact the safe conduct of flying operations, like hazardous materials (HAZMAT), bird strike prevention and snow and ice removal.

## **AGREEMENTS**

41. Canada / DFS is a signatory of several FS agreements at the national and international level. Their implementation ensures our mandate is accomplished when operating air assets at home or abroad or when foreign military air assets operate in Canada. The following paragraphs summarize the principal flight safety agreements in place. A link to these documents can be found on the DFS Internet and Intranet sites.

### **INTERNATIONAL AGREEMENTS**

42. The DND / CF FS Program is aligned with the policies and aims of the aviation safety programs of the International Civil Aviation Organization (ICAO) and the North Atlantic Treaty Organization (NATO).

#### **ICAO CONVENTION ANNEX 13**

43. The ICAO Convention Annex 13 specifies the activities required following an occurrence to an aircraft of a contracting state in the territory of another contracting state.

#### **NATO STANAG 3101**

44. This NATO Standardization Agreement establishes procedures for the exchange of safety information peculiar to aircraft types and missiles in current use by NATO nations.

#### **NATO STANAG 3102**

45. This NATO Standardization Agreement establishes the requirement for coordination of accident prevention matters when a detachment of one nation operates within or over the sovereign territory of another nation for 8 days or more, or when aircraft of two or more nations participate in combined / joint air operations within the sovereign territory of any NATO nation and / or out-of-area air operations.

#### **NATO STANAG 3117**

46. This NATO Standardization Agreement establishes the aircraft marshalling signals and the distinctive garment to be worn by aircraft marshallers.

#### **NATO STANAG 3230**

47. This NATO Standardization Agreement establishes the parameters for emergency markings on the outside and the inside of aircraft.



**NATO STANAG 3318**

48. This NATO Standardization Agreement establishes procedures for the aeromedical investigation of occurrences involving military aircraft or missiles where the equipment, facilities or personnel of two or more NATO nations are involved.

**NATO STANAG 3379**

49. This NATO Standardization Agreement establishes the in-flight visual signals and the essential procedures for using them.

**NATO STANAG 3531**

50. This NATO Standardization Agreement establishes procedures for the reporting and safety investigation of occurrences involving military aircraft where the equipment, facilities or personnel of two or more NATO nations are involved.

**NATO STANAG 3533**

51. This NATO Standardization Agreement establishes basic safety procedures, regulations and responsibilities for flying and static displays that involve aircraft of two or more NATO nations.

**NATO STANAG 3564**

52. This NATO Standardization Agreement establishes the responsibilities for the planning and conduct of NATO live air weapons demonstrations.

**NATO STANAG 3750**

53. This NATO Standardization Agreement establishes procedures for the reporting and investigation of air traffic incidents.

**NATO STANAG 3879**

54. This NATO Standardization Agreement establishes the procedures and formats for the exchange of information on the intensity of bird migration and the reporting of bird strikes.

**NATO STANAG 7160**

55. This NATO Standardization Agreement is an aviation safety document (AFSP-1 Flight Safety) that sets out aviation safety principles, policies and procedures, in particular those aimed at accident prevention for use as required by NATO participating nations.

**NATIONAL AGREEMENT**

**DFS / TSB WORKING AGREEMENT**

57. FS investigations conducted by DFS follow a protocol similar to that of the TSB as prescribed by the *Aeronautics Act*. A working agreement exists between DFS and the TSB that provides direction for the coordinated investigation of transportation occurrences by DND and the TSB.

**SERVICE LEVEL AGREEMENTS**

58. Different agreements have been signed between DFS or other departmental organizations mandated to support DFS during the conduct of investigations. Such agreements are in place with the Quality Engineering Test Establishment (QETE), Defence Research and Development Canada – Toronto (DRDC Toronto) and the National Research Council of Canada.



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## **ANNEX A - AIR CADET FLYING PROGRAM**

### **FS PROGRAM RESPONSIBILITY**

1. The CF responsibility for the FS aspect of the Air Cadet Flying Program is derived from Section 43 of the *National Defence Act*. The CDS is tasked with operational command and control of the Air Cadet Flying Program, specifically all air cadet gliding and powered flight operations, including familiarization flying funded by DND / CF and the FS Program.

### **INVESTIGATION OF CADET OCCURENCES**

2. The investigation of air cadet occurrences will be carried out on behalf of the AIA as outlined in the AIM and conducted as follows:

- a. Air Cadet Glider Program. The Air Cadet Glider Program is a national program consisting of familiarization flights and glider pilot flying training. All air cadet gliding resources are owned by the provincial committees of the Air Cadet League of Canada and are Transport Canada registered, but operational control rests with the CF. All serious occurrences with aircraft involved in the Air Cadet Glider Program shall be investigated by DFS / AIA. Thus in accordance with section 18(1) of the *Canadian Transportation Accident Investigation and Safety Board Act*, the aircraft involved here are considered a “military conveyance”. The TSB must be notified by the quickest means possible following any significant occurrence, using the procedures prescribed in the *Canadian Air Regulations* (CARs) and the Working Agreement between DND and TSB; and
- b. Air Cadet Powered Flight Program. The Air Cadet Powered Flight Program is a national program consisting of familiarization training funded by the local Sponsoring Committee of the applicable air cadet squadron and a summer pilot ab-initio flight training funded by DND. The conduct of a cadet occurrence investigation is governed as follows:
  - (1) Familiarization Flights. The civilian registered aircraft used to conduct the winter familiarization flying program are not considered “military conveyance” aircraft given these flights are contracted by the Local Sponsoring Committee. Therefore, the FS investigations of any occurrence related to this part of the ACPP would be the responsibility of the TSB. DFS would be invited to participate in the investigation as per the Working Agreement between TSB and DND, and
  - (2) Ab-initio Flight Training. The civilian registered aircraft used to conduct ab-initio flight training as part of the Power Pilot Scholarship program are considered “military conveyance” aircraft. Therefore, any FS investigations are the responsibility of the CF as per the *CTAISB Act*. Notwithstanding, TSB would be invited to participate in the FS investigation as per the Working Agreement between TSB and DND..

## DESIGNATED SUPPORT WINGS

3. In view of the structure of the Air Force, certain FSOs from designated wings will act as FS advisors to the Region Comds. This working relationship will apply only when these personnel are performing FS duties associated with Air Cadet flying program activities. The Region Comds and associated FSOs are listed in Table 2 below.

REGION	REGION COMD	DESIGNATED FSO
Atlantic	Comd MARLANT	14 Wing Greenwood
Eastern	Comd LFQA	3 Wing Bagotville
Central	Comd LFCA	8 Wing Trenton
Prairie	Comd 1 Cdn Air Div	17 Wing Winnipeg
Pacific	Comd MARPAC	19 Wing Comox

**Table 2 – Regions and designated FSOs**

4. The FSO from the designated support wing will act as the FS advisor for each respective regional site. The FS support to Air Cadet Glider program gliding sites will be promulgated on an annual basis by 1 Cdn Air Div before the start of the annual Air Cadet Glider program.

## DUTIES AND RESPONSIBILITIES

### DFS RESPONSIBILITIES

5. The DFS responsibilities for the national cadet program are as follows:
- advise on the implementation and monitor the effectiveness of the regional FS Program in cooperation with D Cdts and the RCA Ops O;
  - coordinate independent airworthiness investigations for aircraft occurrences and investigate as required;
  - provide annual FS briefings to summer gliding schools;
  - monitor incidents and the follow-up PM; and
  - monitor FS surveys from all gliding sites.

### 1 Cdn Air Div Responsibilities

6. 1 Cdn Air Div responsibilities for the national Air Cadet Glider program program are listed below:

- annually assign the FSO positions to meet designated regional gliding school and gliding familiarization site requirements; and
- provide advice and assistance to Comd 1 Cdn Air Div on Air Cadet Glider program FS matters.

### Support Wing Responsibilities

7. The responsibilities of the WFSO and responsibilities for the national Air Cadet Glider program are to:

- provide FS assistance to Air Cadet Glider program activities at a designated site;

- b. advise the school / site comds on FS matters in cooperation with the Air Cadet Glider program FSO;
- c. monitor the safety aspects of flying operations in cooperation with the Air Cadet Glider program FSO;
- d. provide assistance in the preparation and timely submission of initial and supplementary occurrence reports, and recommend PM resulting from occurrences;
- e. conduct biennial FS surveys of all designated gliding sites in conjunction with RCA Ops O;
- f. provide assistance to DFS and RCA Ops O in the event of an accident;
- g. assist the Region Comd in preparing comments for FS investigation reports; and
- h. review Air Cadet Glider program occurrence reports for quality assurance.

#### **FSO RESPONSIBILITIES**

8. RCA Ops O shall designate a unit FS Officer (FSO) for all regional gliding schools (RGS) and gliding familiarization sites. The FSO must be familiar with the unit's operations in order to provide sound advice on accident prevention and hazardous conditions. The FSO's responsibilities are as follows:

- a. advise the school/site comd on all aspects of FS;
- b. report all incidents and accidents in accordance with A-GA-135-001/AA-001;
- c. aid school/site comds in the implementation of the unit FS Program; and
- d. monitor all aspects of the operation and advise school/site comds of hazardous conditions.

#### **DETECTION OF UNSAFE PROCEDURES**

9. If, during the course of their duties, FS personnel detect any unsafe procedures / practices, they shall immediately notify the site comd, who will immediately rectify the situation and advise the RCA Ops O of the corrective action proposed / implemented.

#### **OCCURRENCE ACTION**

10. In the event of an FS occurrence:

- a. the FSO will file or submit to the designated WFSO the initial occurrence report;
- b. the FSO is responsible through the site comd for investigating the incident and filing a supplementary report (SR) within 30 days;
- c. the support FSO will monitor the reporting process;
- d. the WFSO will assist the FSO with any investigations into air occurrences within their region of responsibility; and
- e. the FSO will advise the Region Comd on serious occurrences as required.

**ACCIDENT ACTION**

11. In the event of an accident:
- a. the FSO / site comd shall complete the necessary immediate actions required and initiate reporting in accordance with a detailed Site Specific Emergency Response Checklist approved by the RCA Ops O.

**NOTE**

This requirement will differ from site to site depending upon whether the field is DND or TC and controlled or uncontrolled.

- b. the UFSO / site comd shall ensure that the RCA Ops O and the designated WFSO are contacted immediately. The WFSO shall immediately advise DFS (1-888-WARN DFS) that NDCC, AOC and D Cdts 4-6 have been notified. Personnel requirements for an investigation will be coordinated by DFS and NDHQ / D Cdts 4-6, the National Cadet Air Operations Officer; and
- c. DFS will conduct the investigation.

**REVIEW PROCESS**

12. On completion of an FS investigation, copies of the Draft for Comment of the Final Report will be sent to persons of direct interest (PDI), CO RCSU (or equivalent), Region Comd and NDHQ VCDS. The action letter for PM implementation will be signed by the CAS as the AA.

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## **ANNEX B – CONTRACTOR FS PROGRAM**

### **GENERAL**

1. Contractors form an important part of the DND aircraft maintenance philosophy and by extension, the preservation of DND assets during this unique activity. It is essential that each contractor develop a comprehensive FS Program that takes into account the depth of maintenance and extends to flight line test and ferry flight activities. In those locations where the civilian contractor falls under the FSO for FS matters, the contractor shall follow the wing FS Program.

### **APPOINTMENT OF FSO SPECIALIST**

2. The contractor shall appoint a Flight Safety Officer Specialist (FSS) at all contractor facilities where DND owned or controlled aircraft are maintained. The FSS and other FS personnel shall attend the CF BFSC. Course loading is done through the 1 Cdn Air Div / 1 Div FSO.

### **FSOS DUTIES AND RESPONSIBILITIES**

3. The FSS must have direct access to the CEO or equivalent or a delegated company representative with sufficient authority to implement corrective action if required. The FSS must be experienced in the relevant aircraft systems and operations and have a good knowledge of all specialties under the contractor's control. DFS and the 1 Div FSO shall be advised of FSS appointments and qualifications.

4. The post-occurrence obligations of a contractor FSS are fairly similar to those of a DND FSO; however, it is recognized that the Airport Authority or other authorities may have areas of responsibility that supersede or overlap those obligations. It is also realized that much of A-GA-135- 001/AA-001 is specific to DND organizations and therefore requires some interpretation for civilian application. Accordingly, the contractor FSS shall ensure that the intent of the requirements of this publication are addressed either by the company or by other authorities, and shall document those areas that are under direct contractor control and those areas that are the responsibility of another authority.

5. The contractor FSS shall ensure that all FS occurrences involving DND aircraft are reported and investigated notwithstanding the fact that NDQAR Offices are identified as the unit of ownership. In that regard, the FSS hold similar status and have the same reporting obligations as a UFSO. The contractor's role with respect to a flight safety investigation (FSI), for other than a flight safety occurrence report (FSOR), will be determined on a case-by-case basis by DFS. If applicable, questions can be directed to their assigned Wing FSO or DFS. Any investigation activity conducted is done on behalf of the AIA and the provisions outlined in the AIM apply.

6. Contractors that are co-located with units/wings are encouraged to work closely with the local FSO. Offices should be established to promote synergies between the military and civilian programs. Project offices and PWGSC contracting personnel should promote the possibility of joint DND / contractor FS offices during the contracting process.

**NOTE**

Transfer of aircraft airworthiness investigation ownership to organizations outside of the CF is impractical, for financial and legal reasons. While the NDQAR is identified as the unit of ownership in instances identified in Sub-Para a, b and c above, the responsibility to report and investigate occurrence rests with the contractor FSS as detailed above.

## **CHAPTER 3 – EDUCATION AND TRAINING**

### **GENERAL**

1. FS education is one of the fundamental elements of the FS Program. All personnel who are involved in flying operations or the support of flying operations must not only be aware of the FS Program, they must have a solid understanding of the program's objectives, principles and basic processes. This therefore requires a robust formal and informal education program.
2. The teaching of specific skills and knowledge is essential in achieving the aim of preserving aviation assets necessary to conduct the missions of the CF. Thus FS education is the responsibility of all personnel.

### **INFORMAL EDUCATION AND TRAINING**

3. FS education/training is achieved through both formal and informal means. Informally, FS publications, magazines, bulletins, videos, posters, web-based materials, FS briefings, aviation conferences and seminars, including those from other militaries and civilian organizations such as Transport Canada, are all resources that may be used in FS education. This list is not exhaustive, so Air Force personnel are encouraged to actively seek materials and information from numerous sources in order to broaden their FS knowledge. Links to the FS websites and FS Programs and materials can be found on the DFS websites.
4. One of the most effective but often overlooked methods of FS education is the passing of lessons learned from leaders and experienced personnel to those with less experience. The FSO should encourage and afford opportunities to facilitate the exchange of information between unit personnel.

### **FS QUALIFICATION**

5. Personnel selected for FS positions require formal training in order to execute the duties and responsibilities of FS professionals.
6. Formal training is required for FS personnel to obtain an FS accreditation. There are two formal CF flight safety courses designed to fulfill this training requirement. These courses lead to a recognized qualification and are conducted by 1 Cdn Air Div FS staff. The relevant course codes are:
  - a. Basic Flight Safety Course: AEVM (formerly AGNL); and
  - b. Advanced FS Course: AEWD (formerly AGQG);

### **INVESTIGATOR QUALIFICATION**

7. Under the requirements of the CF Airworthiness Program, all occurrence investigators must be accredited in order to conduct FS investigations. The Airworthiness Investigation Manual (AIM) describes a formal system establishing three levels of basic investigators (BI 1, BI 2 and BI 3) and three levels of investigators in charge (IIC 1, IIC 2 and IIC 3). The qualification level (1, 2 or 3) determines the highest Class of investigation in which an IIC or BI can participate as described in Chapter 9. The AIM specifies the standards and qualifications for these FS investigators.



## **AIR WEAPONS SAFETY AWARENESS TRAINING**

8.      Aircrew personnel working directly with air weapons shall receive air weapons systems familiarization training and instruction on the operational and safety requirements for weapons-loaded aircraft in accordance with B-GA-297-001/TS-000.
9.      Air weapons awareness training is applicable to personnel who are regularly exposed to the hazards of air weapons such as maintenance officers, aircraft technicians, aircrew, fuel bowser drivers or those personnel who may have to respond to an air weapons occurrence, such as firefighters or security personnel. This training is required to ensure that those working with or around air weapons possess the knowledge required to perform their duties safely and effectively. This training shall be conducted in accordance with BGA-297-001/TS-000 (Safety Orders for CF Air Weapons Systems).
10.     The training will be included in wing or unit familiarization briefings and should encompass, but not be limited to the following:
  - a.      recognition of the air weapons used at the unit and the dangers associated with them, including the precautions to be taken in the vicinity of the weapons;
  - b.      recognition of air weapons warning signs, placards, flags and banners that indicate danger areas and hazards;
  - c.      danger areas into which personnel shall not enter unless authorized;
  - d.      armament operations which could impinge on the daily routine of the unit i.e. conveying air weapons along regular traffic routes or closing some part of the unit when a particular air weapons operation is in progress; and
  - e.      persons to contact if air weapons safety information is required.

## **SPECIALIZED INVESTIGATOR TRAINING**

11.     DFS and 1 Div FSO investigators undergo additional advanced investigator training. FSOs are encouraged to get additional investigative and FS training as their responsibilities, budgets and COs permit. A list of additional courses is available on the DFS website.

## **OTHER SAFETY COURSES**

12.     A variety of other safety courses have links to, or application within, the FS education and training program. Courses such as Human Performance in Military Aviation (HPMA) contribute directly to the aims of the FS Program. Courses for other established safety programs also offer opportunities for education/training in FS. These courses include General Safety, Laser Safety, Nuclear Radiation Safety, Electro Magnetic Radiation Safety, Ramp Safety, and On Scene Comd Emergency Response.

## **FS PROFESSIONAL DEVELOPMENT**

13.     It is anticipated that comds and managers will provide all FS staff with timely opportunities to enhance their professional knowledge and to interact with local and regional FS organizations like TSB, TC, airport authorities and regional aircraft operators. Participation in relevant FS and aviation conferences / seminars on an annual basis is encouraged. A list of recommended conferences and seminars is available on the DFS website.



## **CHAPTER 4 – PREVENTION ACTIVITIES**

References: A. 1016-18 (DFS) 7 May 2007 - CVR/FDR Policy

B. 1 Cdn Air Div Orders, Vol 3, 3-304: Flight data recorder/Cockpit Voice Recorder/Crash Position Indicator/Other Cockpit Flight Recording Devices

C. EUROCAE document ED-112 Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems

### **GENERAL**

1. Two of the major FS prevention activities are the Bird Strike Prevention Program and the FS survey. Effective Bird Strike Prevention Programs and FS surveys are key to maintaining a combat-capable and operationally effective force.

### **BIRD STRIKE PREVENTION PROGRAM**

#### **AIM OF PROGRAM**

2. The aim of any Bird Strike Prevention Program is to minimize bird hazards to aircraft operating from DND airfields.

#### **OBJECTIVES**

3. The Bird Strike Prevention Program must have at least four objectives:

- a. management of the environment;
- b. dispersal of birds;
- c. education of aircrew; and
- d. reporting bird strikes and near misses.

4. Birds constitute a significant hazard to aircraft. The vast majority of bird strikes occur within five miles of an aerodrome. A comprehensive Bird Strike Prevention Program shall be implemented to reduce their impact.

5. The key element of a good Board of inquiry is the establishment of an effective unit bird and animal control committee. Although bird and animal control is an ATC responsibility, FSOs must play an active role.

6. The Bird Strike Prevention Program strives to manage the environment around the airport. The objective of the plan is to make the airfield unattractive to birds. Studying the birds that inhabit the environment of the airport will suggest measures that can be taken to make the airport unattractive to them. Some measures are obvious such as draining wet areas and cutting down trees. Others, such as changing ground cover or using chemicals, are more complex. Each airport has its own study and improvement plan, which must conform to environmental constraints.

7. Successful measures to modify an airport habitat require the advice of an ornithologist. Almost

every DND airport has been surveyed. Reports are available through the FSO or DFS. If a new survey is required, the wing can request NDHQ / DGRPP (Director General Realty, Policy and Plans) to arrange a bird hazard survey in conjunction with the Canadian Wildlife Service (CWS).

#### **BIRD STRIKE REPORTING**

8. A link to detailed information on airfield environment management procedures can be found on the DFS websites. Further guidance is available in CFACM 2-813, *Air Traffic Control Manual of Operations – Aerodrome Bird and Animal Control*, and in *Sharing the Skies – An Aviation Industry Guide to the Management of Wildlife Hazards* (TP13549).

#### **PREVENTION STRATEGY**

##### **INFORMATION ON BIRDS**

9. Transport Canada has opened a bird hazard website to provide access to bird strike data and TC documents on wildlife control. The DFS website provides a link to this TC website.

##### **REPORTING BIRD ACTIVITY**

10. Pilots shall advise air traffic control and other aircraft of any significant bird activity.

11. Aircrew shall report to their FSO each time they experience a bird strike or near miss. Form CF 215 – FS Occurrence Information Sheet shall be used to assist in providing the required information. The FSO will ensure that the information collected, including category of damage, is entered in the FSOMS database. This will supply the information on bird habits necessary for preventing bird strikes.

#### **IDENTIFICATION OF BIRD TYPE**

12. Accurate identification of bird remains provides invaluable information for an effective Bird Strike Prevention Program. Local expertise (bird watcher groups, ornithologists, wildlife specialists) should be used whenever possible to identify bird remains. Annex A contains a list of regional offices of the CWS.

#### **FS SURVEYS**

##### **PURPOSE**

13. An FS survey measures the effectiveness of an FS program and assists in the identification of recommended PM. Comds have found that FS surveys identify deficiencies that would otherwise have gone undetected until revealed as the causes of occurrences.

##### **REQUIREMENT**

14. Surveys are an FS necessity at every level of operational command as well as at contractor facilities that support the maintenance and operation of CF aircraft.

##### **FREQUENCY**

15. FS surveys must be conducted on a regular basis if they are to be effective. The type of survey normally dictates how often they should be conducted.

## **TYPES**

16. There are four types of FS surveys:

- a. a formal survey;
- b. an informal survey;
- c. an air weapons survey; and
- d. a contractor survey.

### **FORMAL SURVEY**

17. A formal survey is usually conducted by specialists from a formation other than that which is being surveyed (e.g. 1 Cdn Air Div survey of a wing, base or unit). The comd of the formation to be surveyed is usually notified in advance and is always briefed on the results. The survey team must be cooperative, understanding and helpful. Comds can also request surveys whenever they want to have an outside view of their unit. Formal surveys of ATESS and AETE shall be conducted on behalf of the CAS by the 1 Cdn Air Div FSO, and the Divisional Staff will be responsible for follow-up action.

### **INFORMAL SURVEY**

18. An FSO informal survey is normally carried out as a minimum once a year by the FSO as part of the FS Program. Inviting an FSO from outside the unit to conduct the survey provides a fresh view and an invaluable exchange of ideas.

19. The FSO shall survey the units in their organization at least once every year; this includes contractor operated units / sections. Unit FS teams should survey their unit on a regular basis as part of their yearly program. Both the UFSO and FS NCM should visit each section regularly throughout the year. Further, whenever someone joins an FS team, be it at the wing or unit level, they should visit all sections within their purview within one month of assuming their duty.

### **AIR WEAPONS SURVEY**

20. An internal air weapons safety survey shall be conducted in any unit involved in air weapons operations. The survey should be a coordinated effort involving both FS and AWS personnel. A combined FS/AWS Formal Survey should be conducted by 1 Cdn Air Div every 24 months.

### **CONTRACTOR SURVEY**

21. DFS will conduct a contractor survey of all contractor facilities where DND owned or controlled aircraft are maintained. Annex C contains a sample contractor FS survey checklist. These surveys will be conducted every 18–24 months.

## **CONDUCT**

22. Survey members may receive conflicting information. The survey team must attempt to balance these inputs and must rationalize these inputs with the “big picture”. There are three basic tenets to conducting an effective FS survey: listen effectively, observe objectively and share all observations in an open and honest manner. The biggest challenge to overcome is the fact that a survey is a snapshot in time and it is difficult to receive feedback and insights from everyone.

#### TEAM COMPOSITION

23. A survey team comes in many shapes and sizes, all based upon the scope of the survey. An informal unit survey by a WFSO may be comprised of a sister squadron FSOS, the host UFSO / FS NCM and the D/WFSO, whereas a formal survey by 1 Cdn Air Div FSO will have up to 12 members. A unit team that surveys its own operation would likely consist of the UFSO and FS NCM. Another perspective is to do a combined survey, perhaps with the general safety organization, and make up a joint team.

#### QUESTIONNAIRES

24. Questionnaires can be used effectively during surveys. One of the difficulties of taking a snapshot of a unit is the number of people one can meet. A simple questionnaire that can be distributed beforehand and collected during the survey provides the survey team a much broader reach. The questionnaire should be short, easy to complete, anonymous, and use questions that are objective in nature. It is important to collate the results quickly and ensure effective feedback is provided to both the chain of command and those who were surveyed.

#### FORMAL SURVEY REPORT

25. The formal survey report process will consist of three distinct phases:
- the first phase is that the survey team lead will provide a verbal debrief, at the end of the survey, to the host WComd / Sqn CO. The debrief should include all significant findings and observations as well as any analysis from items such as survey questionnaires;
  - the second phase is a written report to the WComd and other applicable comds. The report must identify recommendations and where possible, suggested action levels, e.g. CAS, 1 Cdn Air Div, and wing. The written report should be staffed and distributed within one month of the survey completion date; and
  - the third and final phase of the survey process is for the host wing / unit to provide written feedback on the status of final report recommendations. 1 Cdn Air Div FSO will track status / closure of formal FS report recommendations.
26. Surveys consist of two phases: the actual 3-part survey and the resulting implementation of recommendations. Annex B contains a sample FS survey checklist. Annex D contains a sample FS survey checklist for the Air Cadet Gliding Program.

#### ACTION ON CHANGE OF COMMAND

27. When there is a change of command, a survey of the unit shall be conducted as soon as practical to provide the CO with an updated FS health check of the unit.

#### FEEDBACK AND FOLLOW-UP

28. The survey process is conducted primarily to provide the chain of command with credible advice on how to better accomplish the mission. There are a variety of formats available to provide such advice, be it the informal verbal debrief or a more formal written report. Regardless of which method is utilized, it is essential to have a clear aim and a set structure that leads to a logical conclusion and recommendations. To ensure closure, it is important that realistic target dates be established for each recommendation; moreover, recommendations must be affordable, achievable and based on common sense. Recommendations without an assigned target date for closure can cause the survey to

become merely an event instead of a process, thereby greatly limiting any potential improvements or enhancements that could result from the operation. There are tremendous advantages to capturing the observations and recommendations in a written format. A written report, be it in point form or in full paragraph form, provides a clear delineation of the observations and recommendations.

### **CONDUCT OF FORMAL SURVEY**

29. 1 Div FSO will conduct a formal survey of each wing once every 18–24 months. The FS survey checklist at Annex B will be used as a guideline for areas to be surveyed. A formal report will be released by the 1 Div FSO to the host WComd / Sqn CO within one month of the survey completion date; subsequently the Comd 1 Cdn Air Div and A-staff will be de-briefed on the survey findings and recommendations. The 1 Div FSO is responsible for tracking the status of all recommendations in the written report .

### **TEAM MEMBERS**

30. The survey team for a formal survey will usually be composed of some 10 to 12 members as follows:

- a. Lead – The formal survey team will normally be led by the appropriate 1 Div FSO desk officer at 1 Cdn Air Div;
- b. appropriate desk officer from DFS;
- c. additional 1 Cdn Air Div FS team members as required;
- d. FSO from sister wing (e.g. survey of 4 Wg will have 3 Wg FSO on team);
- e. ATC rep;
- f. maintenance reps (including augmentation from A4 Maint and DFS); and
- g. other members as required.

### **TIMELINES**

31. The following are the recommended timelines for a formal survey:

- a. initial staff check for timings with wing 4–6 months before survey;
- b. request for team member participation 2–4 months before;
- c. survey directive with questionnaire released by 1 Div FSO to WComd 1 month before;
- d. initial FS team brief by team lead 1–2 weeks before survey;
- e. final written report to Wcomd 1 month after survey completion; and
- f. response from applicable OPIs, based on survey recommendations, to 1 Cdn Air Div.

### **COCKPIT VOICE RECORDER (CVR) AND FLIGHT DATA RECORDER (FDR) PARAMETER REQUIREMENTS**

32. The CVR/FDR policy (ref A) established the airworthiness requirements for CF operated aircraft to be equipped with on-board recording devices that are to be used for accident prevention and accident investigation. The policy originally signed off by the Chief of Air Staff (CAS) is set to transition to a DAOD to be published.

33. Ref C represents the minimum standards required for CVR and FDR. It does not address military role specific parameters to be recorded. It is considered the basis for new aircraft procurement; however, in-service fleets are expected to become fully compliant with the CVR/FDR equipment requirements. Given this objective will be achieved over the long-term, it is expected that fleet managers will seek alternate means of compliance and obtain from the AA the appropriate waivers.

34. Annex E to this chapter details a list of additional CVR/FDR parameters for given aircraft families.

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## **ANNEX E - CVR / FDR PARAMETER REQUIREMENTS BY FAMILIES**

Reference: EUROCAE document ED-112 Minimum Operational Performance Specification for Crash Protected Airborne Recorder Systems

1. Reference does not address military role specific parameters to be recorded. As a result, an additional set of parameters has been developed for each family of aircraft. The various aircraft roles and types of recording equipment were taken into account in determining the requirement for airborne recorder systems on board CF aircraft. Accordingly, the aircraft required to support the CF operations were divided into several families, some with slightly different recording requirements. Discriminators used in the assignment of aircraft to various families are:

- a. Aircraft type (fixed wing, rotary wing, or UAV);
- b. Aircraft role (trainer, transport, combat, SAR);
- c. Number of engines (single or multi-engine);
- d. Aircraft maximum take-off weight (more or less than 12,500lbs / 5682 Kg);
- e. Maximum aircraft speed (greater or less than 450 knots IAS);
- f. Number of crew; and
- g. Special considerations such as whether the aircraft is ejection seat capable or weapons capable.

2. Based on these discriminators, five generic fixed-wing families and four rotary wing families were identified as follows:

- a. Fixed Wing Aircraft:
  - (a) Trainer: No additional parameters required.
  - (b) Light Transport: No additional parameters required
  - (c) Heavy Transport: Refer to Appendix 1.
  - (d) Heavy Combat: Refer to Appendix 2.
  - (e) Fast Combat: refer to Appendix 3
- b. Rotary Wing Aircraft
  - (a) Single Engine Trainer: Refer to Appendix 4.
  - (b) Multi Engine Trainer: Refer to Appendix 5.
  - (c) Transport / SAR: Refer to Appendix 6.
  - (d) Combat: Refer to Appendix 7.





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## **APPENDIX 1 – FIXED WING HEAVY**

### **TRANSPORT AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING		APPLICATION			REMARKS
2 hours minimum.		All crew positions + area mike			All radios unless in secure mode.
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
AIRCRAFT GENERAL					
Altitude warning selections	Discrete, as installed				Radio altimeter warning bug altitude
Emergency shut-off valves activation	Discrete, as installed	1			Activation (manual or auto) of all emergency shut-off valves (engine fuel, hydraulics, pneumatics, etc) + status of valve positions (open, closed, failed)
Fire bottle activation	Discrete, as installed	1			Activation (manual or auto) of all fire-fighting agents + status of activated devices (fail, depleted, etc)
TACAN navigation	As installed	1	As installed	As installed	Frequency selected, status of equipment, bearing + dist readout
Cabin pressure altitude	As installed	1	As installed	As installed	Pressurization readout
Emergency brakes selection	Discrete, as installed	1			Selection of emergency brakes



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## **APPENDIX 2 – FIXED WING HEAVY**

### **COMBAT AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING			APPLICATION		REMARKS
30 minutes minimum (2 hours recording preferred)			All crew positions + area mike		All radios unless in secure mode.
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
AIRCRAFT GENERAL					
Stores status	As installed	1			Stores status data (type, location), taken from the mission computer.
Weapons status	Discrete, as installed	1			A discrete signal must be recorded every time a weapon departs the aircraft
Master	Discrete, as installed	1			Activation (manual or auto) of all fire-fighting agents + status of activated devices (fail, depleted, etc)
Arm mode	Discrete, as installed	1			A discrete signal must be recorded every time the master arm function changes status.
Altitude warning selections	Discrete, as installed	1			Radio altimeter warning bug altitude
Data link systems	Discrete, as installed	5			Codes used if applicable, status of equipment. Encryption required



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### **APPENDIX 3 – FIXED WING FAST COMBAT AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING			APPLICATION		REMARKS
30 minutes minimum (2 hours recording preferred)			All crew positions + area mike		All radios unless in secure mode.
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
STORES MANAGEMENT SYSTEMS					
External stores status	Discrete, as installed	1			A discrete signal must be recorded every time an external store departs the aircraft.
Pressing of triggers/launch buttons	Discrete, as installed	1			A discrete signal must be recorded every time a weapon trigger or launch button/switch is activated.
Master arm mode	Discrete, as installed	1			A discrete signal must be recorded every time a master arm or weapons select override function changes status.
AIRCRAFT GENERAL					
Maintenance + system status codes	Discrete, as installed	1			Each systems status or maintenance code triggered shall be recorded (ex: MMP codes)
Display cautions, warnings and advisory messages	Discrete, as installed	1			Each message sent to the cockpit displays, as well as illumination of associated lights.
Altitude warning selections	Discrete, as installed	1			Selected value, as well as silent/mute/override selection
Arresting gear selection + status	Discrete, as installed	1			Selection of arresting gear deployment/retraction/activation, as well as status

Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
<b>AIRCRAFT GENERAL (CONT.)</b>					
Ejection seat dual cockpit mode	Discrete, as installed	10			Mode selection for dual cockpit ejection system (ex: Norm, Solo, Aft Initiate)
Flight control computers messages	Discrete, as installed	1			Status changes, errors, failures and degradations in normal modes of operation
Data link systems	Discrete, as installed	5			Status of equipment.
Auto throttle (ATC)	Discrete, as installed	1			Engage/disengage + status (fail, degd, etc)
Engine exhaust nozzle position	As installed	0.5	As installed	As installed	Nozzle aperture + thrust vectoring position if applicable
Fuel quantities	As installed	10	As installed	As installed	Recording of all fuel tank quantities, as well as indicated total fuel as displayed in cockpit
Emergency shut-off valves activation	Discrete, as installed	1			Activation (manual or auto) of all emergency shut-off valves (engine fuel, hydraulics, pneumatics, etc) + status of valve positions (open, closed, failed)
Fire bottle activation	Discrete, as installed	1			Activation (manual or auto) of all fire-fighting agents + status of activated devices (fail, depleted, etc)
TACAN navigation	As installed	1	As installed	As installed	Frequency selected, status of equipment, bearing + dist readout
Crew oxygen system	As installed	10	As installed	As installed	Pressure/quantity in system, system status
Cockpit pressure altitude	As installed	1	As installed	As installed	Pressurization readout
Emergency brakes selection	Discrete, as installed	1			Selection of emergency brakes
G suit pressure, status	As installed	0.5	As installed	As installed	Recording of pressure supplied to G suit and status of equipment.

Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
<b>AIRCRAFT GENERAL (CONT.)</b>					
Radar Warning Receiver status	Discrete, as installed	1			Changes in mode of operation and status of RWR.
Radar mode of operation	As in-stalled	1			Recording of master mode used, and changes of status (Air mode, Ground mode, Nav mode, etc).
Radar status messages	Discrete, as installed	1			Serviceability status + messages (fail, degd, receive only, etc). Also which mode of operation is used.





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**APPENDIX 4 – ROTARY WING SINGLE ENGINE  
TRAINER AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING			APPLICATION		REMARKS
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
Aircraft General					
Ground Speed	0 to 300	1	As installed	+/- 1 knot	As installed (equipment capable of producing a groundspeed readout)



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**APPENDIX 5 – ROTARY WING MULTI ENGINE  
TRAINER AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING			APPLICATION		REMARKS
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
STORES MANAGEMENT SYSTEMS					
Ground Speed	0 to 300	1	As installed	+/- 1 knot	As installed (equipment capable of producing a groundspeed readout)



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**APPENDIX 6 – ROTARY WING TRANSPORT AND  
SAR TRAINER AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING			APPLICATION		REMARKS
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
STORES MANAGEMENT SYSTEMS					
Ground Speed	0 to 300	1	As installed	+/- 1 knot	As installed (equipment capable of producing a groundspeed readout)



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## **APPENDIX 7 – ROTARY WING COMBAT AIRCRAFT CVR / FDR SPECIFICATIONS**

CVR REQUIREMENTS					
DURATION AUDIO RECORDING		APPLICATION		REMARKS	
30 minutes minimum (2 hours recording preferred)		All crew positions + area mike		All radios unless in secure mode.	
FDR PARAMETERS					
Parameter	Minimum Recording Range	Maximum recording interval in seconds	Recording Accuracy	Recording Resolution	Remarks
STORES MANAGEMENT SYSTEMS					
All loaded external racks/pylons/launchers/rails	Discrete, as installed	1			A discrete signal must be recorded every time a rack/pylon/launcher or rail departs the aircraft or changes in status (ex: failed, degraded)).
Master arm mode	Discrete, as installed	1			A discrete signal must be recorded every time a master arm or weapons select override function changes status.
AIRCRAFT GENERAL					
Aircraft Ground Speed	As Installed.	1	± 3%	1 kt	
Maintenance + system status codes	Discrete, as installed	1			Each systems status or maintenance code triggered shall be recorded (ex: MMP codes)
Emergency shut-off valves activation	Discrete, as installed	1			Activation (manual or auto) of all emergency shut-off valves (engine fuel, hydraulics, pneumatics, etc) + status of valve positions (open, closed, failed)

TACAN navigation	As installed	1	As installed	As installed	Frequency selected, status of equipment, bearing + dist readout
<b>ELECTRONIC WARFARE</b>					
Radar Warning Receiver status	Discrete, as installed	1			Changes in mode of operation and status of RWR.
Radar mode of operation	As installed	1			Recording of master mode used, and changes of status (Air mode, Ground mode, Nav mode, etc).
Radar status messages	Discrete, as installed	1			Serviceability status + messages (fail, degraded, receive only, etc). Also which mode of operation is used.



## **CHAPTER 5 – PROMOTION**

### **GENERAL**

1. The objective of the FS Promotion Program is to facilitate the maintenance of a strong and committed FS culture within all organizations that conduct or support DND / CF flying operations. An active and visible FS Promotion Program designed to engender full participation in the FS Program at the tactical, operational and strategic levels is an excellent way to achieve the objectives of the FS Program with a relatively small investment.
2. The CF FS Program uses a series of briefings, FS documents and awards as the main mechanisms for the Promotion Program.

### **PROMOTIONAL BRIEFINGS**

#### **DFS ANNUAL BRIEFING**

3. The DFS annual briefing is one of the main FS promotion activities. The objective of this briefing is to remind all personnel of the requirement for and the importance of the FS Program. In addition, this activity is used to update personnel on new FS concepts as well as to identify key lessons learned through the analysis of occurrences over the previous 12 to 18 months. The intent of the annual DFS presentation is to brief as many civilian and military personnel as possible at the tactical, operational and strategic level. Although the briefing will be focused on CF / DND formations, wings and units, the briefing will also be presented where possible to OUTCAN formations such as NATO AWACS and NORAD detachments.

#### **FSO BRIEFINGS**

4. FSOs are encouraged to provide / conduct briefings on subjects pertinent to their units.

#### **BRIEFING CONTENT**

5. Briefings must be relevant to the audience, informative, current and interesting.
6. Visual aids should be used to the extent possible. A presentation that contains photos, charts, graphs and statistics relevant to the verbal message can greatly assist in maintaining audience attention and communicating the message.

### **PROMOTIONAL MATERIAL**

#### **CF FS PUBLICATIONS**

##### **FLIGHT COMMENT MAGAZINE**

7. *Flight Comment* is the FS magazine of the Canadian Forces and is produced three times a year. The objective of *Flight Comment* is to provide relevant, interesting and timely FS information to all personnel involved in air operations. The intent of the magazine is also to provide a forum for anyone to present written articles on any issue related to FS. Accordingly, any individual can submit an article or poster concept for publication in *Flight Comment*. DFS reserves the right to edit these articles for length and content.

#### ON TARGET MAGAZINE

8.     *On Target* is a focus magazine similar to Flight Comment and is produced once per year or as required by the Directorate of Flight Safety. The objective of *On Target* is to educate Air Force operators on a single subject of interest in a user friendly yet thorough fashion. All back issues of *On Target* are archived on the DFS website.

#### DEBRIEFING PAMPHLET

9.     The objective of the “Debriefing” pamphlet is to highlight significant FS concerns in a timely manner. “Debriefing” is a short, one-to-two page electronic pamphlet that is produced by DFS or 1 Div FSO in a bilingual, electronic format on a monthly basis. The content generally covers current trends, threats and occurrence information. All back issues of “Debriefing” are archived on the DFS website.

#### FLASH PAMPHLET

10.    The objective of an FS FLASH is to highlight critical FS information to both the chain of command and the rest of the FS team as quickly as possible. An FS FLASH is released on the authority of DFS and is produced on an as-required basis. Typically, an FS FLASH will be produced as a result of issues identified during the investigation of a serious occurrence.

#### OTHER FS PERIODICALS

11.    FS information is available from a myriad of FS magazines produced by national and foreign government departments as well as companies and safety organizations. These periodicals contain a wealth of relevant and interesting FS information that can be used to raise the level of FS consciousness. All members of the FS team are encouraged to regularly review these publications for items of interest. An updated list of appropriate periodicals can be found on the DFS website.

#### OTHER MEDIA

##### VIDEOS

12.    FS videos can be obtained from a variety of sources. DFS maintains a library of FS videos that can be acquired through the DFS website.

##### POSTERS

13.    DFS also maintains a library of FS posters that can be obtained through the DFS website. Individuals and units are encouraged to create their own FS posters pertinent to their specific operations and share them with other FS organizations through DFS.

##### WEBSITES

14.    DFS maintains comprehensive Intranet and Internet websites that provide information on a variety of FS topics. Most Air Force units post their FS Program, current issues and links to a myriad of other sites and resources. Links to the recommended FS sites can be found on the DFS website.

15.    Publishing SRs on the Defence Wide Area Network (DWAN) is allowed. It promises to significantly improve flight safety processes and the FS reporting culture. Still, care must be taken to ensure that it does not inadvertently compromise the reporting culture. Only completed reports may be posted on the Intranet after a diligent review of the SRs by senior FS staff. Completed SRs may be released to the DWAN as long as:

- a. personnel cannot be identified;
- b. no cockpit voice recorder (CVR) information, medical information or witness statements are included;
- c. reports are reviewed carefully to ensure that blame is not assigned to anyone; and
- d. a disclaimer is included in each report stating: “Flight Safety incident reports are produced under the authority of the Minister of National Defence (MND) pursuant to section 4.2(n) of the Aeronautics Act (AA) and in accordance with A-GA-135-001/AA-001 – Flight Safety for the Canadian Forces. They are prepared solely for the purpose of accident prevention and shall not be used for legal, administrative or disciplinary action.”

#### **FS NOTICE BOARDS**

16. Dedicated FS notice boards are an effective and efficient method of transmitting FS information. The purpose of FS notice boards is to remind personnel of the goals and impact of the FS program. To do this, FS notice boards should be erected in high-traffic areas and should be restricted to FS matters such as the “Debriefing” newsletter, the Flash bulletins, awards and AWS incidents. Notice boards should be prominent enough to be easily seen from a distance and bordered by red and white alternating stripes (minimum of 5 cm / 2 inches) to be effective. A pictorial sample of a suitable FS board can be seen on the DFS website.

#### **AWARDS**

##### **OBJECTIVE**

17. The objective of the FS Awards Program is to recognize the efforts of individuals, teams and organizations that have made a significant contribution to the objectives of the FS Program.

18. In order to qualify for an FS award, the action(s) of the nominee(s) must be outstanding for a “Good Show” and superior for a “For Pro”. Submissions must clearly describe the efforts of the individual or individuals nominated. The submission must describe the explicit actions and related facts demonstrating why the action(s) was / were exceptional and above and beyond the scope of normal duty for the individual.

19. Often a well-written FS nomination does not meet the excellence criteria for winning an FS award. But while the actions are commendable, they may be within the scope of the normal duties of the individual. As an example, a submission for a “For Pro” stated that a qualified technician working as part of a fuel tank load crew discovered hydraulic fluid on the bottom of the aircraft. The technician informed the Servicing Supervisor. Further investigation by the maintenance crew revealed a very serious problem with a hydraulic feed line for the landing gear. This nomination would likely be rejected because the technician performed his duties as expected.

##### **TIMELINESS OF AWARDS**

20. As with all promotional activities, the more timely it is, the more effective it is in raising FS awareness as well as the profile of the FS Program. Ideally, the period from the date of occurrence to the date of notification of approval or rejection should not exceed two months.

##### **TYPES OF AWARDS**

21. Awards are an excellent way of recognizing performance that is truly exceptional. In FS, individual or group performance that achieves the aims of the program should always be commended

and if significant enough, should be rewarded / heralded. Originators and reviewing authorities must give careful thought to which form of recognition would be most appropriate and timely.

22. The following are the official FS awards available through the CF. Acts that fit the descriptions hereunder should be submitted to the chain of command for recognition.

- a. Good Show;
- b. For Professionalism (For Pro).

23. A nomination for an official FS award may be denied at the 1 Div FSO or DFS level. It would be anticipated then that the unit CO, formation comd or manager would award a Commander's Commendation.

#### GOOD SHOW AWARD

24. The "Good Show" award is given when an aircraft accident or serious incident is averted or reduced in severity by a timely, skilful, devoted or professional act that is clearly outstanding or above and beyond the call of duty.

25. A Good Show will be awarded when one or more of the following conditions have been met:

- a. the actions of an individual, crew or team directly prevented loss of life or loss of an aviation resource;
- b. the actions of an individual, crew or team directly reduced the severity of an accident or serious occurrence;
- c. an individual, crew or team identified and rectified a critical hazard to FS in truly exceptional circumstances; or
- d. an individual, crew or team demonstrated outstanding skill, knowledge, judgement or situation awareness in exceptional circumstances.

26. Good Show awards must be endorsed by the formation comd or equivalent position, the 1 Div FSO on behalf of Comd 1 Cdn Air Div and DFS. Good Show Awards are approved by the CAS. The award is signed by both the CAS and DFS. The proposed Good Show Award citation is to be up to 500 words in length.

#### FOR PROFESSIONALISM AWARD

27. The For Professionalism award recognizes acts that may not qualify for the Good Show Award yet reflect a superior professional attitude that averted or reduced the severity of an aircraft accident or serious incident. Acts in the line of duty may qualify if clearly indicative of commendable extra effort.

The For Professionalism scroll is signed by the 1 Div FSO and Comd 1 Cdn Air Div. When doubt exists as to which award applies, originators are encouraged to make the nomination for the Good Show Award. A For Pro Award will be awarded when one or more of the following conditions have been met:

- a. an individual, crew or team demonstrated superior skill in identifying and rectifying a significant hazard to FS in very difficult circumstances;
- b. an individual, crew or team demonstrated superior, timely and professional reactions in rectifying a significant hazard to FS in difficult circumstances; or
- c. an individual, team or crew exhibited a superior display of skill, knowledge, situation awareness or judgement in difficult circumstances that resulted in a significant

contribution to the DND / CF FS program.

28. The For Pro award is recommended by the WComd or equivalent position, endorsed by the 1 Div FSO and approved by the Comd 1 Cdn Air Div. The award is signed by both Comd 1 Cdn Air Div and the 1 Div FSO. The proposed For Pro Award citation is to be up to 350 words in length.

#### COMMANDER'S COMMENDATION

29. The Commander's Commendation is given for an act that does not warrant either a Good Show or For Professionalism Award but does deserve recognition. Given that the award submission has been endorsed by a wcomd before being staffed up the chain, the minimum award a nominee should receive is a Commander's Commendation.

#### DFS COMMENDATION

30. The DFS Commendation recognizes outstanding professional performance and dedication in the field of aviation safety. The DFS Commendation is awarded to deserving individuals who through their action have contributed significantly to enhance the capability of the Flight Safety Program across the Canadian Forces and who emulate the values and ethos promoted by the Program.

#### SICOFFA AWARD

31. Canada is a member of the international aviation association called Sistema de Cooperación entre las Fuerzas Aéreas Americanas (SICOFFA). This is a Spanish name meaning system for the cooperation of the air forces in the Americas. Each year SICOFFA provides member countries with an FS Award to recognize a deserving unit within their individual air force. The Canadian award is granted by CAS each year. The award is given to a wing or unit that has demonstrated the highest level of dedication to the furtherance of FS in the CF and, by their actions, been an exceptional example to others. It is intended to acknowledge a concerted effort over a period of time.

32. The guidelines for this award are for the unit or formation that has developed, implemented and performed at a high level of FS efficiency or has an FS program that is:

- a. innovative;
- b. proactive;
- c. comprehensive;
- d. effective; and
- e. enthusiastically embraced by all members of the FS team.

33. The SICOFFA FS award is originated by the 1 Cdn Air Div FSO, endorsed by DFS and approved by the Chief of the Air Staff. A call letter for nominations will be issued yearly by the 1 Cdn Air Div FSO.

#### AWARD STAFFING PROCEDURES

34. Nominations for Good Show and For Professionalism Awards shall be e-mailed to both DFS and 1 Cdn Air Div FS to reduce the time required for a final decision. Submissions are to follow the format at Annex A and are to include a fully detailed account in Word format that is suitable for use as the citation on the commendation scroll. If approved, the citation will appear outside the individual's community, so early reference should be made to the aircraft type. Formations should develop local staffing procedures to appraise the nomination. The FSOMS occurrence report, UCRs, technical

references and other such material should not be shown in the proposed narrative, but must be included as references in the submission to allow proper assessment. Units may be required to provide the 1 Div FSO or DFS staff with a copy of these references, on demand.

35. For Pro nominations will be reviewed by 1 Div FSO staff. If approved, 1 Div FSO will produce the award scroll, have it signed by Comd 1 Cdn Air Div and sent to the unit for presentation. DFS will be advised and the award citation will be forwarded for publication in Flight Comment and on the DFS website.

36. For Good Show Awards, once reviewed and endorsed by the 1 Div FSO staff, they will be forwarded to DFS. If approved, DFS will produce the award scroll, have it signed by CAS and sent to the unit for presentation.

37. If a nomination is not approved, DFS / 1 Div FSO staff, as applicable, will officially inform the submitting unit with a brief explanation as to why the nomination was rejected and if other forms of recognition are recommended.

38. The Good Show or For Professionalism scroll will be forwarded to the appropriate wing, base or unit FS staff, who will coordinate the presentation; local publicity is encouraged. A narrative describing the event will appear in the earliest possible issue of Flight Comment and on the DFS website.



## **CHAPTER 7 – OCCURRENCE REPORTING**

References: A. Joint Program Office UAV Campaign Plan, February 2006

B. DAOD 2008-3 – *Issue and Crisis Management*

C. A-GA-135-003/AG-001 Airworthiness Investigator Manual (AIM)

### **AIRWORTHINESS INVESTIGATION AND THE FS PROGRAM**

1. Chapters 7 to 11 of this manual deal with the airworthiness investigation of matters concerning safety as delegated to the AIA from the MND and outlined in the AIM (reference C). These investigation activities fulfil both a Flight Safety and an Airworthiness Program objective but are identical in their accomplishment. Because the FS Program predates the airworthiness Program, all Flight Safety Investigation terms such as FSIR are retained, even though they are the product of airworthiness investigation activities too. Of note, all investigation activities are conducted on behalf of the AIA through a system of qualifications, certifications and authorizations within the FS Programs established structure. Annex C explains the AIA's requirements and conditions for all FS positions with the associated certifications to carry out such investigations.

### **PURPOSE OF REPORTING**

2. The purpose of FS reporting is to alert all concerned of circumstances that have resulted in or have the potential to cause damage to aircraft, air weapons or injuries to personnel. FS occurrence reporting and investigation allow appropriate PM to be identified and implemented by comd authorities.

### **DEFINITIONS**

#### **AIRCRAFT**

3. A machine capable of deriving support in the atmosphere from reactions with the air.
- a. CF aircraft: This includes aircraft that have been accepted by the CF through purchase, loan or bailment including, for FS purposes, aircraft belonging to the Air Cadet League of Canada. Aircraft under production for the CF are considered CF aircraft from the moment they leave the production line following final assembly, regardless of the actual acceptance date. This situation could be modified by contract provisions or special agreements.
  - b. Non-CF aircraft: These are subdivided as follows:
    - (1) Non-CF military aircraft. There are two categories of non-CF military aircraft:
      - (a) Allied military aircraft. These are aircraft belonging to an allied military force. When the CF assumes quality-assurance responsibility for these aircraft during production, repair, modification or overhaul, they are considered CF aircraft from the moment they are accepted by the contractor until they leave Canada or are accepted for flight by an aircrew of the country of ownership.
      - (b) Non-allied military aircraft. These are aircraft belonging to a non-allied military force.

- (2) Civilian aircraft. This term is normally self-explanatory, but when a CF aircraft is lent or bailed to a civilian agency on a temporary basis, the CF continues to be involved.

#### **COLLATERAL INVESTIGATION**

4. This term applies to any investigation of an occurrence conducted by other than FS personnel or for purposes other than FS.

#### **FS AIRWORTHINESS INVESTIGATOR**

5. The airworthiness investigator is a FSO appointed by DFS / AIA who has received specialty training in aviation occurrence investigations. This airworthiness investigator is certified as qualified as delineated in the AIM and is authorized to conduct independent airworthiness investigations.

#### **FS OCCURRENCE**

6. Any event involving the operation of an aircraft or support to flying operations that constitutes an accident or incident. This could be an air occurrence (air accident or air incident, with or without weapons implications) or a ground occurrence (ground accident or ground incident, with or without weapons implications).

#### **FS PUBLICATIONS**

7. FS publications include all material published by DND for FS purposes, including posters, charts, booklets and the like, intended to assist FSOs and others in reporting procedures and cause factor assessment.

#### **FS REPORTS**

8. This term refers to all reports, whether oral or written, made under the authority of this manual.

#### **AIR ACCIDENT**

9. An event involving an aircraft between the time the first power plant start is attempted with intent for flight and the time the last power plant or rotor stops (for a glider, from the time the hook-up is complete until the glider comes to rest after landing), in which one or more of the following occurs:

- a. someone is missing or receives fatal, very serious or serious injuries or illness (Black, Red or Yellow) as determined by a medical officer in accordance with CFAO 24-1. The aircraft, its equipment or its operation must have contributed to the event for it to be classed as an air accident; or
- b. a CF aircraft is destroyed, missing or sustains very serious or serious damage.

#### **NOTE**

All FS occurrences exclude events caused by enemy action.

#### **AIR INCIDENT**

10. An event involving a CF aircraft intended for flight between the time the first power plant start is attempted and the time the last power plant or rotor stops. For a glider, from the time the hook-up is complete until the glider comes to rest after landing, in which one or more of the following results:



- a. someone receives minor injuries (Green) as determined by a medical officer in accordance with CFAO 24-1, or there is risk of injury. The aircraft, its equipment or its operation must have contributed to the event for it to be classed as an air incident;

**NOTE**

During paratroops, SAR Techs and their equipment are considered part of the aircraft until the SAR Tech or equipment has safely reached the ground or water.

- b. a CF aircraft sustains minor damage;
- c. there is no injury or damage but accident potential did exist;

**NOTE**

This includes precautionary power plant shut-down, loss of cargo or slung loads, paratroops, no-damage lightning strike and any other event having accident potential, including damage from bird strikes.

- d. there is a malfunction of life-support equipment or a crew member experiences an aeromedical problem;
- e. there is a near collision (sometimes referred to as a near miss);
- f. there is a jettison, accidental release, inadvertent firing or hang-up of airborne armament equipment or munitions, or an aircraft occurrence involving armaments (see DAOD 3002-4 for additional procedures involving armaments and weapons); or
- g. there is damage to civilian or military property.

**GROUND ACCIDENT**

11. This type of event involving an aircraft occurs when there is no intent for flight, or when there is intent for flight but no power plant start has been attempted, or after the power plants and rotors have stopped, in which one or more of the following results:

- a. a person is missing or receives fatal, very serious or serious injury or illness (BLACK, RED and YELLOW) as determined by a medical officer in accordance with CFAO 24-1. The aircraft equipment or its operation must have contributed to the event to be classified as a ground accident; or
- b. an aircraft is destroyed, missing or has sustained very serious or serious damage.

**GROUND INCIDENT**

12. This type of event involving an aircraft occurs when there is no intent for flight, or when there is intent for flight but no power plant start has been attempted, or after the power plants and rotors have stopped, in which one or more of the following results:

- a. a person receives minor or no injuries (GREEN or NIL) as determined by a medical officer in accordance with CFAO 24-1, or there is a risk of injury or illness. The aircraft equipment or its operation must have contributed to the event to be classified as a ground incident;

- b. the aircraft sustains minor damage;
- c. there is no damage but accident potential existed;
- d. there is a jettison, accidental release, inadvertent firing or hang-up of airborne armament equipment or munitions, or any aircraft occurrence involving weapons or armaments (see DAOD 3002-4 for additional procedures involving armaments); or
- e. there is damage to civilian or military property.

## **STAGE OF OPERATIONS**

13. This term refers to the task that is being attempted or performed at the time of an occurrence. To ensure consistency in statistical analysis, the stages of operation are categorized as follows:

- a. Parked: Power plants and rotors are stopped, and the aircraft is stationary or unintentionally in motion; chocks may or may not have been used. No action is in progress that is directly associated with any other stage of operation.
- b. Maintenance: Power plants are stopped and maintenance duties, including servicing, refuelling, inspection, modification, repair and arming, are being performed on the aircraft. Towing, loading and run-up are excluded.
- c. Towing: The aircraft is being positioned, or prepared for positioning, by towing, pushing or bear trap handling.
- d. Loading: The aircraft is being loaded or unloaded with cargo, passengers or crew or is being prepared for loading or unloading.
- e. Ground running: The aircraft is stationary or unintentionally in motion, with a power plant being started, running or being shut down. Temporary pauses in the taxi stage are not categorized as ground running.
- f. Taxiing: The aircraft is intentionally moving under its own power on land, a flight deck or water before the application of power for take-off or after the direction of the landing roll is changed to taxi. It also includes aircraft moving by intentional coasting with power plants stopped or taxi operations where there is no intent for flight. It does not include air-taxiing by helicopters.
- g. Take-off: Lasts from the time that power is applied for take-off until reaching 500 feet AGL or operating height, whichever is lower. For a deliberate touch-and-go landing, the take-off stage starts when power is re-applied.
- h. In flight: In flight lasts from the time the aircraft reaches 500 feet AGL or operating height, whichever is lower, until the landing phase is initiated. Helicopters are considered to be in flight when air-taxiing, slinging, hoisting, rappelling or hooking up or jettisoning loads. Occurrences involving paratroops are also included under this stage of operation.
- i. Landing: Landing lasts from the time the landing phase is initiated until the time the direction of the landing roll is changed to taxiing.

## **HAZARD CONDITION**

14. Any actual or potential condition that results or can result in the degradation of the level of aviation safety.

#### **UNIT OF OCCURRENCE**

15. This term refers to the unit involved in the event or, in the case of an accident occurring at other than a CF wing or base, an appropriate unit close to the accident site.

#### **UNIT OF OWNERSHIP**

16. This term refers to the unit that has control and authority over the aircraft. For ground occurrences, the unit of ownership is the unit, wing, or base to which the aircraft is assigned in order to accomplish a specific operational or maintenance task. The only exceptions are:

- a. for aircraft that are undergoing depot-level maintenance at a contractor's plant, the appropriate NDQAR is the unit of ownership and ADM (Mat) / NDHQ is the headquarters;
- b. for new aircraft being produced for the CF, the applicable NDQAR assumes unit of ownership status from the moment that the aircraft leaves the production line following final assembly, regardless of the acceptance date;
- c. the provisions of subparagraphs above also apply to allied military aircraft that are being maintained or manufactured in Canada under a CF-supervised contract; and
- d. for other non-CF aircraft, the DFS shall make suitable arrangements.

#### **FS REPORT FORMS**

17. The forms listed below were created to support the FS Program and unless otherwise indicated, they may be obtained through normal supply action. Some FS forms have been specifically designed for the FS Program, while others serve many purposes.

- a. ADDN Occurrence Report: This form is for ships at sea.
- b. Accident Investigation Tag (NSN 9905- 21 -872-3060): This form is used by investigators to identify and quarantine items during the conduct of FS investigations;
- c. Report of Emergency Escape from Aircraft: This document has no catalogue number because of its limited use, but is available from the DFS; and
- d. Report of Emergency Landing on Water: This form has no catalogue number because of its limited use, but is available from the DFS.

18. FS-related forms. The following forms, although established primarily for other purposes, have specific FS applications as indicated:

- a. Report on Injuries or Immediate Death Form: This form is used to report serious or very serious injuries and fatalities;
- b. Coroner's report: A copy of this report, if raised, shall be included with the medical report; and
- c. CF 777A – Unsatisfactory Condition Report: A UCR is submitted in accordance with CFTOs on conditions, some of which affect FS.

## **SCOPE**

19. A critical requirement of the FS Program is that occurrences be reported. If all events that cause a potential or actual compromise of flight safety are reported, then emerging trends can be identified and analyzed. The analysis then allows appropriate PM to be devised and implemented. Comds must encourage personnel to report all occurrences and hazards.

## **REPORTING INFORMATION AND SECURITY**

20. Reporting FS information is vital to the FS and Airworthiness Investigation Program. However, there will be times when operational security (OPSEC) and operational / time sensitive information could have effect on active operations. In these cases, the method and security associated with reporting must be adjusted to counter the possible negative effects that public release of information or knowledge of an occurrence could impart on non-friendly forces. For example, it may not be appropriate to transfer information in an unsecure manner on an occurrence for an air asset that is actively engaged in operations in a forward area since the knowledge of this event could be advantageous to enemy operations. For such circumstances, reports must still be made in a timely but secure manner so as to preclude any advantages such knowledge might impart on these non-friendly forces. FS reports containing classified information shall only be transmitted to DFS by secure means in an encrypted message or e-mail as per Annex E of Chapter 9.

## **REPORTING RESPONSIBILITY**

21. Comd 1 Cdn Air Div retains responsibility for the reporting of all FS occurrences involving CF air assets. Comds of commands, formations, wings, bases, and units and managers of contracted organizations responsible for conducting or supporting air operations shall ensure that all FS occurrences, the applicable cause factors and PM are reported in accordance with the provisions of this manual. Comds shall ensure that all aircraft commanders, air vehicle operators and all other personnel supporting air operations are conversant with FS reporting procedures.

22. Injuries reported as part of an FS occurrence and under the authority of this manual must also be reported to the General Safety Program and will require investigation in accordance with A-GG-040-001/AG-001.

## **HAZARD REPORTING**

23. Personnel at all levels must maintain vigilance for potential hazards within the work place. This could take the form of unsafe work habits, environmental conflicts, or management direction. When these hazards are recognised, personnel should be encouraged to report them to the FS representatives in their unit. The Hazard Report Form (Annex A) can be used to alert the FS System to potential problem areas. It is available in electronic format on the DFS website. This form may be submitted anonymously or it may be signed. When the unit FS NCM or Officer receives a Hazard Report it shall be assessed for its validity and possible PM to mitigate it. If the Hazard Report has been signed the person that submitted the report may be contacted for further clarification if desired.

24. The hazard shall be treated the same way as an occurrence with respect to the responsibilities for tracking and closing, and the report will be closed only when the PM have been implemented or rejected by the appropriate authority. Once a hazard report has been closed, it is essential that the FSO report back to the individual who submitted the report (if identified) on the action taken or why, as applicable, PM could not be implemented. This all-important step is key if we are aiming to encourage open and honest reporting of hazards.

### **INITIAL INCIDENT REPORT**

25. The FSOMS is normally used to report a simple occurrence. If unable to access the FSOMS, a telephone call or a CF215 FS message report is to be submitted to the home unit for input to the database.

### **INITIAL ACCIDENT REPORT**

26. Immediately following an accident or serious occurrence, call DFS at 1-888-WARN DFS (927-6337) and the chain of command (NDHQ / CanadaCOM / CEFCON / SOFCOM, and / or 1 Cdn Air Div AOC immediately. An initial report (IR) must follow. See Annex B for Accident Notification Procedures. DFS shall be contacted as soon as possible for any accident (Occurrence category 'A' to 'C' and / or for any occurrence having a SFCL equal or greater than High).

### **REPORTABLE OCCURRENCES**

27. The following guidelines should be applied to ascertain if an event should be reported as an FS occurrence:

- a. Was there an injury or illness to personnel engaged in or supporting air operations, damage to a CF-owned aircraft or aircraft operated by or on behalf of CF / DND or damage to CF equipment used to support air operations?
- b. Was there potential for injury or illness or damage to an aircraft?
- c. Could reporting the FS event generate a PM that may prevent a similar occurrence?
- d. If the answer to any of these questions is yes, then an FS occurrence report shall be filed.

28. This concept can be directly applied to occurrences involving flight and support to flight operations; however, the concept is more difficult to apply where involvement in flight line operations is less obvious. If flight safety is not jeopardized, then the event should be reported as a general safety occurrence.

### **FS REPORT CLASSIFICATION**

29. FS reports and supporting documentation will normally be unclassified. However, some of the information contained in these reports and documentation is protected under the *Aeronautics Act*, the *Canadian Transportation Accident Investigation and Safety Board Act*, the *Canadian Human Rights Act* and the *Access to Information Act*. Therefore, FS information will not be released without the express authority of DFS.

**NOTE**

FSOMS is not a classified system and shall not mix classified and unclassified data. In the case of a classified FS occurrence, the reporting unit shall provide the IR content relating to the classified FS occurrence over secure means. An electronic pro-formatted form can be downloaded from the DFS Intranet site at <http://www.airforce.forces.gc.ca/dfs/publications/docs/cf215.pdf>. The details of the occurrence will not be entered into FSOMS. DFS will retain ownership of the occurrence until it is deemed declassified. When the occurrence is declassified, the details of the investigation will be uploaded in FSOMS by DFS. Ownership of the occurrence will then revert to the reporting unit.

**OBLIGATION TO REPORT**

30. An FS occurrence IR is required for each separate event involving injury to personnel or damage to CF aircraft, air vehicles or support equipment, or when flight safety was affected. If two or more aircraft are involved in a single event, one FS report will normally be required.

**OCCURRENCES INVOLVING NON-CF AIRCRAFT**

31. Regardless of the report(s) required by non-CF authorities, occurrences involving non-CF aircraft shall be reported as directed in this publication.

**AIRCRAFT AT CIVILIAN CONTRACTORS**

32. FS occurrence reports are required for each occurrence involving aircraft where there is CF involvement during the periods specified as follows:

- a. new aircraft – except when special arrangements exist, from the time a CF aircraft leaves the production line after final assembly;
- b. aircraft on inspection, repair or overhaul – for the entire period an aircraft is at a civilian contractor facility; and
- c. allied military aircraft under CF-supervised contract – treat as a CF aircraft until it leaves Canada or is accepted by aircrew of the country of ownership.

**CONTRACTED AIRCRAFT / FACILITIES**

33. Reports are required for each occurrence involving a non-CF aircraft when there is CF involvement. In the case of contracted training, operational flying or maintenance, the applicable contract or memorandum of understanding (MOU) will govern the organization's FS reporting requirement and clearly identify the extent of CF involvement:

- a. non-CF aircraft and facilities under contract to provide support to CF flying operations at or below the wing / base or unit level shall be included within the existing wing / base or unit FS program and will report FS occurrences under the authority of the applicable wing / base or unit comd;
- b. FS reporting by contractors providing support through NDQAR or equivalent third-line maintenance facilities shall report occurrences through an assigned wing FSO familiar with those contractor operations; and
- c. CF aircraft FS occurrences involving civilian aircraft, civilian facilities and civilian aircraft operating at military facilities in Canada shall be reported to the nearest TSB



Regional Office. Near misses or similar occurrences involving civilian ATC units are to be reported to the NavCanada Regional Air Traffic Services Officer, and a normal FS occurrence report is to be filed.

#### **OCCURRENCES INVOLVING PARACHUTISTS / RAPPELLERS**

34. Occurrences involving SAR Tech personnel jumping from either CF aircraft or CF military conveyance aircraft will be classified as FS occurrences if the event took place during the jump exit, parachute descent or parachute landing. These occurrences will be filed against the tail number of the aircraft from which they jumped. Occurrences after the SAR Techs are safely on the ground are to be handled through the General Safety Officer.

35. Parachute occurrences involving all other parachutists who are jumping from either CF aircraft or CF military conveyance aircraft will be classified as FS occurrences only if the event took place while on board the aircraft during the jump exit. If it is determined that the aircraft or aircraft equipment used did not contribute to the occurrence, then the occurrence shall be reported through the General Safety Officer.

36. Occurrences involving personnel rappelling from either CF aircraft or CF military conveyance aircraft will be classified as FS occurrences if the event took place during the rappel sequence until the rappellers unhook from the rope safely on the ground. These occurrences will be filed against the tail number of the rappelling aircraft. Occurrences after the rappellers are safely on the ground are to be handled through the General Safety Officer.

#### **OCCURRENCES INVOLVING UAVs**

##### **UNINHABITED AERIAL VEHICLE (UAV) DEFINITION**

37. A UAV is defined as a power-driven aircraft that is designed to fly without a human operator on board.

##### **CATEGORIES OF UAVs**

38. UAVs are divided into three categories as follows:

- a. Tier one: high-altitude long endurance UAV (HALE) / medium-altitude long endurance (MALE) UAVs. These are large UAVs weighing up to several tonnes. They operate at high altitudes and have an endurance as long as 30 hours. They can require runway infrastructure similar to manned aircraft for launch and recovery.
- b. Tier two: tactical UAVs weighing up to 300 kg. They operate at intermediate altitudes as high as 15 km and have several hours endurance. They can be launched by catapult, by booster launcher, or from a short runway or conventional reinforced ramp.
- c. Tier three: small / mini / micro UAVs weighing only a few kg. They operate within a 1 km radius at altitudes of several hundred metres. Endurance is less than one hour. Ideally, they can be launched by hand and as a rule are man-portable.

##### **UAV OCCURRENCE REPORTING**

39. UAVs, like any other CF aircraft, are subject to the CF FS Program. UAV FS reporting takes into consideration design, function, complexity and level of skill required for their operation and maintenance. Damage to a UAV component that is designed as consumable will not normally be

reported using FSOMS. The following guidelines will apply to the reporting of UAV FS occurrences:

- a. Tier one UAVs: no change from manned systems;
- b. Tier two UAVs: the following items will be reported:
  - (1) complete destruction or loss of UAV or major damage to it,
  - (2) engine failure during flight,
  - (3) injury or illness to personnel or potential for injury or illness,
  - (4) uncommanded control input,
  - (5) failure of flight reversionary system,
  - (6) collision with other aircraft or near miss,
  - (7) collision with ground vehicles or infrastructure; and
  - (8) violation of assigned airspace.
- c. Tier three UAVs:
  - (1) injuries or potential for injuries, and
  - (2) violation of assigned air space.

#### **OCCURRENCES INVOLVING AIR WEAPONS**

40. Occurrences that must be reported and, if necessary, investigated and monitored include:
- a. accidental functioning of an air weapons store;
  - b. inadvertent release or firing of an air weapons store;
  - c. hazardous malfunctioning of an air weapons system or air weapon, e.g. hang-up, runaway gun;
  - d. accident or incident which damages or could have damaged an air weapon or air weapons system;
  - e. any other occurrence associated with air weapons, air weapons system, or explosives/pyrotechnics used in support of mission that may reflect on the reliability of the air weapon, the air weapons system, the explosives / pyrotechnics, the operating procedures or personnel; and
  - f. any occurrence associated with air weapons, air weapons system, or explosives/pyrotechnics from the time it is removed from its ready-use storage with the intent to be used in support of an air mission to the time it is returned to a ready-use storage.

#### **NOTE**

In addition to the FSOMS occurrence entry, an Ammunition Defect, Malfunction Report and Disposal Request (CF 410), shall be submitted by the unit armament authority IAW A-GG-040-006/AG-002 for all occurrences where the ammunition / weapon / explosive is faulty, damaged, or the direct cause of the occurrence. The Flight Safety Report number shall be referred to in block 23 of CF 410.



**NOTE**

In situations where occurrences involving Air Weapons are entered into and investigated within FSOMS, the requirement to file an Ammunition Accident, Incident Report under the Explosives Safety Program is satisfied through the completion of the FSOMS occurrence.

**ADDITIONAL REPORTS**

41. The following are available to record and promulgate CF occurrence information. These reports can be used by FSOs to ensure command authorities are properly advised of the circumstances surrounding an occurrence.

- a. Significant Incident Report (SIR). This report should be filed when an aircraft occurrence will likely create public interest. DAOD 2008-3 – Issue and Crisis Management governs the production of an SIR.
- b. FS Hazard Report. This form is designed to track and record (through FSOMS) observations on hazardous conditions or deficiencies in the aviation system. A sample form can be found at Annex A.
- c. Report of Emergency Escape From Aircraft (DND 1056). This form shall be submitted by every survivor who has abandoned an aircraft during an emergency situation, e.g. fire, ejection or bail-out.
- d. Report of Emergency Landing on Water (DND 724). This form shall be submitted for every emergency water landing (ditch).
- e. Ammunition Defect, Malfunction Report and Disposal Request (CF 410). This form shall be submitted for all occurrences as per A-GG-040-006/AG-002 - DND Ammunition Accident/Incident/Defect/Malfunction Reports And Disposal Requests.
- f. Aircraft Maintenance Management Information System (AMMIS) (CF 349 and 543). To be submitted by first-line, second-line and third-line maintenance facilities as required. Maintenance documentation produced following an FS occurrence must be annotated as FS as per C-05-030-001/AG-001. This annotation will ensure that the FS investigation is prioritized and that the chain of evidence custody is preserved.
- g. Unsatisfactory Condition Report (UCR). FS UCRs may be submitted to address conditions directly affecting the safety of flight, and when submitted, shall be submitted in accordance with C-02-015-001/AG-000. All FS UCRs shall be coordinated with the FSO.

**NOTE**

In situations where FS occurrences involve injury to personnel, FSOs should ensure the unit General Safety Officer (GSO) is aware of the injury. Entry of the injury into the FSOMS database does not ensure either a CF 98 Report on Injuries or Exposure to Toxic Materials or Substances or CF 663 Accident Prevention Report is completed or medical authorities are aware of the injury and/or exposure.

**NOTE**

In situations where FS occurrence investigations reveal deficiencies with Aviation Life Support Equipment (ALSE), FSOs should ensure the unit ALSE Officer is aware of the ALSE implications to the FS occurrence. Entry of the occurrence into the FSOMS database does not ensure appropriate ALSE corrective action has been taken.

**FS OCCURRENCE MANAGEMENT SYSTEM**

42. To evaluate the effectiveness of their FS Programs, comds and FSOs at every level must maintain records of every FS occurrence and hazard involving their facilities, equipment and personnel. The FS Occurrence Management System (FSOMS) is the primary tool to assist this process and is useful for identifying trends.

43. The FSOMS was developed to meet the automated support needs of the CF FS Program. It provides FSOs at all levels with an ability to input, record and track FS occurrences.

44. FSOMS shall be used to record all FS occurrences. If unable to access the FSOMS or if the situation warrants immediate notification of a serious occurrence, the FS occurrence information shall be forwarded to an FSO by telephone, fax or CF msg using the CF 215 FS message form. Routine FS occurrences will be submitted to the home unit FSO for input to the FSOMS database. As FSOMS does not automatically inform comds of FS occurrence information, FSOs shall review FSOMS on a regular basis to ensure FS information has been distributed as required.

45. The unit of ownership is responsible for originating the FS report and ensuring it is entered in FSOMS. The unit of occurrence shall also ensure all related to the occurrence have been completed. In certain circumstances coordination between the unit of ownership and unit of occurrence may be necessary to ensure all pertinent FS information has been recorded.

46. FSOMS development and policy is a DFS responsibility. The training of FS personnel on the use of FSOMS to input initial investigation data and hazard reports is the responsibility of 1 Cdn Air Div FS and will be delivered through the Basic FS Course.

**TRANSFER OF OWNERSHIP**

47. In the case where a unit discovers and reports an occurrence that should be investigated by another unit, the reporting unit will liaise formally with the investigating unit and discuss transfer of the investigation. Upon agreement, the unit invited to investigate the occurrence will acknowledge acceptance of ownership by forwarding the correspondence to DFS 2, cc DFS 3-2 (FSOMS Manager) and request official transfer of the investigation. If agreement on ownership cannot be reached, the reporting unit can request that DFS 2 decide which unit shall be responsible for the investigation. DFS 3-2 will ensure that any transfers be documented as appropriate and actioned in FSOMS.

Annex B  
Chapter 7  
A-GA-135-001/AA-001

## **ANNEX B – ACCIDENT NOTIFICATION PROCEDURES**

<b>TYPE OF OCCURRENCE</b>	<b>BY UNIT OF OCCURRENCE OR AIRCRAFT COMMANDER OR SENIOR SURVIVOR</b>	<b>BY WING OF OWNERSHIP</b>	<b>BY DFS</b>
<p>“A”, “B” and “C” Accidents Fatalities Very serious injuries Missing persons Missing aircraft Civilian aircraft accident</p> <p>Any occurrence with a SFCL equal or greater than High</p>	<p>Notify unit of ownership by fastest possible means. If not practicable, call 1-888-WARN DFS (927-6337).</p>	<p>Immediately telephone:</p> <ul style="list-style-type: none"> <li>• DFS at 1-888-WARN DFS (927-6337) if not done already.</li> <li>• National Defence Operations Centre: 613-945-5551</li> <li>• Canada COM Operations Centre 613-944-8888 (Joint Command Centre)</li> <li>• Canadian Expeditionary Forces Command (CEFCOM) Operations Centre 613-995-0454 (Deployed Ops)</li> <li>• Commandement de la Force expéditionnaire du Canada (CANSOFCOM) Operations Centre 613-945-1137 or through NDOC</li> <li>• 1 Cdn Air Div Air Operations Centre (AOC) 204-833-2650.</li> </ul>	<p>If civilian involvement, notify TSB for a coordinated investigation.</p>
	<p>Telephone wing of ownership.</p>	<p>Ensure DFS and 1 Cdn Air Div FS are advised as soon as possible. Brief Duty Officers and confirm details as known.</p>	<p>If foreign military involvement, contact appropriate FS organization.</p>
	<p>If outside North America or Europe, notify the nearest Canadian diplomatic or foreign liaison staff.</p>	<p>If a fatality is involved, notify the local provincial coroner in accordance with CFAO 24-6.</p>	<p>Task an FS investigation.</p>

	Within 12 hours send an FS Occurrence Initial Report using format at Annex E, Chapter 9.	If a civilian aircraft is involved, inform the nearest Air Traffic Control Centre (ATCC).	
	CFAO 24-1 provides direction for casualty reporting and administration.		

**NOTE**

Cellular phones should not be used to transmit sensitive information such as crew injuries or fatalities.

Annex C  
Chapter 7  
A-GA-135-001/AA-001

### **ANNEX C - AIRWORTHINESS INVESTIGATOR MATRIX**

<b>AI POSITION</b>	<b>CONDITIONS REQUIRED TO CARRY OUT AIRWORTHINESS INVESTIGATION ACTIVITY</b>		
	<b>QUALIFICATIONS (NORMAL UNLESS WAIVER ISSUED)</b>	<b>AIA AUTHORIZATION</b>	<b>OTHER REQUIREMENTS</b>
Unit FSO / FS NCM	BI 3 (Issued by 1 Div FSO)	As per AIM regulations and policy	When in designated positions or tasked (for FSI activity by AIA)
Wing FS Support Personnel	BI 3 (Issued by 1 Div FSO)	As per AIM regulations and policy	When in designated positions or tasked (for FSI activity by AIA)
Company FS Personnel	BI 3 (Issued by 1 Div FSO)	As per AIM regulations and policy	When in designated positions or tasked (for FSI activity by AIA)
Wing FSO/NCM	BI 3 & BI 2 (Issued by 1 Div FSO)	IIC 3 (Issued by 1 Div FSO)	When in designated positions or tasked (for FSI activity by AIA)
Division FS Personnel	BI 3 & BI 2 (Issued by 1 Div FSO)	IIC 3 (Issued by 1 Div FSO)	When in designated positions
Division FSO	BI 3 & BI 2 (Issued by AIA)	IIC 3 (Issued by AIA) BI 2, BI 3 & IIC 3 (AIA delegation)	AIA delegation of au- thorization
FSI (Semi Permanent) Team Members	BI3 & BI2 (Issued by 1 Div FSO) BI1 (Issued by AIA)	AIA / Support agency Service Level Agree- ments and upon indi- vidual certification by supervision level of appropriate authority	Individuals identified in FSI tasking message (for FSI activity) and CoC from SLAs
DFS Investigator	BI 3 & BI 2 (Issued by 1 Div FSO) BI 1 (Issued by AIA)	IIC 3 (Issued by 1 Div FSO) IIC 1 & IIC 2 (Issued by AIA)	Individuals identified in FSI tasking message (for FSI activity)

AI POSITION	CONDITIONS REQUIRED TO CARRY OUT AIRWORTHINESS INVESTIGATION ACTIVITY		
	QUALIFICATIONS (NORMAL UNLESS WAIVER ISSUED)	AIA AUTHORIZATION	OTHER REQUIREMENTS
DFS Review Staff (Senior Investigator and Chief Investigator)	BI 3 & BI 2 (Issued by 1 Div FSO) BI 1 (Issued by AIA)	IIC 3 (Issued by 1 Div FSO) IIC 1 & IIC 2 (Issued by AIA)	When in designated positions or tasked (for FSI activity by AIA)
AIA / DFS		AIA (Order by CDS)	When in designated DFS Position

## **CHAPTER 8 – POST-OCCURRENCE ACTIVITIES**

### **PURPOSE**

1. As indicated earlier, the objective of the FS Program is to prevent the accidental loss of aviation resources. Unfortunately, despite the best efforts of all concerned, accidents can still occur. Accordingly, wings and units must prepare sound plans for this eventuality to ensure that loss of life and injury to personnel is minimized, damage to property is minimized and evidence is collected and protected to facilitate a thorough investigation. In addition, aircraft accidents understandably attract a lot of attention. Therefore plans must include provisions for the timely release of accurate information to the chain of command, next of kin and the media.

### **RESPONSE PROCEDURES**

#### **EFFICIENT RESPONSE ELEMENTS**

2. The CO, through the FSO, must ensure the unit is prepared to respond to any occurrence, regardless of location. The occurrence response plan shall include provisions for:
  - a. saving lives and preventing injury or further damage;
  - b. protecting the response team from hazards at accident sites as per Annex A; and
  - c. thorough investigation of every occurrence.
3. The elements of an efficient occurrence response are:
  - a. immediate, accurate and thorough reporting;
  - b. thorough independent airworthiness investigation leading to the discovery of cause factors and findings that identify PM;
  - c. implementation and recording of PM and feedback of information; and
  - d. periodically revisiting PM at a later date to ensure that they were properly implemented and have been effective.
4. Operation orders for CF activities involving air assets or support for air assets like exercises, operations and deployments on airshows shall include contingencies for FS occurrences. Comds should use this opportunity to assess the hazards of the operation and risks involved, and draw attention to specific areas where there might be particular concern. These should be highlighted in a statement on the overall importance of FS in the conduct of operations.

#### **PLANNING REQUIREMENTS**

5. Planning is required to ensure that evidence is protected and to conduct a safe and expeditious investigation. Time is most important in post-occurrence activities; evidence may change or be lost, or there may be another accident before PM can be implemented.
6. In preparing a response to an FS occurrence, DFS will:
  - a. maintain a suitable cadre of trained, authorized and accredited aircraft accident investigators as delineated in the AIM;
  - b. authorize the Div FSO to train and accredit airworthiness investigators as delineated in the AIM;

- c. maintain an adequate inventory of field investigation equipment including recording devices (audio and video), personnel protective equipment (PPE), communication devices, portable IM/IT and field navigation equipment;
  - d. maintain a permanently monitored occurrence notification system (1-888-WARN-DFS);
  - e. maintain arrangements for specialist investigation support from organizations such as AETE, QETE, DRDC Toronto and National Research Council (NRC);
  - f. maintain arrangements for coordinated investigations with other agencies within Canada (TSB) and with other nations (where feasible);
  - g. develop a process that can initiate investigations quickly and deploy investigation teams within 24 hrs domestically and 48 hrs internationally; and
  - h. develop a process that can be used to prepare, revise and finalize FSIs.
7. 1 Div FSO shall in relation to FS matters look after the following:
- a. ensure that units and suitable personnel receive adequate training and accredit trained investigators as authorized by the AIA;
  - b. provide guidance in the preparation of accident response plans and review the plans and checklists as part of FS surveys;
  - c. follow up on PM flowing from SRs; and
  - d. conduct trend analyses to provide FS advice to Comd 1 Cdn Air Div.
8. In many instances, action items are not the responsibility of the FSO. However, the FSO shall ensure that the appropriate actions are taken as required.

#### **ACCIDENT RESPONSE PLAN REVIEW**

9. Each unit shall develop an accident response plan and validate it to ensure that critical actions are not overlooked. This plan should be reviewed and exercised periodically. It shall be held by:
- a. the unit chain of command and UFSO;
  - b. the Duty Officer;
  - c. the Control Tower;
  - d. the Operations Section;
  - e. the Military Police; and
  - f. the local civilian police, fire halls, hospitals, ambulance services, telephone operators and information services.

#### **ACCIDENT RESPONSE COMPONENTS**

10. The response plan shall include, in order of precedence, those individuals to be advised. The Aircraft Accident Checklist at Annex B lists the actions anticipated from the organizations concerned in case of a serious accident.
11. The accident response plan should include:
- a. provisions for the immediate involvement of aeromedical personnel;
  - b. training of firefighting personnel in aircraft rescue techniques;



- c. availability of rescue personnel whenever flying is in progress, including personnel to disarm, remove or safety explosive devices and pressurized systems;
- d. provision of technical and operational advice to the pilot in an emergency;
- e. a checklist to be used during emergencies by personnel in key positions like CO, DCO, SAMEO, tower, operations, OSCER and FSO;
- f. procedures for recovery or diversion of aircraft;
- g. briefings to the local authorities on how to report an occurrence and what to do at the scene until CF authorities arrive, like liaising with coroner or police;
- h. alert the agencies that must respond to an off-unit site occurrence;
- i. communications for all rescue vehicles and agencies, e.g. Padre, Environmental Officer and PAO;
- j. the accident-rescue grid map of the airfield and surrounding area. Copies should be kept in the control tower, dispatch centres, OSCER vehicle, helicopters, ambulances, fire trucks, maintenance, and other vehicles that must respond to an accident or emergency;
- k. preparations for evacuation and medical treatment of casualties. Make arrangements with local hospitals, fire halls and police for assistance, including briefings on rescue procedures and toxicology requirements for personnel involved in the accident. Copies shall be kept in the tower, ambulances and accident response vehicles;
- l. the search-and-rescue (SAR) plan (water, land or air parties), arrangements for a search centre and for SAR support;
- m. considerations for runway clearance and diversion procedures to allow, if possible, the recording of evidence before wreckage is moved;
- n. procedures for runway clearance, including instructions for the selection, maintenance and use of heavy equipment, cranes, jacks, portable floodlights, spare wheels and slings;
- o. media response guidelines;
- p. security of the aircraft;

**NOTE**

Whenever sabotage is apparent or suspected, Security Orders for the CF apply.

- q. periodic review of instructions, including:
  - (1) the testing or practice of crash alarm systems;
  - (2) the accident rescue response procedures; and
  - (3) the use of training films and other aids;
- r. preparations for safeguarding evidence. Plans should include the following:
  - (1) making video recordings of emergency landings;
  - (2) guarding and protecting accident sites to protect evidence and any contaminated areas associated with the accident site. An accident security team shall be estab-

lished with a designated comd, who shall be responsible for:

- (a) if crash site is outside a defence establishment, coordinating with local police authority to identify CF security needs and ask for their support;
  - (b) seeking and issuing proper rules of engagement for military personnel;
  - (c) issuing, maintaining and using equipment to support guard operations;
  - (d) developing a shift system;
  - (e) making provisions for transport, money, rations and accommodation;
  - (f) ensuring that communications equipment is functional; and
  - (g) ensuring that provisions are made to set up a single controlled accident site entry / exit point at which appropriate protective instructions and kit will be issued;.
- (3) selecting and briefing alternate security comd and crew;
- s. establishing chain of command for site control, within or outside the defence establishment site, prior to and following the arrival of the FS investigation team;
  - t. selecting, maintaining and using equipment for the protection and collection of evidence;
  - u. using the services of the Recovery and Salvage Squadron (RASS) of ATESS for heavy equipment and diving or dragging equipment to recover wreckage, using both civilian and CF resources (see C-05-010-002/AG-000 – Aircraft Salvage Procedures); and
  - v. preparing for the commencement of the investigation by ensuring that perishable evidence is recorded, personnel involved and witnesses are isolated and requested to provide a written statement as soon as possible after the accident, personnel are instructed to take and ship samples, measurements are taken, accident site diagrams are prepared, appropriate medical exams are conducted, appropriate items are quarantined and impounded as required, witnesses (including start crews) are identified, and weather observations at the time of the occurrence are taken.

**NOTE**

Annex E amplifies details of the photographic requirements. Custody of photographs must be carefully controlled to ensure maintenance of the chain of evidence custody.

**NOTE**

A Report of Emergency Escape From Aircraft and / or Report of Emergency Landing on Water may also be required.

## **COMMUNICATIONS**

### **NOTIFICATION OF FOREIGN COUNTRIES**

12. When occurrences involve non-CF aircraft and / or locations and facilities, DFS shall notify the countries involved as required by NATO STANAG 3531, Letters of Agreement and other standing arrangements, so that the actual owners of the aircraft may discharge or take possession of their property and indicate what type of support they require from DFS.

#### **REQUESTS BEYOND SUPPORTING WING CAPABILITY**

13. Normally, the nearest practicable wing will be designated as the supporting wing. Requests for assistance that are beyond the capabilities of a wing or a supporting wing shall be directed to 1 Cdn Air Div / CANR Headquarters.

#### **NOTIFICATION TO CORONER**

14. In the case of fatalities, the provisions of the appropriate provincial coroner statute shall be respected. The coroner is responsible for establishing the cause of death and is the final authority for the removal of human remains.

#### **RELEASE OF INFORMATION**

##### **PUBLIC AND MEDIA QUERIES**

15. The release of information to the public is the responsibility of the Public Affairs Officer (PAO). Following an FS occurrence, the FSO or IIC shall maintain contact with the PAO to ensure timely and accurate news releases. Public and media interest must be anticipated and the FSO should be prepared to assist the PAO. When pressed for information, the FSO and IIC should be guided by DAOD 2008 and AIA delegated authorizations regarding release of information outlined in the AIM. If the occurrence is a significant event in that it involves either prominent persons or circumstances likely to create public interest, there will be a requirement to generate a Significant Incident Report.

16. The FSO and the IIC may be asked to answer questions concerning an occurrence and its investigation. At no time shall they admit Crown responsibility for any damage, no matter how obvious this liability may seem in the circumstances. They should reinforce that the mandate of the FS Program is to investigate to prevent future occurrences and the aim of the investigation is not to assign blame.

17. The investigation team members should be responsive to media or public requests for general or background information, and should always treat reporters politely. The PAO shall be notified of any intent by or request to a team member to conduct an interview related to the investigation.

18. Under no circumstances will the individuals involved in an FS occurrence be interviewed by the media until they are cleared to do so by the IIC.

##### **BRIEFING TO NEXT OF KIN**

19. The unit is responsible for keeping family members informed of the progress of an investigation. In the case where the accident involved casualties, the norm would be for DFS to provide the next of kin with an initial briefing describing the FSIR process and provide them with a copy of the FTI prior to its public release on the DFS website. The intent of conducting the initial briefings is to provide the NOK with an explanation of the investigation process and provide them with a copy of the FTI so they can get ready to address the press prior to DFS public release. DFS will also give family members a detailed briefing on the findings, causes and recommendations contained in the final FSIR prior to its public release. Close coordination with Wing and Unit commanders and their advisors is essential to meeting the aim of the briefings while minimizing stress on the NOK and survivors.

##### **INFORMATION NOT TO BE RELEASED**

20. To prevent impeding the investigation and to avoid premature or incorrect conclusions, the following shall not be released:

- a. the specific location of an off-site occurrence if rescue procedures would be impeded by sightseers;
- b. names of personnel killed, missing or injured until after their next of kin have been informed;
- c. detailed descriptions of injuries or fatalities;
- d. classified information and / or equipment, including weapons loading;
- e. privileged information, such as witness statements, related evidence and all flight recorder information;
- f. statements that tend to indicate responsibility of the Crown or any person;
- g. statements that imply failure of equipment or facilities;
- h. premature speculation that could jeopardize the conduct of the investigation;
- i. statements on causes to civilians, including news media representatives;
- j. accident statistics, rates, trends, costs of accidents and similar information without DFS authority; and
- k. when civilian or allied military aircraft or installations are involved, anything that has not been approved by their local representatives.

#### **RELEASING INFORMATION TO CONTRACTORS**

21. Releasing information to commercial firms under DND contract is subject to QR&O 19.36, in that only general information may be released immediately to contractors, field service representatives or technical representatives. In addition, they may be given other information only as authorized within security limitations to fulfil their contracts. There will be occasions when field service or technical representatives will be enlisted as specialist advisors to investigations. In that case they will be allocated observer status while supporting the investigation. Procedures regarding this situation are contained in the AIM.

#### **RELEASING INFORMATION TO NATO NATIONS**

22. NATO STANAGs provide guidance for the dissemination of FS information. STANAG 3101 provides for exchange of information concerning aircraft or missiles in common use. Information concerning FS matters arising from the operation of a nation's air services within or over another NATO nation's territory is exchanged under the terms of STANAG 3102.

#### **ACCIDENT SITE HEALTH PROTECTION**

23. At most accident sites, there will be dust, chemicals and / or fumes that can be toxic or very hazardous to health. Therefore it is essential to protect all personnel working at the accident site. Equipment must protect the lungs and skin from contact with and ingestion of particles and fumes. The CF has a legal obligation to ensure the safety of all personnel involved in the support of an accident investigation, including any agency or civilian contractor involved in work at the accident site or the salvage operation. Accident Response Plans must ensure that any information regarding dangerous substances is passed to these support agencies. Refer to Annex A and the AIM for further details.

24. The particulars of all personnel involved in post-crash activities will be recorded prior to entering the cordon placed around the accident site or at the quarantine facility. The nature and duration of each exposure to the accident site / quarantine and the PPE worn during that exposure will also be recorded.

This information will be placed on individual personnel files and medical records.

## **ACCIDENT INVESTIGATION KIT**

25. Kits must be available at all wings and units operating in isolation. The FSO Accident Investigation Kit is referred to in the tool control system as TLD 1246. Units looking to re-supply their kits can get the necessary information from CFTCCS ATESS in Trenton. The FSO is responsible for the provision and safekeeping of these kits. Because of the value and attractiveness of many of the items, a member of the investigation team is required to be responsible for the kit when it is in use. Annex C lists the recommended items to be contained in the FSO accident investigation kit. There are three types of items:

- a. Hand-portable items. These are likely to be required at every accident site;
- b. Contingency items. These are heavy or bulky items that may be needed on site; and
- c. Facilities. These may be needed on returning from the accident site to complete the investigation.

## **PROTECTION OF EVIDENCE**

### **SITE SECURITY**

26. Security is normally required at every accident site and local police are usually the best option unless the site is very isolated or only accessible to CF / DND personnel. On defence establishments it is the responsibility of the MPs. If the site is outside CF military facilities or what is considered a defence establishment, the local police has jurisdiction. The aircraft commander, the CO or the senior capable survivor may obtain local police or other civilian personnel to perform the initial security.

27. Investigators are not to be tasked with the administration of the security party; thus a separate security comd shall be appointed, briefed and equipped to handle this responsibility.

28. With the exception of established field service representatives (FSR) under contract to DND, company or contractor representatives are not to be permitted access to an accident site or wreckage components unless authorized by DFS. In the case of FSIs, access to the accident site and the extent of investigative participation is left to the discretion of the DFS. Representatives of the news media should be asked to stay clear to protect the evidence on the crash site and for their own safety. They should be informed that a PAO will provide all details which may be released to the public. Cooperation of news photographers should be requested, but no force will be used by CF personnel to prevent them from gathering imagery. The PAO should be advised of any news media in breach of restricted access areas. Similar procedures are to be followed with owners of the property involved, remembering that a full and effective investigation may depend upon a property owner's cooperation.

29. However, when it is impractical or of doubtful value, the CO, having considered the security classification of the components, may decide not to secure the area. COMSEC authorities should be consulted when COMSEC material is present.

30. For accidents or forced landings outside Canada, security will likely be provided by the country of occurrence, particularly if that country is a signatory of NATO STANAG 3531. Whenever CF security is not provided, DFS shall be informed.

## **SECURITY DUTIES**

31. Security personnel must be briefed to ensure that no evidence is disturbed or obliterated, unless it is absolutely necessary in order to save lives or to prevent injury or serious damage. Moreover, personnel shall have been briefed on accident site hazards and made aware of the PPE required when working on site. If possible, items should be moved only short distances, in straight lines parallel to other parts being moved to preserve the layout of the scene. Photographs and video should be taken before evidence is disturbed and notes made of any explosive charges made safe and pressure systems deflated. The security comd shall ensure that:

- a. doctors, coroners, first-aid personnel, firefighters, rescue teams, aircraft disarming and wreckage recovery personnel, and authorized investigators and photographers are allowed access and are not impeded in the performance of their duties;
- b. civil and military property is adequately protected;
- c. unauthorized persons are not permitted to enter the area; and
- d. following release by DFS, accident aircraft components appearing on the list of classified equipment are accorded appropriate security. Classified equipment may be removed from the site, on approval of the DFS investigator-in-charge (IIC) to ensure security control during the investigation. Ultimate disposal of classified equipment remains the responsibility of the NDHQ Item Manager, or DCOMSEC for COMSEC material.

## **SECURITY IN FOREIGN COUNTRIES**

32. Outside Canada, the local authorities or locally provided security have jurisdiction for physical security. CF requirements should be made known and CF methods should be tactfully suggested. For details concerning the security of evidence within NATO countries, refer to STANAG 3531, available on the DFS website.

## **IMPOUNDING ARTICLES**

33. Impounding articles refers to safeguarding material to prevent the loss or alteration of all records, documents, films, tapes, and forms that may be required for the investigation. The person designated as the impounding officer shall submit a statement of impoundment to the investigative authority, using the format shown in Annex F. All impounded items shall bear the following notation:

Impounded:(*time, date, month, year*) on the authority of:

\_\_\_\_\_  
(*full details of authority for impounding*)

\_\_\_\_\_  
(Signature and Rank)  
Impounding Authority



**ITEMS TO BE IMPOUNDED**

34. The following items shall be impounded following an accident and may be impounded following a serious incident:

- a. the maintenance record set, current logbooks and computer records from ADAM or similar systems for the aircraft concerned and its components;
- b. pertinent Aviation Fuel DAND Sampler Reports (CF 907), Equipment Oil Sampling Register (CF 34-2) and Spectrometric Oil Analysis Reports;
- c. aircraft crash position indicator (CPI), flight data recorder (FDR) and cockpit voice recorder (CVR), or any other recording devices (e.g. HUMMS, MSDRS, HUD tapes), non-volatile memory chips;

**NOTE**

DFS will issue handling instructions for any recording devices removed from an aircraft involved in an occurrence.

- d. the flight authorization form, flight plan, passenger manifest and load sheets for the flight in question;
- e. data stored on the Mission Management Application (MMA) can be captured through the “impound” feature;
- f. the crew’s log books;
- g. unit training and standards records;
- h. tower log books and ATC communication and data recordings. In the case of civilian ATC facilities, contact DFS or DFS IIC, who will make the official impoundment request;

**NOTE**

For an occurrence where elements of both a flight safety occurrence and an aviation infraction / violation are present, DICP and DFS / AIA can, in order to conduct their respective investigations, request copies of the same ATC voice and data file recordings through their respective chains of command.

- i. pertinent meteorological records, forecasts and special observations;
- j. pertinent photographic records;
- k. radar unit log books, radar scope tape and voice recordings relating to the occurrence;

**NOTE**

These must be handled carefully, since they are irreplaceable.

- l. medical records and, in the case of fatalities, dental records and fingerprints from NDHQ / National Defence Identification Service (NDIS); and
- m. any other documents, forms, tapes, films or computer records that are pertinent, e.g., maintenance, arrestor cable or AMSE records.

## **QUARANTINING**

35. Quarantining is the withholding and safeguarding of physical evidence or hazardous items. Such items may include complete aircraft components, equipment, stores, and production lots or batches. Quarantining shall begin as soon as a unit learns of an FS occurrence. Objects to be quarantined shall be removed from use immediately. If the item has a log book, an entry shall be made that the item is quarantined under authority of this publication. In the case of an accident, the person designated by the CO as the quarantining officer shall submit a statement to the DFS IIC using the format at Annex F.

### **ITEMS TO BE QUARANTINED**

36. The following items, if applicable, shall be quarantined:

- a. the aircraft;
- b. the aircraft components (to include software and test equipment used to verify component serviceability) or personal equipment involved or suspected in the occurrence;
- c. the equipment or facilities that last serviced the aircraft with oxygen, POL, armaments or other stores;
- d. any other equipment such as that which may have hit the aircraft, cargo that caused problems, defective ground radar, arrestor cable, starting unit or other facilities; and
- e. any stocks, particular makes or batches of components, like stores and POL, that are suspect.

37. When the facility involved is a civilian contractor for into-plane services, quarantining the facility shall be the responsibility of the appropriate technical services detachment.

### **ONBOARD RECORDING DEVICES**

38. To ensure valuable investigation data is not lost, the following policy will apply:

- a. for any FS occurrence with the potential to be upgraded to an accident or which will be reported by means of an FSIR, all onboard recording devices like the OLM, MSDRS, MDAU, CVR and FDR will be quarantined pending a decision on the requirement to retrieve the recorded data. This decision will be taken following consultation with unit FS Personnel when DFS if necessary. Until that decision is taken, personnel will avoid turning on the battery power or ground power to avoid losing recorded data, such as CVR information; and
- b. the quarantine will remain in effect until the data has been successfully downloaded and is proven usable for evidence purposes.

### **FLUID SAMPLING**

39. Fluid sampling is the gathering and submission of specimens of POL and other fluids for analysis. Sampling shall begin as soon as a unit learns of an occurrence. In the case of an accident, the sampling officer, usually the AFSO, must submit a statement of impoundment to the DFS Investigator using the format shown at Annex F. Sampling procedures shall be as directed in applicable CFTOs; if not specified, use sound engineering practices to prevent further contamination. If contamination is unavoidable, record its nature and if possible obtain a sample of the contaminant. When possible, more than one sample should be taken from each source.



40. Ideally, all fluid sample analysis should be done at QETE. However, the need to avoid operational delays may dictate that a preliminary analysis be conducted locally. Coordination with QETE shall be carried out prior to any local fluid sample testing and QETE will provide either direct or delegated oversight of the tests. In this case, a second set of fluid samples will be sent directly to QETE for analysis.

41. Unless clear evidence exists that contamination or other component breakdown did not contribute to the occurrence, the following items must be sampled:

- a. all entrapped fluids in any wreckage;
- b. all entrapped fluids in any failed or suspect fluid systems such as fuel, oil, hydraulics and oxygen along with associated filters; and
- c. all ground equipment (e.g. LOX/HOX cart, fuel bowser) and facilities (e.g. fuel tank) involved.

#### **CUSTODY OF SAMPLES**

42. Samples must be analyzed as quickly as possible. If duplicate samples are taken they should be retained by one of the following until they are released:

- a. FSO or D/FSO;
- b. DFS;
- c. CO or designate; or
- d. a CF-approved laboratory when authorized by one of the above and when overseen by QETE.

#### **NOTE**

Samples shall be labelled with the source component or item, the section or system of that item, the date and time of sampling, the nature of the sample fluid with any known or suspected contaminants, and any other information which will assist in the analysis.

43. The Fluid Sampling Kit (NSN 8115-21-886-4126) should be used, and is to be sent to QETE in accordance with transport instruction contained therein. QETE will send a replacement kit on request.

#### **LIFTING OF QUARANTINE / IMPOUNDMENT**

##### **AUTHORITY TO LIFT QUARANTINE / IMPOUNDMENT**

44. DFS is the authority to lift quarantine / impoundment. This authority is delegated, with the exception of photographic / imagery evidence, in order of precedence as follows:

- a. for Class I, II and Class III investigations directed by DFS: the IIC; and
- b. for Class III and IV SR or CR investigations:
  - (1) the WFSO or FSO, and
  - (2) the CO or a CO's delegated person of authority having the required knowledge to ascertain that the lifting of the quarantine / impoundment of item(s) will not affect the conduct of the investigation.

**NOTE**

Due to Privacy Act considerations, the DFS / AIA retains the authority for the release of all photographic / imagery evidence.

**PROVISION FOR RECORDING DEVICES**

45. Lifting of quarantine for recording devices can only be done once the agency charged with producing the data has advised the applicable authority that the information was successfully downloaded and is usable and that a printed copy of the data has been produced.

**RECORDING THE LIFTING OF QUARANTINE / IMPOUNDMENT**

46. Whenever log book entries have been made impounding or quarantining an item of evidence, the following endorsement shall be made in the log book on release of the item:

Released (*time, date, month, year*) on the authority of:

\_\_\_\_\_  
(*full details of authority for lifting impounding / quarantining*)

\_\_\_\_\_  
(Signature and Rank)

Impounding / Quarantining Lifting Authority

**NOTE**

For aircraft maintenance record sets, see C-05-005-P04/AM-001.

**DISPOSAL OF QUARANTINED / IMPOUNDED EVIDENCE**

47. Disposal instructions for certain items may only be issued by the appropriate authority at higher HQ, e.g. the applicable item manager at DAEPM. Before issuing such disposal instructions, the authority concerned must confirm whether the item is to be shipped under an FS quarantine or is to be released from quarantine.

48. Disposal instructions will include one or more of the following actions:

- a. DFS handling instructions for the FDR, CVR, MSDRS, HUMMS or any other recording devices from the occurrence aircraft;
- b. repair or return the items to normal use, including the return of personal property to the rightful owner;
- c. return the items to supply or forward for repair and overhaul;
- d. forward the items to a specified agency, e.g., QETE, AETE or contractor, for further investigation and analysis. Items are to remain under the FS quarantine and must be accompanied by sufficient details to describe the occurrence (e.g., UCR, CF 543, initial /

supplementary report). Pack such parts in accordance with D-LM-008-001/SF-001 – Specifications for Methods of Packing, and A-LM-187-001/JS-001 – Packing and Preservation General Procedures;

- e. retain the items for a specified period; or
- f. scrap the items.

#### **CIVILIAN INTO PLANE SERVICING FACILITY**

49. When a civilian into-plane servicing facility under DND contract has been quarantined by the appropriate NDQAR, the release from quarantine shall be carried out by the CFQAR.

#### **PROCESSING OF SPECIAL EQUIPMENT**

50. Certain items must be handled with particular care and caution to avoid personnel injury or equipment damage and to prevent further damage that might hinder the investigation. Specific handling instructions are outlined below.

#### **ESCAPE SYSTEMS**

51. If the occurrence involves an ejection seat or canopy, it should not be moved before the AETE specialist arrives on site.

52. Escape system components involved in ejections or damaged in accidents are to be photographed using close-up, high-quality colour photography before any on-site movement. All escape system components must be safetied by an AETE specialist prior to being shipped as per IIC instructions. Such items include ejection seats and all related components, e.g., leg straps, seat-pack shells, seat-pack / torso-vest contents, and parachutes. These components are to be packed in accordance with appropriate CFTOs to ensure that they arrive at AETE in the same condition as found at the accident site. Applicable armament orders shall be observed before shipping any armament component, and the parts shall be packed in accordance with CFTOs.

53. Ejection equipment is not to be dismantled and parachutes are not to be repacked in their original enclosures. This equipment is to be packaged so as to prevent further damage in shipment. If the seat rocket has not fired, separation of the catapult tubes could cause the rocket to ignite unless the seat is made safe by an AETE specialist.

#### **AVIATION LIFE SUPPORT EQUIPMENT**

54. In all ejections and in accidents involving injuries, all aviation life support equipment (ALSE) and all items of apparel must be suitably packed, annotated, and shipped to DRDC Toronto. DRDC Toronto should be consulted on proper packing / shipping procedures. Such items include aircrew helmets, oxygen masks, survival vests and contents, immersion suits, anti-G suits, handwear, footwear, flight clothing, and underclothing such as thermal vests, T-shirts and turtlenecks. To preserve the integrity of evidence, in-depth investigation of these items should not be attempted without the approval of DRDC Toronto. These items are to be struck off the appropriate inventory before shipping, as they will not be returned by DRDC Toronto. Personally purchased survival items, crests and badges are not to be removed. They will be returned to the owner when the DRDC Toronto investigation is completed.

**NOTE**

If an aircraft is involved in an accident or other flight safety occurrence, the recording device information shall not be downloaded for training debriefing, maintenance-related activities, or engineering test and evaluation unless specifically authorized by DFS.

**DISCLOSURE OF RECORDED INFORMATION**

**TREATMENT OF RECORDED INFORMATION AS PRIVILEGED**

55. The data from CVR, FDR or other cockpit flight-recording device shall always be treated as privileged. Except for specific training, maintenance, or engineering test and evaluation activities duly authorized by DFS, under no circumstances shall CVR, FDR or other Cockpit Flight Recording Devices information be downloaded, viewed or released.

**DOWNLOAD FOR TRAINING PURPOSE**

56. Under no circumstances shall data from CVR recorder be used for training purposes without the prior approval of DFS. Any unit that utilizes recording device information, such as HUD tape or video, for training purpose during post-flight debriefing of students, etc. is authorized to download/review recorded information for that specific purpose. However, the data shall be treated and handled in accordance with published training procedures and not released or used for any other purposes. If, during the review of recorded information it is discovered that there has been a Flight Safety Occurrence, the further review of the information will be stopped, and the Unit Flight Safety Officer contacted for further direction. A flight safety occurrence will be filed.

**DOWNLOAD FOR MAINTENANCE PURPOSE**

57. The CVR/FDR may be removed or downloaded to assist with maintenance-related activity only when conducted in strict accordance to the following provisions:

a. FDR:

- (1) No person, including any person to whom access is provided to the privileged representation shall knowingly communicate it or permit it to be communicated to any person. This implies that:
  - (a) Information from FDR shall not be used for any administrative, disciplinary proceedings or punitive actions,
  - (b) Information from FDR information will not be accessible through the Access to Information Act (ATI), and
  - (c) Crew identities shall not be released without their explicit consent;
- (2) The data shall solely be used for the purposes of maintenance activities related to aircraft systems;
- (3) Instructions for periodic FDR maintenance, data download, and calibration must be established for each fleet. Frequencies for these maintenance activities are to be detailed in the FDR maintenance schedule applicable for each fleet;

- (4) Data retrieved from the FDR shall be copied integrally and steps be taken to ensure that no information is lost, altered, or destroyed as a result of the downloading;
  - (5) Once every 12 months, the FDR downloaded data as well as the correlation data are to be sent to the National Research Council (NRC) Flight Data Recorder Playback Center for verification of the recorded parameters and accuracy. The frequency of the FDR data download may be increased, if so requested by the AIA, to verify the accuracy or the reliability of the system.
- b. CVR:
- (1) Instructions for CVR periodic maintenance, data download, and calibration must be established for each fleet. Frequencies for these CVR maintenance activities are to be detailed in the maintenance schedule applicable for each fleet; and
  - (2) Once every 12 months, the CVR data will be downloaded and sent to NRC Flight Recorder Playback Center for the purposes of validating the quality of the recording and the serviceability of the recorder. The frequency of the downloads may be increased, if so requested by the AIA, to verify the correct functioning of a recording system.

#### **DOWNLOAD FOR ENGINEERING TEST AND EVALUATION**

58. The FDR may be removed or downloaded to assist with engineering test and evaluation conducted by AETE. Removal and download shall only occur when called for in a test plan approved by the CF Test Flight Authority.

#### **NOTE**

If the capability to download the CVR data does not exist, then the complete CVR unit must be sent to NRC for analysis.

#### **DOWNLOAD OF OTHER RECORDING DEVICES**

59. For the purposes of this publication, specifically with respect to flight safety privilege and the authority to download data, any recording device, including a digital imagery and/or audio recorder, that provides details on crew actions and communications shall be treated as a CVR. Any device that only captures flight parameters, such as engine and flight instruments, shall be treated as an FDR.

#### **HANDLING RECORDED DATA**

60. All documents associated with a Cat. “A” accident must be handled as prescribed in C-05-005-P04/AM-001, Part 1

- a. whenever an FDR is required by this order, it must be operated continuously from the time electrical power is first available to the recorder before the flight to the time electrical power is removed from the recorder after the flight;
- b. except for data erased as authorized in paragraph (c) below, each certificate holder shall keep the recorded data prescribed by this order, until the aircraft has been operated for at least 25 hours. When an FDR is removed from an aircraft the FDR must either:
  - (1) be retained until 25 hours have been accumulated by the aircraft; or
  - (2) be copied and the data be retained until 25 hours have been accumulated by the aircraft;

- c. a total of one hour of recorded data may be erased for the purpose of testing the flight recorder or the flight recorder system;
- d. any erasure made in accordance with this paragraph must be of the oldest recorded data accumulated at the time of testing; and
- e. in the event of an occurrence (incident or accident) that requires notification of the DFS, the certificate holder shall remove the recorder from the aircraft and quarantine the recorded data.

#### **DATA CONVERSION DOCUMENTATION**

61. Documentation sufficient to convert recorded data into the relevant engineering units and discrete values must be maintained by the certificate holder.

#### **FDR DATA CORRELATION**

62. A correlation must be established between the values recorded by the FDR and the corresponding values being measured in the cockpit or on the aircraft. The correlation must contain a sufficient number of correlation points to accurately establish the conversion from the recorded values to engineering units or discrete state over the full operating range of the parameter. A single correlation may be established for any group of aircraft:

- a. that are of the same type;
- b. on which the flight recorder system and its installation are the same; and
- c. on which there is no difference in the type design with respect to the installation of those sensors associated with the FDR system. Correlation documentation must be maintained by the certificate holder.

#### **RECORDER MAINTENANCE AND TESTING**

63. The data recorders shall be serviced and tested regularly. They are critical for occurrence investigation, especially when the crew is unavailable and the aircraft is totally destroyed, in which case there is little evidence available to the investigators.

64. In the event of an occurrence that requires an FS investigation, the unit shall remove the recorder from the aircraft and quarantine the recorder data. No person shall use or erase any communication pertaining to the flight under investigation that has been recorded by the recorder without the express permission of DFS.

#### **ON-BOARD RECORDING**

65. The on-board recording of digital communications is required by all CF aircraft equipped with a CVR and FDR, which are equipped to utilize digital ATS communications and operate in a CNS / ATM environment.

Appendix 1  
Annex A  
Chapter 8  
A-GA-135-001/AA-001

## **APPENDIX 1 – HEALTH PROTECTION KITS**

<b>HEALTH PROTECTION KITS</b>			
<b>KIT</b>	<b>KIT SIZE</b>		
	<b>15-PERSON</b>	<b>30-PERSON</b>	<b>50-PERSON</b>
Extra protection – hooded coveralls (size a/a) NSN 8415-21-907-9476	30	60	100
Gloves, work, leather (size a/a) NSN 8415-21-510-5230	15	30	50
Mitten, chemical and oil protective NSN 8415-21-866-6927 (must be purchased locally)	15	30	50
Nitril/latex gloves (must be purchased locally)	90	180	300
Respirator, air filtering NSN 4240-00-629-8199	90	180	300
Goggles, industrial NSN 4240-21-843-3685 (must be purchased locally)	15	30	50





Annex B  
Chapter 8  
A-GA-135-001/AA-001

## **ANNEX B – AIRCRAFT ACCIDENT CHECKLIST**

References: A. QR&O 19.36 to 19.375 and 19.41

B. DAOD 1002-2, Informal Access to Personal Information

C. DAOD 2008-0, Public Affairs Policy – Authorities Table

D. DAOD 2008-3, Issues and Crises Management

E. DAOD 2008-4, Public Affairs, Military Doctrine and CF Operations

F. DAOD 3002-4, Ammunition or Explosives Accident, Incident, Defect or Malfunction Reporting. |

G. DAOD 2008-1, Accountability and Responsibility for Public Affairs

### **ACTIONS ON NOTIFICATION OF AN AIRCRAFT ACCIDENT**

1. Personnel at the site of an accident and for every occurrence shall ensure that action is taken to prevent loss of life, injury to personnel or damage to property and to protect evidence and classified material against loss, alteration or compromise, irrespective of the locations described in the following paragraphs.

#### **TELEPHONE NOTIFICATION**

2. When information is received by telephone, the following should be recorded:
- a. the informant's name, location and telephone number;
  - b. the time of the accident;
  - c. whether there is a fire;
  - d. exact location of accident site and its accessibility;
  - e. location and condition of the crew and passengers;
  - f. immediate medical response no matter what the condition of crew and passengers;
  - g. in the case of a fatality, whether the coroner has been advised;
  - h. whether there is serious property or environmental damage;
  - i. the type and tail number of the aircraft;
  - j. where the rescue team will be met;
  - k. whether local emergency services have been notified;
  - l. any other information that may be volunteered; and

#### **NOTE**

The checklist should include the need for phoning the informant back to check authenticity.

- m. the times at which the information was received and when it was relayed to designated recipients.

**NOTE**

Before ending the telephone call, caution the informant to remain clear of the wreckage, and ask the caller to attempt to deter others from entering the area or tampering with evidence. Suggest that this could well jeopardize the investigation and warn of hazards such as fuel fumes, fire, explosives, dust from composite materials, ejection seats, armaments, jettisonable tanks and pressurized systems.

**RESPONSE PROCEDURE AT ACCIDENT SITE**

**IMMEDIATE RESPONSE**

3. For every aircraft accident, personnel at the site shall ensure that the accident is reported as quickly as possible and that action is taken in conjunction with local authorities to:
  - a. prevent loss of life, injury to personnel or damage to property (including arranging for medical aid, fire suppression, making explosives safe, and SAR); and
  - b. protect evidence and classified material against loss, alteration or compromise (including arranging for guards, crowd control and photographing of wreckage before it is removed from runways or before the onset of snow).
4. The immediate response to an accident will normally be under the direction of the firefighters, and if fire or fumes are involved, self-contained breathing apparatus, coveralls, gloves and eye protection may be required. Only firefighters and medical personnel should be directly involved in the immediate response.
5. There must be a strictly enforced policy of no smoking, eating or drinking at the site, as these activities promote the inadvertent ingestion of potentially hazardous or toxic materials from the wreckage.
6. Establish a protected entry point to the site, at which a facility should be erected to enable access control, the donning and doffing of protective equipment, cleaning of boots and washing of hands before departing the site. All disposable gear such as masks, coveralls and gloves shall be removed and disposed of in accordance with appropriate directives.

**HEALTH PROTECTION**

7. After rescue activity is complete and the immediate threat to personnel and property has passed, the OSCER will give the DFS IIC access to the site. The IIC shall inspect the site in full protective gear to assess hazards. The following should be considered (IAW publication C-05-010-002/AG-000):
  - a. Fire hazards. Extreme caution should be exercised if the site is contaminated by fuel. Smoking is prohibited. Aircraft batteries should be disconnected as soon as possible.
  - b. Explosion hazards. Qualified technicians should safety all explosives including armaments and explosive-activated devices. Death or serious injury can also be caused by a tire exploding due to a damaged wheel.

**NOTE**

All personnel are to be kept a minimum of 500 feet from explosive devices and pressurized systems that have been subjected to accident impact forces or fire.

- c. Blood-borne pathogens. All blood, tissue and certain body fluids should be treated as hazardous. Puncture-resistant disposal containers must be available at the site if any of these substances are present. Proper biological hazard warning signs must be placed on the containers. Therefore, FS investigators and immediate accident responders should be inoculated for Hepatitis A and B. Non-disposable equipment such as boots and goggles shall be disinfected at the site.
  - d. Composite materials and toxic substances. Smoke and burning composite materials are toxic and hazardous to personnel and aircraft systems. Carbon fibre released from burning composite materials can be inhaled, become embedded in the eyes, or penetrate the skin or aircraft electrical system with adverse effects. Fibres can also be released in the atmosphere when this material is impacted or cut. For further details refer to C-05-040-012/TS001 – Post Aircraft Accident/Accident Release of Carbon Fibre. Exposed carbon fibre should be covered with plastic or sprayed with shellac. Some aircraft also contain plastics or other materials that give off toxins that may be inhaled or absorbed on exposure. Battery acid and Skydrol hydraulic fluid are highly corrosive.
  - e. Radiation hazards. Although efforts have been made to remove equipment containing radioactive substances, many of the older aircraft still have flight instruments containing radioactive material. The main hazard is from inhalation and ingestion of radioactive particles in dust when this equipment is broken or burnt. Refer to CFAO 34-24, Ionizing Radiation Safety.
  - f. Parts and equipment containing radioactive material are listed in C-02-040-003/TP-000. If a radioactive hazard is suspected, the Base Radiation Safety Officer shall be notified.
8. Once the site survey has been completed, the investigator will determine the protective clothing and PPE that personnel must use.

**RESPONSE PROCEDURE FOR FIRST UNIT ADVISED****NOTE**

When the unit of occurrence is also the unit of ownership, the actions listed in Para 10 also apply.

9. On the declaration of any air emergency in the area of a flying unit, the occurrence response plan should be implemented immediately. This ensures that medical, firefighting and rescue services are alerted and brought into position. Occurrences at non-flying units should be referred immediately to the nearest flying unit. The following actions may be required after an occurrence:
- a. preventing loss of life, injury to personnel and damage to property through the provision of medical aid, firefighting, SAR and safetying of explosives, pressure systems and ejection seats;

- b. security and protection of evidence, including wreckage (specific instructions regarding classified equipment are to be obtained from wing security officer. If COMSEC material is involved, the wing COMSEC officer should be consulted);
- c. B-GA-100-001/AA-000 and CFMO 42-04 require that all personnel involved in an air or ground accident or physiological incident receive a medical exam, toxicology screen and human factor assessment. This should be completed as soon as practicable following the occurrence.
- d. If there is a possibility that a “D” Category occurrence may be upgraded to an accident, then the medical requirements of CFMO 42-04 must be implemented; all personnel involved in an air or ground accident or physiological incident receive a medical exam, toxicology screen and human factor assessment. This should be completed as soon as practicable following the occurrence;
- e. reporting the occurrence as quickly as possible to the unit of ownership;
- f. taking photographs of the wreckage and other evidence IAW CFAO 53-2 before it is disturbed or obliterated by the elements;
- g. making a preliminary wreckage diagram should it be necessary to move the wreckage prior to the arrival of the DFS investigator;
- h. quarantining, impounding and / or taking samples from applicable items of evidence;
- i. locating and identifying all witnesses to the occurrence, including start crew supervisors and acquaintances of personnel involved (see CFAO 21-9 and A-GA-135-002/AA-001, Occurrence Investigation Techniques);
- j. implementing investigative procedures as required;
- k. assisting investigators by providing the following:
  - (1) administrative and logistic support,
  - (2) wreckage search-and-recovery teams
  - (3) transportation, and
  - (4) accommodation;

**NOTE**

If provision of these services is beyond the capability of the unit, refer to para 16 Recovery and Salvage section below.

- l. When an FS investigation is convened, the recovery and salvage officer (RASO) assigned to the occurrence is to abide by the recovery instructions from the IIC. Prior to the complete recovery/salvage of the aircraft, the RASO is to liaise with the appropriate DFS investigator (see also DAOD 4003-0, Environmental Stewardship);
- m. instituting or recommending measures to remedy the causes of the occurrence;
- n. observing the deadlines and routing for all reports by the unit of ownership; and
- o. disseminating information relating to the occurrence.

## **RESPONSE PROCEDURE FOR UNIT OF OWNERSHIP**

10. On the declaration of any aircraft accident involving a unit aircraft, the occurrence response plan should be implemented immediately as follows:

- a. ensuring that arrangements at the accidents site comply with above section entitled Response Procedures for Unit of Occurrence, and providing the necessary assistance to the unit of occurrence;
- b. ensuring that the occurrence is reported as quickly as possible. The following may require notification or direction with respect to impounding or quarantining, depending on the severity of the occurrence:
  - (1) CAS, DFS (1-888-WARN DFS);
  - (2) 1 Cdn Air Div AOC or through CanadaCOM; CEFCOM or CANSOFCOM;
  - (3) the wing or unit of occurrence;
  - (4) unit(s) of last fuelling, servicing;
  - (5) last unit of departure and other units involved;
  - (6) other units involved (for example, the army unit owning the vehicle being airlifted having developed a fuel leak when airborne);
  - (7) TSB thru DFS if the occurrence involves civilian aircraft and /or ATC agencies;
  - (8) NDQAR (if the occurrence involves a civilian maintenance or servicing contractor); and
  - (9) Director Quality Assurance (if the occurrence involves aircraft at NDQAR).

### **NOTE**

If an Address Indicator Group (AIG) is used, ensure that all other applicable addressees are also included in the message.

- c. Wing maintenance shall immediately refer to their copy of the appropriate security guide, i.e., C-12-XXX(A/C type)-000/AS-000, and prepare a list of classified equipment carried by the accident aircraft. Copies of the classified equipment list are to be given as soon as possible to the following personnel at the designated support wing and NDHQ:
  - (1) the Wing Security Officer,
  - (2) the FSO,
  - (3) the DFS IIC, and
  - (4) NDHQ / DAEPM for the item manager;

### **NOTE**

The wing custodian, assisted by appropriate personnel, shall determine the type and quantity of COMSEC equipment and material on board. The reporting procedures for loss and / or compromise of COMSEC material are contained in CIS/01/2, CF Instructions for COMSEC Material and Accountable Publications. This report must be sent without delay.

- d. quarantining, impounding and / or taking samples from applicable items of evidence;
- e. locating and identifying all witnesses of the occurrence, including start crews supervisors, and acquaintances of personnel involved (see CFAO 21-9 and A-GA-135-002/AA-001, Occurrence Investigation Techniques);
- f. conducting an appropriate investigation of the occurrence or requesting assistance;
- g. disposing of evidence only as authorized. When an FS investigation is convened, the RASO assigned to the occurrence is to abide by the recovery instructions from the IIC. Prior to the complete recovery/salvage of the aircraft, the RASO is to liaise with the appropriate DFS investigator (see also DAOD 4003-0, Environmental Stewardship);
- h. instituting or recommending measures to remedy each cause;
- i. observing the deadlines and routing of all reports by the unit of ownership; and
- j. disseminating information related to occurrences.

#### **RESPONSE PROCEDURE FOR OTHER WINGS OR UNITS INVOLVED**

11. On being notified of the occurrence or when so requested, any other wing or unit involved in an FS occurrence shall immediately carry out the following actions as appropriate:

- a. quarantine, impound and / or take samples from local items of evidence;
- b. identify witnesses of the occurrence, including:
  - (1) servicing and start crews;
  - (2) tower controllers; and
  - (3) anyone else with pertinent information;
- c. report the above actions by message to:
  - (1) the wing, base or unit of occurrence;
  - (2) the wing, base or unit of ownership; and
  - (3) CAS/DFS and 1 Cdn Air Div;
- d. assist investigators as required, e.g. providing administrative and logistic support, transportation and accommodation, as required;
- e. institute or recommend measures to remedy each cause of the occurrence that has been assigned as a responsibility of that unit; and
- f. disseminate information related to occurrences.

#### **RESPONSE PROCEDURE BY DFS**

12. The DFS occurrence response procedure includes:

- a. for occurrences involving non-CF aircraft, notifying the owners of the aircraft as required by NATO STANAG 3531, Letters of Agreement, or other standing arrangements, so that the actual owners of the aircraft may discharge their responsibilities;
- b. acting as FS advisor to test establishments, technical services agencies and their units;

- c. monitoring 1 Cdn Air Div, wing, base and unit actions;
- d. initiating and conducting DFS investigations;
- e. recommending special investigations when extraordinary circumstances prevail;
- f. reviewing and amending each cause factor as required;
- g. analyzing and recording PM;
- h. recommending and monitoring PM as necessary; and
- i. performing analysis, follow-up and dissemination of statistics and accident prevention information arising from occurrence reports.

### **RESPONSE PROCEDURE BY NDHQ**

13. NDHQ agencies shall respond to occurrences by:
- a. providing specialist advice, facilities and special testing as required; and
  - b. implementing those PM that are beyond the capabilities of subordinate formations.

### **SPECIAL ASSISTANCE IN AIRCRAFT ACCIDENT INVESTIGATIONS**

14. The unit of occurrence and unit of ownership must provide the DFS IIC with the assistance required to conduct the investigation. If special technical, medical or other assistance is required beyond that available at the unit of occurrence or unit of ownership, such assistance will be requested by DFS. Special assistance might be in the form of:

- a. airlifting personnel and equipment to and from the accident site;
- b. ground search parties;
- c. shelter and messing;
- d. detectors for locating vital aircraft parts;
- e. underwater recovery personnel and equipment;
- f. infrared scanning for aircraft wreckage location; and
- g. a receiver to detect the underwater acoustic beacon.

15. In addition, specially trained advisors may be approved by CAS or NDHQ to assist in salvage or analysis. In accordance with a letter of understanding between DFS and DRDC Toronto, DRDC Toronto will provide a human factors specialist for all A, B and C Category accident investigations. In addition, a DRDC Toronto Human Factor / Life Support Equipment member will be provided if requested for examination of non-ejection seat life support equipment. For ejection seat accidents, an AETE ejection specialist will normally be assigned to the investigation team (in accordance with MOU between AETE and DFS).

#### **NOTE**

In all cases, DFS must be advised of any such requirements in order to evaluate the benefits and arrange the support.



## **RECOVERY AND SALVAGE, COMMAND / CONTROL AND COMMUNICATIONS GUIDELINES**

16. There are four basic accident scenarios for which different command, control and communications guidelines are applicable; the following directions shall apply:

a. On DND property:

- (1) The unit comd, through a designated representative, shall retain command of the emergency response until the DFS IIC arrives. Upon completion of all pertinent on-scene investigations, control shall revert to the unit comd's representative;
- (2) Duties IAW A-GA-135-001/AA-001 shall be carried out by the FSO or his/her representative(s);
- (3) The unit comd shall ensure the site is cordoned and secured. Access to the site is permitted only on the appropriate authority of the DFS IIC or the unit comd's representative during the pre- and post-investigation process;
- (4) The DFS IIC shall assume the responsibilities outlined in A-GA-135-001/AA-001 and, in cooperation with the unit RASO, shall determine the hazards that exist and the level of protection required;
- (5) The RASO assists the DFS IIC as required. The DFS IIC may direct that the wreckage be collected and relocated for further investigation;
- (6) Accident site communications equipment shall be used, within reason, to ensure communications security. All requests for information should be directed to the DFS IIC through the designated PAO; and
- (7) The unit comd is responsible for the coordination of all activities that support recovery actions, salvage and clean-up of the site. Such activities shall normally be coordinated through the Environmental Officer, who will ensure that all reasonable efforts are made to leave the site in a condition that will not pose any hazard to the public (see also DAOD 4003-0, Environmental Stewardship).

b. Off DND property:

- (1) The supporting unit shall liaise with local authorities, and shall ensure coordinated support that may require a designated representative to be on site. If local authorities are present, military Emergency Response shall assist as required;
- (2) Applicable duties IAW A-GA-135-001/AA-001 shall be carried out by the FSO or designated representative(s);
- (3) If the accident is in a remote area or military flying area, the supporting unit shall ensure site control until the DFS IIC arrives;
- (4) The DFS IIC, in cooperation with the supporting RASO, shall determine the hazards which exist and the level of protection required;
- (5) The supporting RASO assists the DFS IIC as required. The DFS IIC may direct that the wreckage be collected and relocated for further investigation;
- (6) Accident site communications equipment shall be used, within reason, so ensure communications security. All requests for information should be directed to the DFS IIC through the designated PAO; and



- (7) The supporting unit is responsible for coordinating all activities that support recovery actions, salvage, and clean-up of the site. Such activities shall normally be coordinated through the Environmental Officer, who will ensure that all reasonable efforts are made to leave the site in a condition that will not pose a hazard to the public.

c. Submerged aircraft:

- (1) Emergency Response and SAR shall be coordinated by the appropriate RCC. The supporting unit shall liaise with RCC and provide available support;
- (2) Applicable duties IAW A-GA-135-001/AA-001 shall be carried out by the FSO or his/her representative(s);
- (3) DFS shall coordinate any external military / civilian assistance beyond the capabilities of the supporting unit for site security and aircraft recovery and salvage. If non-Air Force assets are required, an NDCC Ops tasking will be issued;
- (4) In cooperation with the supporting RASO, the DFS IIC shall provide the external agencies with technical advice, notification of possible hazardous material and the associated safety precautions;
- (5) The DFS IIC may direct the collection and relocation of the wreckage by external military/civilian agencies for further investigation at another site;
- (6) Accident site communications equipment shall be used, within reason to ensure communications security. All requests for information should be directed to the DFS IIC through the designated PAO; and
- (7) The supporting unit, in cooperation with the external military/civilian agency, is responsible for the coordination of all activities that effect recovery actions, salvage and clean up of the site. Such activities shall normally be coordinated through the Environmental Officer who will ensure that all reasonable effort has been made to leave the site in a condition that will not pose any hazard to the public at large. If non-air force assets are required, a NDCC Ops tasking will be issued.

d. Civilian airport:

- (1) Local Emergency Response authorities shall be in charge according to existing MOUs and Working Agreements and the Aeronautics Act. The supporting unit shall liaise with local authorities. The Working Agreement in force with TSB shall govern the investigative agency that will lead any investigation;
- (2) DFS shall coordinate any external military assistance beyond the capabilities of the supporting unit for aircraft recovery and salvage operations;
- (3) In cooperation with the supporting RASO, DFS shall provide the external agencies with technical advice, notification of possible hazardous materials and the associated safety precautions;
- (4) The supporting RASO assists the designated investigative agency as required; and
- (5) Accident site communications equipment shall be used, within reason, to ensure communications security. All requests for information should be directed to DFS through the designated PAO.

## **FACILITIES AND EQUIPMENT NEEDED ON RETURN FROM AN ACCIDENT SITE**

### **FACILITIES**

17. The following facilities should be readily available so that investigators can compile their field reports:

- a. a large secure room to which investigators may have 24-hour access;
- b. a telephone (preferably a dedicated line);
- c. competent administrative assistance with applicable security clearance;
- d. a white or blackboard, markers, chalk and eraser; and
- e. at least five large tables or desks for examining evidence and laying out the report during assembly.

### **REFERENCE MATERIALS**

18. The following references should be available:

- a. QR&Os, DAODs and CFAOs;
- b. B-GA-100-001/AA-001, CF Flying Orders;
- c. 1 Cdn Air Div Orders;
- d. local orders and instructions; and
- e. complete CFTO series for the aircraft concerned.

### **REPORT COMPILATION MATERIALS**

19. The following materials should be available:

- a. forms for FS Investigation Report, Ditching Report, and Emergency Escape from Aircraft Report (held by DFS);
- b. a personal computer with Microsoft Word application; and
- c. hard covers, fasteners and labels.

20. The supporting unit, in cooperation with the unit of ownership, is responsible for coordinating the activities that affect recovery and salvage operations and the clean-up of the site. Such activities shall normally be coordinated through local authorities and the Environmental Officer, who will ensure that all reasonable efforts are made to leave the site in a condition that will not pose a hazard to the public.

## **CHAPTER 9 – INVESTIGATIONS**

References: A. CFAO 24-1

B. CFACM 2-350, Emergency Response Planning

C. A-GA-135-003/AG-001, Airworthiness Investigator Manual

### **INTRODUCTION**

1. FS occurrences result in or have the potential to cause the loss of aviation resources. It is therefore important to investigate appropriate occurrences with the objective of quickly identifying effective PM that will either prevent or reduce the risk of a similar occurrence. The AIA has been delegated the responsibility to independently investigate matters of aviation safety concern and has delineated the policy by which this activity is conducted in the AIM. All FS investigation activities are also airworthiness investigations and they are carried out on behalf of the AIA. This chapter outlines the authorities for investigations, the occurrence classification system, the investigation classification system and the types of FS investigations done by DND / CF.

### **DEFINITIONS**

#### **AIRCRAFT DAMAGE**

2. Damage is defined as physical harm to an aircraft that impairs the value or normal function of that aircraft. Damage is said to have occurred when the aircraft or any portion of it is lost or requires repair or replacement as a result of unusual forces like a collision, impact, explosion, fire, rupture, or overstress. Damage does not include faults that progressively develop from repeated applications of load at or below the design operating limits of the aircraft as a result of normal flight stresses. Additional damage resulting from stress failures may be classified appropriately as damage. Routine system or component unserviceabilities are not considered to be damage, and need not be reported unless the originator feels that there was injury or damage potential.

#### **NOTE**

If the equipment has not been misused or subjected to unusual stress failures, it shall not be classed as damage, but as normal wear resulting from prolonged service use.

#### **AIRCRAFT MAJOR COMPONENTS**

3. Aircraft major components are:

a. Fixed wing:

- (1) the fuselage, cargo ramp and major structural sections thereof, but does not include canopies, jettisonable stores, windows, astrodomes, antennae, radomes, MAD booms, aerodynamic braking devices, small non-structural panels, doors or hatches, and non-integral nacelles,
- (2) the wings and major structural sections thereof, but not including the wing-tips, non-integral nacelles, spoilers, flaps, ailerons or other control-of-lift devices, and
- (3) the empennage and major structural sections thereof (vertical stabilizer, horizontal stabilizer, and stabilator), but not including the rudder or elevator;

b. Rotary wing:

- (1) the fuselage, cargo ramp and major structural sections thereof, but does not include, windows, astrodomes, antennae, radomes, small non-structural panels, doors or hatches, and non-integral nacelles,
  - (2) the main rotor and tail rotor blades system, main transmission, and gearboxes but not including the drive shafts,
  - (3) the helicopter tail boom and pylon, but not including the fairings, non-integral vertical or horizontal stabilizers or synchronized elevators, and
  - (4) the landing-gear oleos, legs, struts, sponsons and similar weight-supporting members and structures, but not including the tail wheel strut or support assemblies, wheels, floats, shoes, skis, helicopter cross-tubes or skids, non-integral removable axles, brakes, tires, gear doors or actuating rods; and
- c. UAV major components. UAV major components will be defined on a case-by-case basis as determined by individual UAV type and consultation with DFS.

**NOTE**

Powerplants are NOT considered to be major components for the purposes of determining the Aircraft Damage Level.

**INVESTIGATOR IN CHARGE (IIC)**

4. The IIC will be a qualified, trained and certified accident investigator appointed by the AIA or through authorized delegation by the 1 Div FSO. The IIC conducts all airworthiness investigation activities on behalf of the AIA. All activities of personnel involved in the investigation are to be coordinated through the IIC

**FS INVESTIGATION**

5. A flight safety investigation (FSI) refers to any investigation conducted under the terms of this publication and the AIM for the sole purpose of occurrence prevention. These investigations are also referred to as airworthiness investigations and fulfil the investigation requirement of the CF / DND Airworthiness Program.

**FS INVESTIGATION REPORT**

6. The report produced in support for a Class I or most Class II FSI into the circumstances of a particular FS occurrence, and subsequently commented upon by various levels of command and the PDIs is titled a FSI Report (FSIR).

**POWER PLANT**

7. The power plant includes the engine, engine-driven components and related systems, including propellers, afterburners, fans and the like.

**PERSONS WITH A DIRECT INTEREST (PDI)**

8. A PDI is a person, in the opinion of DFS, whose behaviour or the performance of whose products or organization may be commented on in the report and whose rights or reputation, or his/her product reputation may be adversely affected by the report. Typically, PDI status is given to crew members, the CO, Comd 1 Cdn Air Div and contractors directly involved in the operation maintenance or manufacturing of the aircraft.

## **NEED TO INVESTIGATE**

9. FS occurrences result in or have the potential to cause a loss of resources. Therefore, any occurrence that could lead to the identification of causes and determine effective PM will be investigated. This chapter describes the tasking authorities and necessary protocols for the conduct of FSIs.

## **AUTHORITY TO INVESTIGATE**

10. The *Aeronautics Act*, the A-GA135-001/AA-001, Flight Safety for the CF, and the delegations and authorizations as outlined in the A-GA-136-003/AG-001 Airworthiness Investigator Manual provide the authority to investigate FS occurrences. These documents define terminology, responsibilities and procedures for investigation. The A-GA135-002/AA-001 also provides guidance for terminology and prescribes procedures specific to investigative techniques.

## **FSI CONVENING AUTHORITY**

11. DFS / AIA is the convening authority for Class I and Class II investigations as well as Class III investigations done in the form of an ESR. The convening authority for a Class III and IV investigations is delegated by the AIA to the WFSO.

## **INVESTIGATION RESPONSIBILITIES**

### **DEPARTMENTAL RESPONSIBILITIES**

12. The MND has designated DFS as the Airworthiness Investigative Authority for the CF / DND. The AIA is responsible to independently investigate all matters of aviation safety concern, an MND requirement based in the *Aeronautics Act* and a coincidental requirement of both the Airworthiness Program and the FS Program. Consequently, DFS / AIA shall ensure that occurrences as defined in this document are documented and investigated as required. In principle, the completion of a Combined Report or a Supplementary Report constitutes in itself an investigation, although it may consist of the simple gathering of facts as done for occurrences labelled as Repetitive Occurrences (ROs).

### **COMMAND RESPONSIBILITIES**

13. The unit CO shall ensure that all FSIs affecting aircraft under unit control are investigated; however, all investigation activities are undertaken on behalf of the AIA as delineated in the AIM. If an investigation is impractical for the unit of ownership to investigate, the WComd / Comd 1 Cdn Air Div and DFS shall be advised.

## **OCCURRENCE CATEGORY**

14. FS occurrences are categorized according to the overall seriousness of the occurrence.

15. The occurrence category is an alphabetical designation assigning an overall seriousness classification to an occurrence.

- a. aircraft damage level (ADL); or
- b. personnel casualty level (PCL).

16. Occurrence categories range from A to E for both air and ground occurrences, with A being the most serious and E identifying situations where, although no damage occurred, the potential for damage or injury existed. Annex A details the Occurrence Category to be assigned to an occurrence based on the ADL and PCL.

## AIRCRAFT DAMAGE LEVEL

17. The ADL is a qualitative categorization system used to determine the level of damage sustained by an aircraft during an occurrence. The following damage level definitions are used to reflect the degree of damage:

- a. Destroyed / missing: The aircraft has been totally destroyed, is assessed as having suffered damage beyond economical repair or is declared missing.

### NOTE

Aircraft totally destroyed are normally written off the inventory. Accidents with a lower ADL may subsequently result in administrative write-off of the aircraft for reasons not directly related to the damage. The original ADL will be recorded in the FSOMS for statistical purposes.

- b. Very serious: The aircraft has sustained damage to multiple major components requiring third-line maintenance.
- c. Serious: The aircraft has sustained damage to a major component requiring third-line maintenance.

### NOTE

For very serious or serious damage levels, third-line maintenance is considered applicable if the damaged component is shipped to a contractor or a third-line facility for repair, the repair is carried out in part or in full by a mobile repair party from a contractor or third-line facility dispatched specifically for that purpose, or the repair is carried out by a third-line maintenance capability integral to a military unit.

### NOTE

When a fuselage, wing, helicopter drive train or rotor blade are damaged beyond economical repair or are shipped to a repair facility, the level of damage will be referred to DFS for categorization (e.g. rotor blade change is minor damage, multiple blade changes is serious damage, transmission overspeed requiring overhaul is minor damage, sudden stoppage requiring complete change of drive train is serious damage).

- d. Minor: The aircraft has sustained damage to non-major components requiring normal second-line maintenance repair.
- e. Nil: The aircraft, including the power plant, has not been damaged.

### NOTE

When there are unique contractual maintenance arrangements in place that preclude CF personnel from performing repairs that are considered within second-line maintenance, the case will be referred to DFS, who will assign the ADL.



## **PERSONNEL CASUALTY LEVEL**

18. The PCL is a colour-based categorization system used to identify the most severe casualty suffered by personnel in an FS occurrence. The PCL is determined by a medical officer in accordance with CFAO 24-1. The PCL assigned for an occurrence is defined as follows:

- a. BLACK. BLACK is the PCL level assigned when a fatality has occurred;
- b. GREY. GREY is the PCL level assigned when personnel is missing;
- c. RED. RED is the PCL level assigned when personnel is very seriously injured or ill and the person's life is in immediate danger;
- d. YELLOW. YELLOW is the PCL level assigned when when personnel is seriously injured or ill. There is cause for immediate concern but the patient's life is not in immediate danger. Usually the person is non-ambulatory; and
- e. GREEN. GREEN is the PCL level assigned when personnel are moderately injured or ill in an occurrence for which medical attention is needed but there is no immediate concern. Usually the person is ambulatory.

### **NOTE**

FS reports shall only provide PCL information. No other medical information or details shall be circulated on the FS net or entered in FSOMS.

## **CLASS OF INVESTIGATION**

### **CRITERIA FOR ASSESSING FSI CLASS**

19. In order to assign investigations to the appropriate authority, an occurrence investigation classification system is used. The purpose of classifying FSIs is to determine the amount of time and resources that will be devoted to the investigation. The type of investigation into an occurrence and the level of effort will be determined by an assessment of the following three criteria:

- a. the occurrence category;
- b. the safety of flight compromise level; and
- c. other factors which could impact on the reputation of the FS Program, the Airworthiness Program, the CF and the Department.

20. FSIs will be classified I to IV based on the above criteria. Annex B shows the Class of investigation assigned based on these criteria.

### **SAFETY OF FLIGHT COMPROMISE LEVEL FACTOR**

21. The SFCL is categorized with a qualifier that describes the level to which safety margins were compromised during an occurrence. By extension, it provides an indication of how much the crew and / or aircraft were put at risk.

- a. Extreme. The aircraft and / or crew were exposed to an extreme risk and the outcome of the occurrence could have been catastrophic and might have resulted in the loss of life or the aircraft;
- b. High. The aircraft and / or crew were exposed to a significant risk and the outcome of the occurrence could have been hazardous and might have resulted in very serious injury or damage to the aircraft;
- c. Medium. The aircraft and / or crew were exposed to a moderate risk and the outcome of the occurrence could have been major and might have resulted in serious injury or damage to the aircraft; and

- d. Low. The aircraft and / or crew could potentially have been exposed to minor risks if the hazard was left uncorrected and this exposure might have resulted in minor injury or damage to the aircraft.

#### OTHER AGGRAVATING FACTORS

22. There are other factors that may elevate the level at which an occurrence is investigated. If a higher level of investigation might lead to a more effective reduction of risk to persons, property or the environment then this level should be assigned. Consideration shall also be given to maintaining the trust of CF personnel and the general public in the FS Program and the CF by having occurrences investigated at the appropriate level.

#### RELATIONSHIP BETWEEN INVESTIGATION CLASS AND INVESTIGATION TYPE

23. Each FSI Class requires the production of a report format as follows:
- a. Class I: FSIR;
  - b. Class II: FSIR, A/FSIR or ESR;
  - c. Class III: ESR or SR; and
  - d. Class IV: CR or SR.

#### TASKING FOR CONDUCT OF INVESTIGATIONS

24. DFS / AIA conducts all Class I and Class II investigations. A specific FSO and IIC will be tasked by DFS to conduct any Class III ESR. All other investigations are conducted by unit FSO on behalf of DFS / AIA and are released by the supporting wing FSO (IIC). Some occurrences are repetitive in nature and limited benefit would be gained by carrying out a full-scale investigation.

#### REPETITIVE OCCURRENCES

##### BACKGROUND

25. Some occurrences are repetitive in nature and limited benefit may be gained by carrying out a detailed investigation. In the past, the term “For Tracking Purposes Only” (FTPO) had been used in FSOMS to track these occurrences but little guidance was provided for the management of such occurrences and the criteria used to qualify an occurrence as FTPO were inconsistent. Further, the term FTPO gave the impression to FS staff that no investigation had been carried out and that the data was more or less valuable for trend analysis. A simple methodology requiring minimal effort is required to capture these occurrences as they provide valuable statistical data.

##### DEFINITION OF REPETITIVE OCCURRENCE (RO)

26. A RO is defined as a recurring type of FS incident where the event and investigation results are consistent with a previous investigation. The use of an RO is limited to a SR or a CR.
27. Typical ROs are the Cormorant tail rotor half-hub cracks, bird strikes with little to no damage and the Griffon chip light detectors occurrences. Given the repetitive nature of these incidents and the limited potential to find new causes and original PM, a rudimentary investigation is still required to ascertain the facts and confirm the occurrence is similar in all aspects.



## **RO CONDITIONS**

28. To qualify as an RO, an occurrence must meet the following conditions:
- the personnel involved has suffered no injury;
  - the aircraft has sustained only minor or no damage;
  - the PM and cause factor(s) for the investigated occurrence is/are in line with a reference occurrence; and
  - the FS risk and aggravating factors, if any, are in line with the reference occurrence which will serve as the initial RO.

## **RO STAFFING, APPROVAL AND MONITORING**

29. Any occurrence which will be treated as an RO must refer to an original FSOMS reference ID # for which a detailed investigation was completed. It will use the same key words, cause factor(s) and PM(s) of the reference RO.
30. The 1 Div FSO staff monitors the occurrences reported by different wings and is the approving authority to accept a type of occurrences as an RO. If it is determined that a certain type of occurrences should be treated as a RO, the FSO or WFSO shall submit a request to the Div FSO for approval and inclusion on the RO master list. The suitability of the RO designation will be evaluated by the 1 Div FSO staff and approved, as applicable. The WFSOs and FSOs of affected units will be informed of the newly approved RO. The approved RO list will then be updated by the 1 Div FSO staff and posted on the FS Intranet site.
31. By keeping track of ROs, DFS can initiate more detailed analysis if some concerns are identified or as required. The RO list shall be reviewed annually for suitability by the FSOMS WG and briefed as an agenda item at the DFS annual seminar.

## **FSI TEAM SELECTION**

32. FSI team personnel are tasked by the appropriate FS tasking authority, the AIA. The selection of the IIC and FSI team members for Class I, II and Class III ESRs occurrences is determined by DFS / AIA.
33. DFS / AIA will task the investigation of certain Class III ESR occurrences to Wing. The tasked member shall liaise with DFS for support and guidance, as required.

## **INVESTIGATOR-IN-CHARGE**

34. All FS investigations will have an IIC. This is normally the WFSO (typically holding an IIC 3 qualification) for Class III or IV investigations. The IIC for Class I or II investigations should be a DFS accident investigator currently employed at DFS (typically holding IIC 2 or IIC 1 qualifications). In unusual circumstances, DFS may appoint another trained investigator who is not currently employed at DFS. Anyone tasked to conduct an FSI shall be excused from all other duties until released from the investigation by DFS. The IIC reports to DFS / AIA for the conduct of the investigation.
35. The IIC has the authority to quarantine and impound evidence, interview witnesses and examine documents and equipment related in the occurrence. The IIC also has certain delegated authorizations from the AIA for activities associated with investigations as outlined in the AIM. Detailed process guidance for the investigation is promulgated in A-GA135-002/AA-001.

36. The mandate of the IIC is to conduct an investigation of the occurrence, gather factual information and conclude with findings and recommendations and submit a report on the FSI in the mandated format. The AIA's policy on investigator behaviour, interaction with personnel, other authorities and agencies, intra-team protocols, and other investigation requirements are contained in the AIM. While deployed for this effort, the IIC shall remit daily SITREPs as per Annex C to DFS / AIA. For ESRs, the IIC will liaise through an appointed DFS desk officer.

#### **MEMBERS AND ADVISORS**

37. Personnel assigned to an FSI team are tasked by DFS / AIA and will report to the IIC until released from duty by DFS / AIA. Unless there is no reasonable alternative, a team member should not be selected from the unit of occurrence. The circumstances of the occurrence will dictate the team complement best suited to investigate considerations such as human factors, technical issues, recovery and salvage support and medical issues. In addition, advisors such as meteorologists, other aircrew, air traffic controllers and paratroop officers should be appointed when the need arises. Specialist advisors not specifically assigned to the FSI team in the tasking order may be required to assist in the investigation. These individuals will be appointed with an observer status and will normally have limited access to information not related to their field of expertise. At the discretion of the IIC and provided an undertaking is signed to treat the information related to the investigation as privileged, they could be integrated fully into the investigation team.

#### **MINIMUM FSI TEAM COMPLEMENT**

38. The FSI team tasked by DFS / AIA will ideally comprise:
- a. IIC. This person is a qualified and certified investigator who is authorized by the AIA to conduct the investigation and is familiar with the aircraft type and role;
  - b. Aircrew member. This person is a subject matter expert who is qualified and current on the aircraft type involved in the occurrence;
  - c. Technical member. This person is the DFS AERE Officer or an AERE officer familiar with the aircraft type;
  - d. Medical member. This person is the DFS Flight Surgeon or a military physician, ideally a flight surgeon;
  - e. Specialist advisors. Advisors will be appointed as required; and
  - f. Observers. Observers will be appointed as required.

#### **TYPES OF OCCURRENCE REPORTS**

39. There are several types of FS occurrence reports that may need to be completed depending on the Class of investigation carried out:
- a. Initial Report (IR);
  - b. Supplementary Report (SR);
  - c. Combined Report (CR);
  - d. Enhanced SR (ESR);
  - e. Abbreviated FSIR (A/FSIR); and
  - f. FSIR.

**INITIAL REPORT (IR)**

40. The IR describes the immediately available particulars of the occurrence and must be sent within 12 hours of the event. It is generally reported through FSOMS. If the user is unable to access the application, occurrence details shall be sent to the designated wing for input into the database. Annex E lists the information that must be submitted in the IR. An IR form can be downloaded from the DFS websites.

**NOTE**

When and if applicable, the IR should include whether “quarantining was undertaken” (e.g. quarantining of aircraft and aircraft oxygen system, aircrew ALSE, LOX trailer, LOX storage tank), so that those reviewing the FSOMS entry know right away that this important airworthiness investigation step was not omitted or overlooked.

**SUPPLEMENTARY REPORT (SR)**

41. The SR is the report normally produced by the wing or unit for aircraft incidents of category D and E. It shall be submitted within 30 calendar days of the occurrence. The report requirements are shown in Annex F.

**COMBINED REPORT (CR)**

42. The CR is the combination of the IR and SR in a single report submitted for minor occurrences requiring limited or cursory investigation, provided it can be released within 48 hrs of the occurrence. The report format is the same as the SR.

**ENHANCED SR (ESR)**

43. The ESR is to be used for occurrences that are sufficiently complex to warrant a more thorough investigation than a normal SR, but do not require the same degree of scrutiny that is required for an FS Investigation Report (FSIR). The reporting requirements are the same as for the SR except that the investigation paragraph will be more detailed. DFS is the tasking and releasing authority for ESRs.

**FS INVESTIGATION REPORT (FSIR)**

44. The FSIR is a comprehensive report on an FS occurrence and all related aspects, so the reviewing authorities have detailed information on which to base recommended PM. The report follows the ICAO accident report format. DFS is the tasking and releasing authority for FSIRs. The FSIR requirements are available on the DFS website.

45. FSIRs shall normally be unclassified and be released to the public via the DFS Internet site and internally to the Department on the Intranet site.

**ABBREVIATED FSIR (A/FSIR)**

46. *The Draft for Comment* report stage may be omitted for accidents for which there are no further substantive PM or for accidents in which all PM have already been implemented. DFS may also elect an abbreviated review process if the report is straightforward and findings and recommendations are not expected to be controversial. In this case, an FSIR Draft for Comment may be distributed by e-mail or other means. Comments will be requested within 10 working days of receipt of the draft report. This

final report resulting from this abbreviated review process is called an Abbreviated FSIR.

## **DOCUMENTATION LEADING TO PRODUCTION OF FSIR**

47. In the process of staffing a FSIR the IIC will have to submit different documents which will include:

- a. Preliminary FSIR;
- b. *From the investigator*;
- c. Draft FSIR;
- d. Final FSIR; and
- e. *Epilogue*.

### **PRELIMINARY FSIR**

48. The purpose of the Preliminary FSIR is to provide senior management with factual information pertinent to the occurrence and provide immediate PM recommendations where appropriate. The Preliminary FSIR shall include Part 1, Factual Information, and Part 4, Safety Recommendations of the FSIR. One blank page for each of Part 2 and Part 3 shall be included for completeness. In the interest of expediency, the report may be produced in one language only (normally English unless the addressee is a French language unit (FLU)).

### **FROM THE INVESTIGATOR (FTI)**

49. The FTI summarizes information contained in the preliminary report. It shall describe factual information, immediate safety actions taken and the focus of the ongoing investigation. The FTI will be published in bilingual format on the DFS website and in “Flight Comment.” The complete document will not normally be longer than two pages.

### **FSIR DRAFT FOR COMMENT**

50. The purpose of the FSIR Draft for Comment is to confirm the accuracy and completeness of the report. The FSIR Draft for Comment will be distributed directly to all PDIs, and PDI comments will be returned directly to DFS. The FSIR Draft for Comment will capture factual information, analysis, findings and PM pertaining to the occurrence. The purpose of the direct response is to ensure privileged information is protected as required by the *CTAISB Act*.

### **FINAL FSIR**

51. The final report is titled FSIR. It is a comprehensive report on an FS occurrence and all related aspects to provide reviewing authorities with detailed information on which to base recommended PM. The report follows the ICAO accident report format. DFS will be the tasking and releasing authority for the report. The report requirements are available on the DFS website. The Final FSIR will include valid PDI input from the Draft for Comment process. The report will be produced in both official languages.

52. FSIRs shall normally be unclassified and be released to the public via the DFS Internet site and internally on the DND Intranet site.

### **EPILOGUE**

53. The *Epilogue* summarizes the information contained in the Final Report. The Epilogue will be published in bilingual format on the DFS website and in Flight Comment.

## **REPORT FORMAT**

54. In the course of investigating an FS occurrence, the IIC shall be responsible for staffing a

Preliminary FSIR, a Draft FSIR for Comment and a Final FSIR. All three reports will adhere to the same format and each successive report will be a more detailed or refined iteration of the previous report. Although formally addressed in the Preliminary and Final Report, safety recommendations will be promulgated by the IIC whenever the investigation discovers a deficiency that requires immediate action from the chain of command.

55. Investigations of aircraft accidents and serious incidents are promulgated by means of the FSIR format. The FSIR closely parallels the internationally accepted ICAO format. The Final Report is released to the public and the authority of the DFS. The report contains four sections:

- a. facts;
- b. analysis;
- c. conclusions; and
- d. PM.

## REPORT DEADLINES

56. Report deadlines shall be met unless there are extenuating circumstances and an extension is authorized by DFS / DFS 2. All times are not-later-than times referenced from the date of occurrence. Table 3 provides the timelines for each report type.

REPORT TYPE	TIMELINE
Preliminary FSIR	4 weeks
FTI	5 weeks
Draft FSIR	7 months
Final FSIR	12 months
Epilogue	12 months

**Table 3 – Report timelines**

## HANDLING OF COMMENTS FROM PDI

57. Since the chain of command is routinely involved in post-occurrence PM, superior officers may well benefit from or contribute to inputs submitted by PDIs at subordinate levels. If a PDI wishes the chain of command to be given access to their representations, they may indicate this by signing a waiver and identifying those individuals (or levels of command) that they believe should have access to their input. DFS will then distribute accordingly.

58. When an input from a PDI is released to the chain of command, the input remains privileged. It needs to be treated as such and circulated on a need to know basis only. It may only be used for accident prevention purposes. The principle of protection of representations, as espoused in the *CTAISB Act*, shall be overriding and, where doubt exists regarding further dissemination, DFS must be consulted.

## FOLLOW-UP ON PROPOSED PM

59. DFS will forward the Final FSIR to CAS, who will subsequently distribute it to the OAA and TAA, as applicable, to allow them the opportunity to review and provide input into the proposed PM. They will have access to the PDI comments for which a waiver has been signed, in accordance with Paras 52 and 53 above. Should the OAA or TAA determine that a recommendation in the FSIR is not feasible, they shall advise the Airworthiness Authority in writing of their decision and the rationale for it. It is highly desirable that the decision not to implement a recommendation be accompanied by a formal

risk assessment.

60. OAA and TAA shall submit any comment and input into the proposed PM (including risk assessments) to CAS within 21 days following receipt of the Final FSIR. The AA will consider the input from the OAA and TAA during the formulation of the final action directive.

61. Once the action letter has been released by CAS, DFS will send a letter to each PDI outlining the DFS position on their representations. The cover letter shall clearly indicate if the PDI comments were incorporated in the FSIR and the rationale for the DFS decision in this regard.

62. Chapter 11 of this publication describes the generic handling and follow-up of PM. Chapter 2 of the AIM details the principles of airworthiness investigations and articulate the processes for the follow-up of PM stemming from airworthiness investigations.

## **USE AND HANDLING OF FS REPORTS**

63. Reports prepared under the authority of this publication are considered by the CF to be sensitive documents and, unless specifically authorized, these reports and their attachments shall not be used for any purpose other than FS. The special treatment accorded these reports is of vital importance in obtaining complete cooperation from witnesses and in determining the real cause(s) of an occurrence. Authorization for other uses shall only be granted with the express concurrence of DFS / AIA. Examples of agencies who might have access to FS information are as follows:

- a. a coroner requests access for the purposes of a coroner's investigation; and
- b. an individual is conducting a coordinated investigation under the provisions of one or more signed agreements (a STANAG or an MOU with TSB).

## **PROTECTION OF INFORMATION IN FS REPORTS**

64. The concept of classifying information given during an FS investigation as privileged encourages a frank and open reporting culture. This helps to determine the cause(s) quickly and to develop the most appropriate PM. It must be noted that FS reports may be accessed through the *Access to Information Act*. Nevertheless, the contents of the reports are eligible for protection under the *CTAISB Act*, *Access to Information Act* and *Privacy Act*.

65. It is the policy of DND that some investigation reports will be made available to the public in order to facilitate accident prevention throughout the aviation community. They are released under the authority of the DFS / AIA pursuant to the powers delegated to him / her by the MND as the Airworthiness Investigative Authority of the CF, with the understanding that the reports will be used for no other purposes than accident prevention.

## **RECONVENING AN FSI**

66. An investigation shall be re-opened by DFS or the delegated FSO without delay if it appears that some evidence was not considered or was omitted; if a relevant aspect was not covered adequately; or new evidence has been uncovered, and this evidence would lead to a PM which has not already been recommended. Such action should not be taken unless absolutely essential.

## **RELATIONSHIP BETWEEN FSI AND BOARD OF INQUIRY**

67. The effectiveness of the FS Program is reliant on open, honest and timely reporting of occurrences by individuals without fear of retribution. When required, the CF may be required to convene a collateral investigation concurrent with or in addition to a FS investigation for the purposes of



determining administrative or disciplinary disposition. In order to preserve the fundamental principles of the FS Program, FSOs shall not be appointed to or participate in collateral investigations. Information gained by FSOs through the conduct of a FS investigation shall only be provided to a collateral investigation on the authority of DFS.

68. When an aircraft accident occurs, a separate Board of inquiry may be convened in accordance with QR&Os. The requirement to conduct a Board of inquiry might be for a variety of reasons such as Investigation of Claim By or Against the Crown; QR&O 21.46, Investigation of Injury or Death; or to support COMSEC, administrative or disciplinary actions. This collateral investigation shall be independent of the FS investigation into the same occurrence. Privileged information (as defined in sections 28–30 of the *CTAISB Act*) which is gathered during the course of the FSI shall not be made available to the Board of inquiry President. However, all the factual information and a statement of cause, if available, will be made available upon request.

## **COORDINATED INVESTIGATIONS**

69. Within Canada, TSB is responsible for investigating all aviation occurrences involving aircraft other than military conveyance aircraft or facilities. DND has the responsibility for investigating all occurrences involving military conveyance aircraft or facilities. The *CTAISB Act* defines a military conveyance aircraft as one being operated by or on behalf of DND, CF or a visiting force.

70. When the occurrence involves both civilian and military aircraft and / or facilities, the work of civilian and military investigators will be coordinated and will be governed by a DND / TSB Working Agreement developed for that purpose. The DND investigation will be conducted under the authority of section 4.2 of the *Aeronautics Act*, the *CTAISB Act*, the DND / TSB Working Agreement and in accordance with this publication. The TSB investigation will be conducted under the authority of the *CTAISB Act* and in accordance with the DND / TSB Working Agreement. Coordinated investigations with other military forces will normally be conducted within the procedures contained in ICAO Annex 13 for investigations involving non-NATO foreign military aircraft, and in STANAG 3531 for investigations involving NATO nations.

## **ACCESS TO INFORMATION REQUESTS**

71. The *Access to Information Act* (ATIA) provides broad and effective legal access to information generated by government employees and information about government employees. With respect to FS investigations in general, and more specifically aviation accident / incident investigations, the ATIA, the *Privacy Act*, the *Aeronautics Act* and the *CTAISB Act* provide some protection for information obtained through investigations. Provisions for protection of privileged information is fully protected from release through the *ATI Act*. WFSOs are not expected to be current with the provisions of the various statutes mentioned above nor are they expected to handle FS ATI requests. All requests for FS information should be immediately routed through the designated ATI officer for the wing and handled according to the provisions stipulated in Chapter 6 of the AIM and applicable annexes. If that officer is not aware of the protections afforded by the various laws, they should be cautioned and advised to contact DFS (JAG) for legal advice.





Annex B  
Chapter 9  
A-GA-135-001/AA-001

## **ANNEX B – FLIGHT SAFETY INVESTIGATION CLASS TABLE**

This table serves as a guide only. DFS reserves the right to determine the Class of investigation to be done on any category of occurrence. DFS is the tasking authority for Class I and II investigations. Further, DFS shall be contacted as soon as possible for any accident (Occurrence category ‘A’ to ‘C’) and /or for any occurrence having a SFCL equal or greater than High.

FACTORS			INVESTIGATION		
OCC CATEGORY	SFCL	OTHER AGGRAVATING FACTORS	INV CLASS	AGENCY	RECOMMENDED REPORT TYPE
-	Extreme to High	Extreme to High	I	DFS	FSIR
C	Medium	Medium	II	DFS or WFSO	ESR
D, E	Medium	Medium	III	WFSO or UFSO	SR
E	Low	Low	IV	UFSO	SR or CR

Occurrence category: The occurrence category is based on the combination of the ADL and PCL as per the Occurrence Category Table at Annex A.

Safety of flight compromise level: The SFCL indicates the actual level of risk experienced by the personnel and / or aircraft during an occurrence or the potential SFCL.

Other aggravating factors: There are other factors that may elevate the level at which an occurrence is investigated. If a higher level of investigation might lead to a more effective reduction of risk to persons, property or the environment then this level should be assigned. Consideration shall also be given to maintaining the trust of CF personnel, the trust of the general public in the FS Program and in the CF by having occurrences investigated at the appropriate level.



Annex E  
Chapter 9  
A-GA-135-001/AA-001

## **ANNEX E – INITIAL REPORT CONTENT**

The following information should be reported in the event of an aircraft occurrence and will form the content of the Initial Report and be entered into FSOMS within 12 hours of the occurrence.

### **GENERAL**

- Date/Time of occurrence
- Type of occurrence
  - Accident / Incident
  - Air / Ground
  - Bird strike
  - Armament
- Personnel Casualty Level (PCL) (most serious injury assessed IAW B-MD-007-000/AF-003)
  - Nil
  - Minor injury or illness (Green)
  - Serious injury or illness (Yellow)
  - Very serious injury or illness (Red)
  - Fatality (Black)
  - Missing (Grey)
- For each injury
  - MOS ID
  - Role (Aircrew, Maintenance, Other)
  - Position on aircraft if on board
  - Injury Severity
  - PCL

### **AIRCRAFT**

- Aircraft Damage Level (ADL)
  - Missing or Destroyed
  - Very serious damage
  - Serious damage
  - Minor damage
  - Potential for incident or accident
- Aircraft Type and Registration
  - Unit of operation
  - Unit of ownership
- Phase of flight (e.g. parked, in-flight with description, maintenance)
- Mission type (short description)
- Flight attributes (if applicable)
- Barrier Engagement (IAS, Wind, Weather, and Temp)

## **LOCATION**

- Location of occurrence (describe)
- Navaid location (applicable for bird strikes)

## **DESCRIPTION**

- Detailed description of occurrence
  - Statement of fact (Who, What, Where and When)
  - De-identified information

## **PERSONNEL INFORMATION**

For each person injured, the following is required:

- Role
- MOS ID
- On board aircraft
- Injury classification (most serious injury assessed IAW B-MD-007-000/AF-003) FS reports shall only provide PCL information. No other medical information or details shall be circulated on the FS net or entered in FSOMS)

## **CONDITIONS**

- Weather
- Cloud
- Visibility
- Light condition
- Wind Speed / Direction

## **BIRD STRIKE REPORT REQUIREMENTS**

The following information should be reported in the event of a bird strike and will supplement the content of the Initial Report and be entered into FSOMS within 12 hours of the occurrence.

## **BIRD STRIKE REPORT**

- Category
  - Impact / Near miss / Sighting
- Remains submitted
  - Yes / No
- Within 5 NM of airport
  - Yes / No
- Flight disruption
  - Continued flight
  - Returned to airport
  - Landed Nearest airport
  - Aborted take-off
- NOTAM warning
  - Was alerted
  - Didn't check
  - None issued
  - Not available

- Lights on
  - External
  - Wing
  - Navigation
  - Strobe
  - Red rotating beacon
  - White rotation beacon
  - Landing
- Part struck
  - Canopy
  - Radome
  - Engine #1 / #2 / #3 / #4
  - Nose
  - Tail unit
  - Wing
  - Fuselage
  - Flap
  - Rotors
  - Landing gear
  - Stores / Tanks
  - Other
- Type of damage
  - Aircraft skin ruptured
  - Air inlets / Scoops blocked
  - Impaired function of flight controls, flaps, spoilers, slats
  - Metal deposited in oil filters or other internal engine damage
  - Windshield or other glazing damaged
  - Fans / Compressor blades, Inlet guide vanes
- Bird description
  - Species / Quantity
- Bird size
  - Small (Starling) / Medium (Gull) / Large (Duck) / Very Large (Swan)



Annex F  
Chapter 9  
A-GA-135-001/AA-001

## **ANNEX F – SUPPLEMENTARY REPORT REQUIREMENTS**

The following information should be reported as part of the Supplementary Report (SR) and will form the content of the information entered into FSOMS. Not all the information categories below are required on all occurrence investigations. FSOs should provide information in the categories below only if that information is considered as contributing to the occurrence.

### **AIRCRAFT**

- Flight Attributes
- Altitude
- Air Speed
- Dive Angle
- G Status
- Heading

### **MAINTENANCE INFORMATION**

- Aircraft Maintenance
- Time Since New
  - Time Since Overhaul
  - Time Since Inspection
  - Inspection Type
  - CF349 #
  - CF543 #

### **AIRCRAFT COMPONENT INFORMATION**

- Aircraft Component or Munitions: for each component
- Nomenclature
  - WUC
  - Serial #
  - Time since new (TSN)
  - Time since overhaul (TSO)
  - Time since installation/inspection
  - Part number
- CFTO reference
- Munition Lot and Batch #
- Disposition

### **ARRESTING SYSTEM**

- Arresting System – if arresting system was engaged or attempted, this report shall include:
- Aircraft speed and weight at arresting system
- Position and angle of engagement from runway centreline
- Use of brakes at engagement
- Chute used (visiting aircraft)

- Distance
- Successful or unsuccessful – explain
- Reason for engagement
- Damage to arresting system – brief description
- Elapsed time until arresting system available for reuse
- Aircraft damage caused by engagement – brief description

**FLIGHT CONDITIONS**

- Flight Conditions
  - Flight Conditions (i.e. IFR/VFR)
  - Ceiling (ft)
  - Temperature (Celsius)
  - Visibility (Nautical Miles)
  - Light Conditions (i.e. Twilight – dusk/dawn)
- Alighting Conditions:
  - Type of Alighting Area (unprepared)
  - Alighting Surface Conditions (ice-covered)
- Weather
  - Wind Speed
  - Wind Direction

**PERSONNEL**

- For all personnel identified
  - Time on duty: Last 48 Hours
  - Time on duty: Last 24 Hours
- For Aircrew only – Flying Hours
  - Grand total
  - Total on type
  - Past 30 days (all types)
  - Last 48 hours (all types)
  - Aircrew role (Aircraft comd, Co-pilot)
- Investigation Narrative
- Detailed explanation of how and why
- Cause Factors/HFACS
- PM



## **CHAPTER 10 – CAUSE FACTORS IDENTIFICATION**

### **PURPOSE OF CAUSE FACTORS IDENTIFICATION**

1. The purpose of FS investigations is to prevent future accidents through the careful determination of causes and the formulation of recommended PM. FS does not assign blame. Determining cause factors is thus not an end in itself but a means of identifying problems and assisting in trend analysis. Specifying cause factors in FS occurrences results in a more exhaustive analysis of the occurrence, which in turn leads to the formulation of measures that will prevent a recurrence of the problem. Since the purpose of assessing cause factors is accident prevention, they need not be, in the legal sense, established beyond reasonable doubt.

2. Identification of cause factors assists in understanding the reasons why an accident or incident occurred. Since the purpose of identifying cause factors is not to assign blame, investigators should not avoid identifying those that seem to implicate individuals, such as “Deviations”.

### **DEFINITION OF CAUSE FACTOR**

3. A cause factor is defined as any event, condition or circumstance, the presence or absence of which within reason, increases the likelihood of an FS occurrence. Cause factors are assigned for prevention purposes only, and need not be substantiated in the strict legal sense, nor need they comply with QR&O 21.47 concerning causes of injuries or death for Pension Board purposes.

### **ASSESSMENT AND PUBLICATION OF CAUSE FACTORS IN FS REPORT**

4. Cause factors will be assessed for all FS reports. For FS reports published in CR, SR or ESR format, they will be identified and stated in the report using terminology found in this chapter including CF-HFACS. However, for FS reports published in FSIR format the cause of the occurrence and contributing factors will be identified and stated in the report using normal narrative form (i.e. plain language). Although not published in FSIR using terminology found in this chapter including CF-HFACS, cause factors shall nonetheless be identified by DFS investigators and recorded in FSOMS for statistical purposes. The final authority for cause factor assessment and publication is DFS.

5. Cause factors shall be addressed through the assignment of PM(s).

### **CATEGORIES OF CAUSE FACTORS**

6. For purposes of record keeping and trend analysis, it is necessary to use standard terminology for cause factors. Care must be taken to identify and systematically list cause factors as described in this chapter. Listed below are the definitions for the six cause factors that are applied to aviation occurrences in the CF.

7. Cause factors will be explained in details in this chapter and are divided as follows:

- a. Personnel: Includes acts of omission or commission, by those responsible in any way for aircraft operation or maintenance or support to operations, and contributing circumstances that lead to a FS occurrence.
- b. Materiel: Includes failures of all aircraft components, support equipment and facilities used in the conduct and support of air operations that lead to a FS occurrence.
- c. Environmental: Includes environmental conditions that, if all reasonable precautions have

been taken and applied, are beyond human control within the present state of the art that lead to a FS occurrence.

- d. Operational: Includes operational situations that lead to a FS occurrence in which no other controllable circumstances contributed to that event. This cause factor shall only be approved by the CAS.
- e. Unidentified Foreign Object Damage (FOD): Includes occurrences caused by the presence of a foreign object not able to be identified that causes or is assessed as having the potential to cause aircraft damage or personal injury.
- f. Undetermined: Includes occurrences in which there is not enough evidence to either reasonably determine an exact cause or eliminate two of the three main cause factor categories (personnel, materiel and environment). Probable causes are normally assigned so that PM can be implemented.

## **PERSONNEL CAUSE FACTORS**

### **BACKGROUND**

8. On Jan 1, 2004, the CF adopted the Human Factors Analysis and Classification System (HFACS) to assess and document personnel cause factors (PCF). Prior to that date, the FS Program used a different nomenclature for the assignment of PCF, which can be found on the DFS website if required for data mining or statistical comparisons.

### **CF HUMAN FACTORS ANALYSIS AND CLASSIFICATION SYSTEM (CF-HFACS)**

9. When a FS occurrence involves personnel, the study of human factors has shown that there are two general categories for the causes associated with the situation. These categories are referred to as active failures and latent conditions. FS investigations need to identify the active failures and latent conditions for all occurrences so that effective PM can be implemented to reduce the likelihood of recurrence.

10. Using the concept of active failures and latent conditions, the CF-HFACS causal model has four levels for classifying failures or conditions associated with personnel.

- a. Unsafe acts or conditions (active failures);
- b. Preconditions for unsafe acts (latent conditions – direct);
- c. Supervision (latent conditions – remote); and
- d. Organizational influences (latent conditions – remote).

#### **NOTE**

The CF-HFACS model utilizes a step-approach broken down in tiers (e.g. Unsafe Acts), categories (e.g. Errors) and sub-categories (e.g. Skill-based). In addition, the concept of streams (e.g. Inadequate Technique) within categories or sub-categories is introduced, as well as nanocodes (e.g. Delayed Response) under the majority of the streams. This step-approach will facilitate the use of the model. Further, it allows the coding to be more reproducible, which in turn will impact positively on reliability and standardization. Consequently, FS data mining and trending will benefit. This step-approach is reflected in the FSOMS application in the form of dropdown menus where selections down to streams and nanocodes are required to be made.

**NOTE**

This chapter incorporates several examples pertinent to aviation to illustrate the model. Those examples, though not all-inclusive, will help the reader greatly. Refer to the diagram at Annex B for the CF-HFACS causal model.

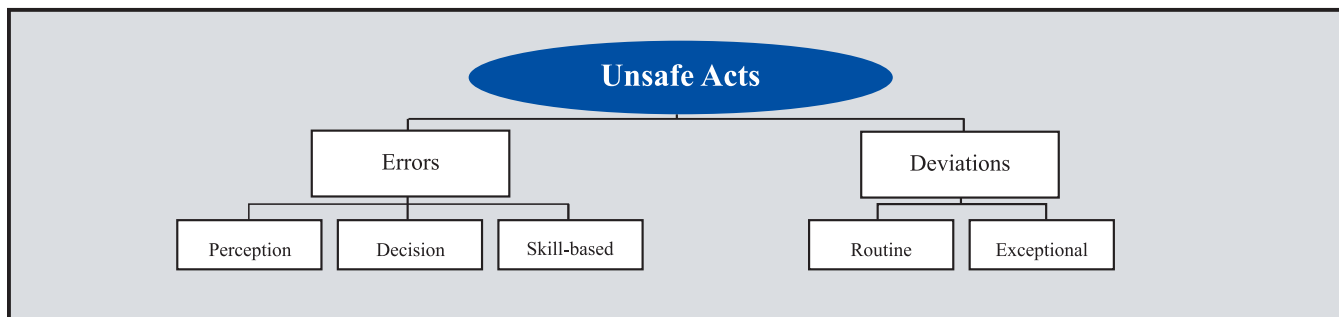
11. Active failures are either the error(s) or the conscious deviation(s) from an authorized procedure that are directly causal to a FS occurrence.
12. Latent conditions are situations or circumstances associated with the individual(s) or the system of management of the individual(s) involved in the occurrence. Latent conditions contribute to the final sequence of events in the occurrence or hazard by predisposing it to happen. Such conditions can be found within the individual(s) directly involved in the occurrence, any level of the individual(s) immediate supervisory chain, and / or within larger broad based organizational components within which the individual(s) operates. Though these are not found to be the direct cause of the occurrence, they are directly connected to the direct cause / active failure to which they are associated and their impact can be as great. Latent conditions may lie dormant or undetected until one day an active failure(s) occurs.

**UNSAFE ACTS**

13. Active failures, when applied to FS occurrences, are the Unsafe Acts most closely tied to the occurrence. Unsafe Acts occur when personnel take inappropriate action(s) or when required action(s) are absent in advance of, or during, a task / mission. Occurrences may contain one or more Unsafe Act(s) as multiple or compounding errors or deviations can be causal to the occurrence. Unsafe Act(s) can occur at various points in advance of, or during, an occurrence and are a sequence of errors or deviations that form one or more crucial flaws that are directly causal to the occurrence. Regardless of the number of Unsafe Act(s) identified as causal to the occurrence, it is important to ensure, as a minimum, that the last Unsafe Act (last action or inaction immediately prior to the occurrence) and the seminal or first Unsafe Act (the first action or inaction resulting in a departure from safe operations) are captured and investigated. The last error or deviation prior to the occurrence is the last Unsafe Act after which there is no longer a possibility of avoiding the occurrence.

**NOTE**

For clarification, it could be possible that the “last” and the “seminal or first” Unsafe Act be the same. In such a case, only one Unsafe Act will be identified.



**Figure 1 – Active Failures – Unsafe Acts**

## Errors

14. Errors are unintentional and occur because they are an inherent element of human nature. Consequently, errors in human performance are found in most occurrences. Not all errors are the same, and thus further classification is necessary. The three basic types of Errors are Perception, Decision and Skill-based.

### Perception Errors

15. Perception can be seen as the result of a three steps process: detection, awareness and understanding of the situation. A Perception Error can occur when the individual involved has detected elements (object, threat or situation) of the environment inaccurately (detection failure), whether the misperception is visual, auditory, olfactory, proprioceptive (seat-of-the-pants) or vestibular in nature. However, a Perception Error can still occur even if accurate detection takes place if the individual fails to attend to the information (awareness failure). Even if accurate detection and awareness of the elements are achieved, a Perceptual Error can still occur if absence of, or inaccurate, understanding of their significance takes place (understanding failure). Indeed, experience plays a role at this level, in that the information about the environment is processed by comparing it with what the individual already knows.

- a. Detection Errors. Occur when the individual involved has detected elements of the environment inaccurately. For example if an annunciator warning light illuminates in the cockpit and the individual does not visually detect it, a Detection Error has occurred.
  - (1) Inaccurate detection of visual cues (e.g. of a warning light, of incoming traffic, of visual illusions such as *false horizon illusion* or *height-depth perception illusion* when flying over an area devoid of visual references – desert, snow, water).
  - (2) Inaccurate detection of auditory cues (e.g. of unusual rumbling of an engine).
  - (3) Inaccurate detection of olfactory cues (sense of smell) (e.g. of acrid smell of an electrical fire).
  - (4) Inaccurate detection of proprioceptive cues (seat-of-the-pants) (e.g. of distinct movements of the aircraft by the pressures of the seat against the body).
  - (5) Inaccurate detection of vestibular cues (e.g. of spinning sensation / vertigo, of vestibular illusions such as somatogyral illusion – e.g. *the Leans* – during angular acceleration or somatogravic illusion – e.g. *oculogravic illusion* – during linear acceleration).
- b. Awareness Errors. Occur, even if accurate detection takes place, when the individual fails to attend to the information. Referring to the annunciator warning light example above, if the individual visually detected the warning light but was busy with something else and therefore did not pay attention to it, an Awareness Error has occurred. Preconditions such as channelized attention or work overload can lead to this type of error.
  - (1) Failure to attend to the visual cues detected.
  - (2) Failure to attend to the auditory cues detected.
  - (3) Failure to attend to the olfactory cues detected (sense of smell).
  - (4) Failure to attend to the proprioceptive cues detected (seat-of-the-pants).
  - (5) Failure to attend to the vestibular cues detected.
- c. Understanding Errors. Occurs, even if accurate detection and awareness of the elements of the environment are achieved, when absence of, or inaccurate, understanding of their

significance takes place (e.g. misjudgement or misinterpretation of the information detected or attended to, such as visual cues / illusions, auditory cues, olfactory cues, proprioceptive cues / kinesthetic illusions (seat-of-the-pants), vestibular cues / illusions or spatial disorientation). Continuing with the illuminated annunciator light example above, if the individual visually detected the warning light and paid attention to it but did not understand what it meant, an Understanding Error has occurred.

- (1) Failure to understand the visual cues.
- (2) Failure to understand the auditory cues.
- (3) Failure to understand the olfactory cues (sense of smell).
- (4) Failure to understand the proprioceptive cues (seat-of-the-pants).
- (5) Failure to understand the vestibular cues.

**NOTE**

It is important to note that it is not, for example, the illusion or disorientation that is classified as a Perceptual Error; rather, it is the individual's erroneous response to the illusion or disorientation based on its misunderstanding or misjudgement.

**NOTE**

Spatial disorientation cannot be totally eliminated from the aviation environment. However, aircrew need to remember that misleading sensations from sensory systems are predictable. These sensations can happen to anyone because they are due to the normal functions and limitations of the senses. Training, instrument proficiency, good health, and proper aircraft design can minimize spatial disorientation.

### Decision Errors

16. Decisions are made to achieve a goal or an intention where the perceived elements are used to initiate the process. Success in achieving this is a function of relevant training and knowledge of the task at hand, the system, operations, tactics, previous exposure, experience and proficiency. Decision Errors represent deliberate and conscious acts and occur when behaviour proceeds as intended, yet the plan proves inadequate or inappropriate for the situation. A decision to achieve the desired end-state is not made appropriately, which results in an unsafe situation. Often referred to as “honest mistakes”, they typically represent poor conscious choices, improper procedural selection and application, or the misinterpretation or misuse of relevant information. Insufficient time, inexperience or lack of proficiency, or outside pressures such as overload and task saturation may preclude safe decisions.

- a. Knowledge-based or Information Errors. Occur when knowledge or the information available to achieve the desired end-state is incorrect, partial or absent. Poorly written tactics manual or technical orders, or deficiencies in baseline training are examples of preconditions that could lead to this kind of error.
  - (1) Inadequate knowledge available (e.g. knowledge of the task / mission / tactics, systems, orders / directives / procedures / checklists required to make a proper decision and achieve the desired end-state is incorrect, partial or absent).
  - (2) Inadequate information available (e.g. information required to make a proper decision and achieve the desired end-state is incorrect / ambiguous, partial / impractical, absent).

- b. Problem-solving or Risk Management Errors. Occur when facing a situation or problem for which formal procedures and response options are not available. The elaboration of a solution / way ahead is required, however reasoning and risk management processes are not applied properly. Task saturation, misplaced motivation, lack of time or reduced attention are examples of preconditions that could lead to this kind of error.
  - (1) Inadequate reasoning / problem-solving (e.g. the reasoning / problem-solving process required to elaborate a solution or way-ahead is inadequate to make a proper decision and achieve the desired end-state).
  - (2) Inadequate risk management (e.g. inadequate decision making where the individual(s) neglected to assess risk, adopt appropriate risk mitigation or monitor effectiveness of risk mitigation to achieve the desired end-state).
- c. Procedural or Rule-based Errors. Occur during highly structured tasks (e.g. if X, then do Y) where an improper or inappropriate procedure is selected and applied following a misdiagnosed or unrecognized situation. Insufficient time (time compression) or inexperience are examples of preconditions that could lead to this kind of error.
  - (1) Situation misdiagnosed (e.g. after misdiagnosing a time-critical emergency that should have led to a structured response, decision made to select and apply a procedure (a way ahead) that is inappropriate for the situation).
  - (2) Situation not recognized / ignored (e.g. after taking no notice or overlooking a caution / warning indicator that should have led to a structured response, decision made to select and apply a procedure (a way ahead) that is inappropriate for the situation).

**NOTE**

As an example, an Unsafe Act such as the decision to takeoff without a proper takeoff clearance (assuming that there is no wilful intent to disregard orders / procedure) could result from either a Knowledge-based or Information error (e.g. a pilot received an ambiguous departure clearance from ATC, but interpreted it to be a takeoff clearance and decided to initiate the takeoff) or from a Procedural or Rule-based error (e.g. a pilot overlooked the fact that a takeoff clearance had not been issued yet, but nonetheless decided to initiate the takeoff). Therefore, when facing a Decision Error, it is important to identify the source of the error within its specific context.

Skill-based Errors

17. Operation, workmanship or mechanical skills become automatized with extensive practice. As a result, the execution of such activities becomes routine and therefore occurs without significant conscious thought. Skill-based Errors can occur when automatized activity is performed incorrectly. Unlike Decision Errors, which result from intended courses of action, Skill-based Errors are the result of unintended actions. These types of errors can result from Inadequate Technique, Attention Failures or Lapses in Memory. Examples of preconditions that could lead to this kind of error are inadequate proficiency (*i.e. degraded or sub-optimal capabilities with regards to procedures and emergencies, limited total experience*), lack of appropriate training or a deficient level of currency (*i.e. limited recent experience, inability to achieve number of hours to be flown and / or sequence to be performed over a specified period of time, leading to erosion of skills and knowledge*) with the task being performed.



- a. Inadequate Technique. Occurs when an individual(s) performs a task with workmanship, mechanical skills or an operation that is below the level expected from an individual(s) fully trained and experienced to perform the task. These are particularly linked to failures of proficiency, appropriate training and currency. They can occur, for example when a maintainer damages a delicate engine valve by handling it roughly or a pilot applies insufficient crosswind control inputs on landing.
  - (1) Poor / inappropriate technique (e.g. overcontrol, undercontrol, failure to execute a proper visual scan technique or an anti-G straining manoeuvre – AGSM –, inadvertent activation / operation of a pump or lever, rough handling of a delicate component).
  - (2) Delayed response (e.g. control inputs initiated too late to correct for crosswind on landing).
  - (3) Omitted proper technique (e.g. complete failure to execute the required technique, failure to activate / operate a pump or lever).
- b. Attention Failures. Occurs when an individual(s) did not devote sufficient attention to a given task in order to complete the task properly. Individual(s) tends to create “short-cuts” or “fill in” missing information based upon familiarity with the situation. This is especially true when performing highly practiced tasks with which an individual(s) is extremely familiar, while relying on incomplete or partially fabricated information. They can occur, for example when a pilot fails to make a routine mandatory transmission to ATC because he / she is encountering unanticipated weather conditions or when a maintainer misses a hand signal.
  - (1) Failed to recognize condition (e.g. failure to recognize a deteriorating condition, failure to recognize a hand signal).
  - (2) Interruption in process (e.g. while encountering unanticipated disruption or interruption in process, failure to complete checklist, skipping or omitting item(s) in checklist, breakdown in visual scan on instruments or radar screen or for traffic).
  - (3) Negative transfer (e.g. importation of an already highly practiced technique into a new environment, which proves to be inadequate).
- c. Memory Lapses. Occurs when an individual(s) either fails to recall or recalls incorrectly information from memory that is required to complete a task. Once tasks become automatized for the individual(s), the successful completion of them relies more and more on the ability of the individual(s) to recall completely and correctly important information about the task from memory. When there is a breakdown in this recollection, Skill-based Errors can occur. The breakdown can occur undetected by the individual(s) committing it (*in the case of an incorrect recollection of the order of the steps in a procedure*) or can be detected immediately by the individual (*in the case of a failure to recall the steps of a procedure in a given situation*).
  - (1) Incorrect recall (e.g. incorrect ordering of steps in a procedure).
  - (2) Failed to recall (e.g. failed to recall critical emergency checklist item).

## Deviations

18. Deviations are events where there was a wilful disregard of orders, regulations or other rules. If “wilful disregard” is not present, the active human failure(s) which lead to the occurrence must be categorized as Error(s). Unlike errors, Deviations are deliberate and usually point to serious FS issues. The

two types of Deviations, Routine and Exceptional, are not differentiated by the nature or the outcome of the act but by whether or not the act had become the norm within the organization (Routine Deviation) or is totally odd and unacceptable for this organization (Exceptional Deviation)

### Routine Deviations

19. Routine Deviations are considered normalized practices of “*bending the rules*” by individuals and are *tolerated or condoned by some supervisory / leadership authorities and/or peers*. They are the result of accepted individual behaviour not conforming to established rules or regulations. Routine Deviations tend to be common or habitual behaviours by nature and are often enabled by close supervisors, and/or peers that tolerate such departures from rules or regulations. If a Routine Deviation is identified, further investigation up the supervisory chain is required to determine the extent of the acceptance of this behaviour. Routine “work-arounds” and unofficial procedures are examples of Routine Deviations.

- a. Transgression of Orders / Directives / Regulations / SOP – Strategic. For example deviation from B-GA-100-001/AA-000 National Defence Flying Orders, A-OA-148-001/AA-000 Manual of Instrument Flying, C-05-005-P03/AM-001 CF Maintenance Activity Authorizations and Training Standards.
- b. Transgression of Orders / Directives / Regulations / SOP – Wing, Base or Unit. For example deviation from Wing Flying Orders, Unit SOPs.

#### **NOTE**

There are no nanocodes under this stream. This stream is to be used as a final selection within this Routine Deviations sub-category.

#### **NOTE**

Routine Deviations normally have related latent conditions. It is important for the FSO to inform the commanding officer of any routine deviations as they may be a sign of supervisory problems at many levels of the organization.

### Exceptional Deviations

20. Exceptional Deviations are isolated departures from established rules or regulations. They are unusual or isolated to very specific individual(s) rather than larger groups. They are definitely not sanctioned or condoned by supervisory / leadership authorities nor supported by peers. While most Exceptional Deviations are flagrant, it is important to note that they are not to be considered exceptional because of their extreme nature. Rather, they are to be considered exceptional because they are not typical of an organization’s accepted behaviour pattern. An occurrence can only be treated as an Exceptional Deviation when the investigator has positively determined that the unsafe act / active failure that caused the occurrence cannot be assigned to an Error or a Routine Deviation. Flying an aircraft beyond operating limits or under a bridge without valid operational reasons, signing-off an aircraft repair when maintenance work has not been performed or unapproved material/procedures were used may be, depending on the context, examples of Exceptional Deviations. In a “just culture”, the presence of Exceptional Deviations are usually rare and serious. While PM may still be derived from Exceptional Deviations, resolution of the problem often resides outside of the FS Program.



**NOTE**

A “just culture” lies between a non-punitive culture and one of sanction and punishment. While a non-punitive environment is fundamental for a good reporting culture, negligence or wilful, deliberate deviations must not be tolerated by leadership. A “just culture” recognizes that, in certain circumstances, there may be a need for punitive or administrative action. It defines the line between acceptable and unacceptable behaviour.

- a. Transgression of Orders / Directives / Regulations / SOP – Strategic. For example deviation from B-GA-100-001/AA-000 National Defence Flying Orders, A-OA-148-001/AA-000 Manual of Instrument Flying, C-05-005-P03/AM-001 CF Maintenance Activity Authorizations and Training Standards.
- b. Transgression of Orders / Directives / Regulations / SOP – Wing, Base or Unit. For example deviation from Wing Flying Orders, Unit SOPs.

**NOTE**

There are no nanocodes under these streams. These streams are to be used as a final selection within this Exceptional Deviations sub-category.

**NOTE**

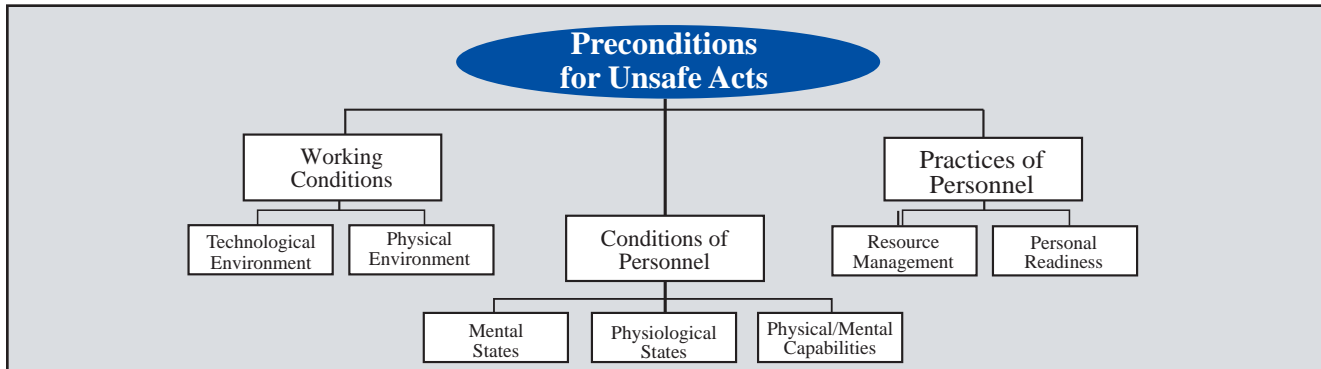
If an Exceptional Deviation is suspected, the FSO shall recommend to the Commanding Officer the conduct of a collateral investigation.

**NOTE**

Any collateral investigation must be separate and independent of the FS investigation. Privileged information collected in the conduct of a FS investigation shall not be released to the collateral investigation team or the chain of command.

## PRECONDITIONS FOR UNSAFE ACTS

21. This is the latent condition level that is usually directly associated with personnel involved in an Unsafe Act. Identification of causes at this level reveals additional information about the circumstances within which the Unsafe Act occurred. Preconditions for Unsafe Acts are subdivided into Working Conditions, Practices of Personnel and Conditions of Personnel.



**Figure 2 – Latent Conditions – Preconditions for Unsafe Acts**

### Working Conditions

22. The Working Conditions category relates to the immediate environment of the individual(s) directly involved with the occurrence. Working Conditions can, in themselves or by influencing the Conditions of Personnel or Practices of Personnel, lead to Unsafe Acts. This category is divided into the following sub-categories: Technological Environment and Physical Environment.

#### Technological Environment

23. Technological Environment relates to the equipment used to perform a task / mission or the interaction of the individual(s) with that equipment. This sub-category encompasses individual(s) using equipment that is inappropriate for the task / mission, the unavailability of the right equipment for the job, or an individual's sub-optimal interface with equipment. These characteristics create the circumstances whereby an individual(s) is forced to “*make do*”, thereby increasing the potential for error.

- a. Equipment (physical or virtual). Occurs when the equipment used, whether mechanical or electronic, impedes the individual(s) ability to perform safely and effectively.
  - (1) Inappropriate for the task (e.g. unsafe, unreliable, inoperable, uncontrollable, miscalibrated, damaged, outdated).
  - (2) Unavailable (e.g. no equipment available for the job).
- b. Operator / Equipment Interaction. Occurs when an individual(s) is unable or has difficulty accessing / processing information or operating equipment as a result of the design / layout or automation of the equipment.
  - (1) Inadequate design / layout (e.g. problems with software design or checklist layout that impede proper human-machine interface).
  - (2) Inadequate display / automation (e.g. problems with color display or automation characteristics that impede proper human-machine interface)

#### Physical Environment

24. The Physical Environment sub-category is present when the immediate surroundings, such as weather / exposure and workspace, impede the ability of personnel to complete the task / mission ef-

fectively. Physical hazards that contribute to the occurrence will also be included in this precondition category.

- a. Weather / Exposure. Occurs when climatic factors or a particular exposure impede the ability of the individual(s) to perform the task / mission.
  - (1) Thermal stress (e.g. cold / warm temperature, frostbite, heat stress, immersion in cold water).
  - (2) Cloud / precipitation (e.g. rain, snow, drizzle, fog, brownout, whiteout).
  - (3) Wind (e.g. crosswinds, gusts, nocturnal jets, wind shear).
  - (4) Density Altitude.
- b. Physical Hazards. Occurs when personnel are impeded from performing tasks / missions in a safe and effective manner due to the presence of physical factors (or inadequacy or absence thereof, in the case of lighting).
  - (1) Lighting (e.g. inadequate cockpit / hangar lighting, light at dusk, night time, sunlight).
  - (2) Noise (e.g. ambient cockpit noise, flight line noise, noise from tools).
  - (3) Vibrations / Turbulence (e.g. whole-body vibration from helicopters, hand-arm vibration from tools).
  - (4) Lasers (e.g. unauthorized pointers / light show displays, target designators).
- c. Workspace / Immediate Surroundings. Occurs when cockpit, hangar, flight line or other working area / environments are inadequate to safely perform the task / mission.
  - (1) Constrained / obstructed (e.g. insufficient workspace, constrained position).
  - (2) Inaccessible (e.g. totally or partially).
  - (3) Poorly defined / Markings inappropriate.
  - (4) Slippery surfaces (e.g. hangar floors, ladder steps, aircraft surfaces).

## Practices of Personnel

25. This category includes situations or circumstances such as resource management and personal readiness associated with the individual(s) directly involved in the occurrence, which affect their conditions, practices and actions and contribute to the final sequence of events in the occurrence by predisposing it to happen.

### Resource Management

26. All phases of air operations and maintenance require effective teamwork. Effective teams make use of the knowledge, skills and abilities of all members involved and take advantage of proper interactions among them; deficiencies and breakdowns in Communication / Coordination and Planning can be detrimental to their cohesion, impact performance negatively and impede safety.

- a. Communication / Coordination. This relates typically to the lack of effective communication / coordination among aircrew, maintenance and support personnel, which can create confusion and lead to unsafe conduct of operations. Examples of this include ineffective or inadequate communication / coordination within and between aircraft, as well as with air traffic control, maintenance, and other support personnel. It also includes ineffective or inadequate communication / coordination before and after the task / mission with the brief and debrief of aircrew, maintenance and support personnel.

- (1) Crew / team leadership (e.g. failure to facilitate a proper team / crew climate, failure to establish and maintain an accurate and shared understanding of the evolving mission and plan on the part of all team / crew members, failure to actively manage the distribution of mission tasks to prevent overloading of any team / crew member).
  - (2) Inadequate task / mission briefing (e.g. inadequate content, inadequate time allocation).
  - (3) Ineffective communication (verbal, written, hand signal) (e.g. lack of assertiveness, misinterpretation of information, miscommunication of critical information, use of non-standard / improper terminology, inappropriate challenge and reply / acknowledgement, inadequate shift turnover, inadequate log entry).
  - (4) Failure to cross-monitor performance / assist / back-up (e.g. inadequate monitoring of the pilot flying during an instrument approach, no assistance provided during the handling of an emergency or the repair of an aircraft).
  - (5) Rank / position authority gradient (e.g. inappropriate trans-cockpit authority gradient, whether level or steep).
- b. Planning. Occurs when an individual, crew or team fails to complete all preparatory tasks associated with planning the mission, or fails to re-assess changes in their dynamic environment during task / mission execution and review their plan accordingly. Planning and re-planning tasks / missions include information collection and analysis, dispatching activities within the crew / team and with appropriate support personnel and external agencies, contingency planning, and risk assessment.
- (1) Inadequate task / mission planning (e.g. inadequate contingency planning).
  - (2) Inadequate task / mission-in-progress re-planning (e.g. failure to assess changing weather during mission execution and review the plan).

### Personal Readiness

27. In any occupational setting, individual(s) are expected to show up for work ready to perform at optimum levels. This is even more so in aviation. If personal habit patterns or behaviours interfere with this requirement, then this sub-category is present. A breakdown in Personal Readiness can occur when individual(s) fail to prepare physically and mentally for the task / mission they must perform, which in turn can be detrimental to their performance, lead to errors and impede safety. Not all Personal Readiness failures occur because rules and regulations have been disregarded or broken. While certain behaviours or conditions may not be governed by any rule or may not be against any existing regulation, individual(s) must use good judgement when deciding whether they are “fit” to work or not. A person arriving at work just after over-exercising (e.g. dehydrated after a long-distance run in a hot and humid environment), a person arriving at work without adequate rest, hung over (e.g. under the influence of residual effects of alcohol despite a bottle-to-work period that was in accordance with regulations) or with impaired vigilance (e.g. from direct, secondary or residual effects of drugs / medication) are examples within this sub-category. Such individual(s) are not ready to function effectively and at optimum levels in the workplace.

- a. Inadequate Physical /Mental Preparation. Occurs when self-imposed physical or mental stresses, in terms of fitness and rest, or unreported medical conditions, impair performance and do not support task / mission demands.
- (1) Inadequate physical fitness (e.g. when the relative physical state of the individual(s), in terms of a regular exercise program or a physically active life-

**NOTE**

Issues such as circadian desynchrony (e.g. jet lag, crossing several time zones or shift work) can lead to either acute or chronic fatigue. Therefore, when selecting either “acute” or “chronic” fatigue, it is important to identify the source of the fatigue.

- style, is not adequate to support task / mission demands).
- (2) Inadequate rest (e.g. when the opportunity for rest was provided but the individual(s) failed to rest appropriately, leading to fatigue and impaired cognitive performance).
  - (3) Unreported medical condition (e.g. when the individual(s) intentionally performs a task / mission with a known, unreported medical condition that impairs performance and leads to an unsafe situation).
- b. Inappropriate Consumption. Occurs when self-imposed stresses such as dietary practices, consumption of alcohol, drugs, supplements or self-medication (including over-the-counter drugs) result in degraded performance and lead to an unsafe action.
- (1) Nutrition (e.g. when poor dietary practices are inadequate to fuel the brain and body functions, resulting in degraded performance).
  - (2) Alcohol (e.g. when acute or residual effects of alcohol impairs performance).
  - (3) Drugs / supplements / self-medication (e.g. when the individual(s) takes any drug, *other than prescribed*, that interferes with performance).

**Conditions of Personnel**

28. This category identifies the latent condition(s) that affect the personnel directly involved in the occurrence. These Conditions of Personnel are divided into Mental States, Physiological States and Physical / Mental Capability

Mental States**NOTE**

Issues such as boredom or inattention (as two examples) can result from either reduced attention over time or task overload / underload. Therefore it is important to assess the nature and level of activity before determining the type of attention deficiency.

29. The Mental States sub-category involves those mental conditions that directly affect performance. The complexity of most aviation related tasks / missions requires the individual(s) performing them to be mentally prepared. A deficiency in mental preparedness, and therefore cognitive performance, can result from Fatigue, Attention Deficiencies and Personality Traits / Attitudes.

- a. Mental Fatigue. Occurs when the effects of fatigue impair the individual’s cognitive performance. Many tasks / missions performed in aviation require an individual(s) to process large amounts of information in a short period of time and to do this on a continuous basis. An individual’s ability to do this can be reduced by beginning the task without the appropriate amount of rest. Likewise, the continuous information processing required during sustained operations can deteriorate an individual’s ability to perform a task. Given the high operational tempo experienced by most individuals involved with military aviation, mental fatigue can be common under certain circumstances. This can occur for example, when a maintenance technician or pilot sleeps for only a few hours the

night before a task / mission or when an air traffic controller is required to control a large volume of air traffic over a period of several hours.

**NOTE**

Situation awareness (SA) in itself does not appear in this text. Though a well-known concept in aviation, the focus and interest must be on the problems or issues that can lead to “loss of SA” or “inability to achieve SA” as opposed to SA itself. A few examples of such issues are reduced attention, overload / underload, fatigue, pressing, inadequate proficiency or experience and many physiological states, which in turn steer the PM in the appropriate direction. In a sense, a parallel can be made with the concept of “fever” in medicine: what counts is to know where the fever comes from, not the fever in itself. Therefore it is important to assess the issues that influence SA to understand the Preconditions leading to Unsafe Acts.

- (1) Acute fatigue (e.g. lack of, or low quality, sleep the night before a task / mission, circadian rhythm effects).
  - (2) Chronic fatigue (e.g. sleep debt accumulated over a period greater than 48 hours, circadian rhythm effects).
- b. Attention Deficiencies. Occurs when an individual’s ability to devote sustained attention to a task / mission has deteriorated resulting in a reduction in performance. This deterioration in attention can be the result of maintaining sustained attention over time, task overload / underload or stress (whether self-imposed or external). Humans, by their very nature, are not very effective at maintaining sustained attention over extended periods of time. This can result in either incomplete or inaccurate processing of information, therefore predisposing the individual(s) to errors. The ability of individual(s) to manage simultaneous, multiple tasks (e.g. task overload) or perform tasks when void of external motivators (e.g. task underload / boredom), can also lead to attention deficiencies. Individual(s) are also particularly susceptible to attention deficiencies when attempting to perform tasks / missions while experiencing either externally-imposed or self-imposed stress. This can occur, for example when a pilot performing a complex mission becomes overwhelmed with the surroundings and makes decisions or takes action based upon a flawed appreciation of the situation or when a maintenance technician attempts to complete a repair task while preoccupied with marital or family problems.
- (1) Reduced attention – sustained attention over time (e.g. inattention, boredom).
  - (2) Reduced attention – task overload / underload (e.g. boredom, channelized attention, task saturation, haste).
  - (3) Reduced attention – stress (e.g. self-imposed stress, life stress, job stress, distraction from stress, stress generated by peer pressure).
- c. Personality Traits and Attitudes. Occurs when certain personality traits or attitudes of individuals has an effect upon their ability to perform safely. Presence of these traits / attitudes will influence the likelihood that an Unsafe Act will occur. This can occur for example, when an individual’s overconfidence, ego or stubborn attitude impedes the ability to safely complete a task / mission.
- (1) Expectancy (e.g. pre-determined mindset such as the anticipation to find traffic in



- a given portion of the sky or the hope that weather will hold).
- (2) Motivation (e.g. misplaced motivation, inadequate motivation, hidden agenda).
  - (3) Carelessness / complacency (e.g. contentment, lack of concern in the face of new or changing conditions, unawareness of danger or hazard).
  - (4) Overconfidence / over-aggressiveness (e.g. macho attitude, “can do” attitude).
  - (5) Pressing / haste / get-home-itis (e.g. cutting corners to get a job done by a certain deadline).
  - (6) Personality / psychological trait (e.g. conflicted social interaction, irritability, disrespectful or insubordinate behaviour).

### Physiological States

30. The Physiological States sub-category refers to a medical or physiological condition that precludes safe operations. Certain medical or physiological conditions make individual(s) particularly susceptible to adverse reactions and inaccurate sensations in an aviation environment. Particularly important to aviation are physiological conditions that increase the susceptibility of the individual(s) to spatial disorientation, illusions, G-induced loss of consciousness (G-LOC), almost loss of consciousness (A-LOC), hypoxia, physical fatigue as well as the numerous pharmacological and medical abnormalities known to affect performance. This can occur, for example, when a pilot flies while suffering from an ear infection, rendering the pilot more susceptible to spatial disorientation or a maintenance technician on prescription medication who is more susceptible to increased drowsiness while working at heights or operating specialized machinery.

a. Adverse Medical Conditions.

- (1) Medical illness / injury / physical fatigue.
- (2) Pharmacological / toxicological effects (e.g. direct, secondary or residual effects of prescribed drugs / medication, incapacitation from carbon monoxide poisoning).

b. Adverse Physiological Consequences of Flight

- (1) Motion sickness (e.g. air sickness, simulator sickness).
- (2) Acceleration effects / G-LOC / A-LOC (e.g. push-pull effect, grey-out, incapacitation following G-LOC, A-LOC *i.e. impairment but not LOC*).
- (3) Decompression sickness (DCS) (e.g. the ‘bends’ following exposure at a reduced environmental / atmospheric pressure sufficient to cause DCS, such as in an aircraft with failed or inexistent pressurization system or in a hypobaric chamber).
- (4) Hypoxia / hyperventilation (e.g. inadequate supply of oxygen to the tissues, most importantly the brain, following a sudden aircraft depressurization or a malfunction of an oxygen regulator, nervousness or unease in a passenger leading to an increased rate of breathing and associated symptoms).
- (5) Trapped gas disorders (e.g. following ascent or descent in an aircraft or on loss of cabin pressurization, expansion or compression of gas contained in closed and semi-closed cavities of the body leading to conditions such as sinus pain / squeeze, eardrum pain / perforation, lung rupture, bowel discomfort / pain).
- (6) Illusions (e.g. visual illusions such as *false horizon illusion* or *height-depth perception illusion* when flying over an area devoid of visual references – desert, snow, water –, vestibular illusions such as somatogyral illusion – *e.g. the Leans* – during angular acceleration or somatogravic illusion – *e.g. oculogravic illusion* – during linear acceleration).

- (7) Spatial disorientation (e.g. SD1 (unrecognized), SD2 (recognized), SD3 (incapacitating)).

#### Physical / Mental Capabilities

31. The Physical / Mental Capabilities sub-category refers to those instances when the task / mission requirements exceed the capabilities of the individual(s) involved in the activity. This could be the result of the limitations in the capabilities of human beings in general or capability limitations of the individual(s) involved. If the task / mission exceeds the capabilities of humans in general, the human-machine interface or the task itself needs to be addressed. If however the task / mission exceeds the capability of the individual(s) involved, then re-assignment, training or adjustment of the recruiting / selection standard may be required. This sub-category includes aptitudes or other physical characteristics over which the individual(s) involved may not have much control. This can occur, for example, when a pilot cannot reach the rudder pedals of aircraft because the legs are too short. It also includes qualification and training issues over which remedial approaches may be possible. Additionally, this can occur when a maintainer lacks proficiency with the task being performed.

- a. Physical Capabilities Limitations. Occurs when the physical limitation(s) of the human impairs the individual's ability to perform work duties to a safe and effective level.
  - (1) Anthropometric / biomechanical limitations (e.g. in body size, reach, view over the nose, strength).
  - (2) Visual limitations (e.g. in visual acuity, color vision, contrast sensitivity).
  - (3) Hearing limitations (e.g. in hearing acuity, speech discrimination).
  - (4) Motor skill / coordination / reaction time deficiency (e.g. insufficient hands-feet coordination).
- b. Mental Capabilities Limitations. Occurs when the mental limitation(s) of the human impairs the individual's ability to absorb and process the information required to safely complete tasks / missions.
  - (1) Incompatible aptitude (e.g. ability to mentally absorb and process information regarding the flying, controlling or repair / maintenance of aircraft is unsuited for the aviation environment, which impairs the safe completion of task / mission).
  - (2) Limited learning / memory ability (e.g. limited ability to learn and retain advanced notions and concepts to safely complete task / mission).
- c. Inadequate Qualification and Training. Occurs when the level of training or standard of qualification provided to, or demonstrated by, individual(s) is not sufficient to complete assigned duties or tasks / missions safely.
  - (1) Inadequate proficiency (e.g. degraded or sub-optimal capabilities with regards to procedures and emergencies, limited total experience with the task being performed).
  - (2) Lapsed currency (e.g. inability to achieve number of hours to be flown and / or sequence to be performed over a specified period of time, leading to erosion of skills and knowledge, limited recent experience with the task being performed).
  - (3) Inappropriate training (e.g. not trained for the task, unrealistic training, ineffective skill training).

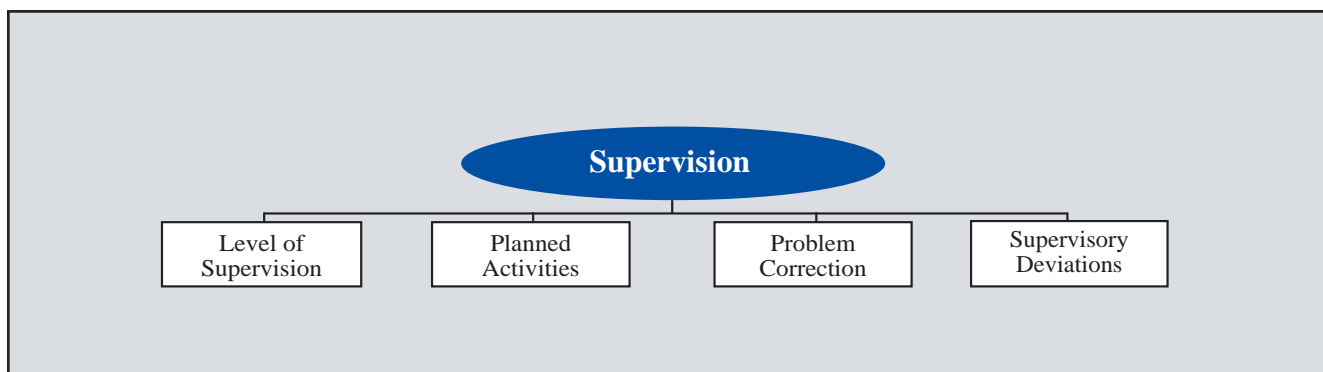
#### SUPERVISION

32. Supervisors influence the conditions and practices of individuals and the type of environment they work in. Supervision is a factor in an occurrence if the methods, decisions or policies of the super-



visory chain-of-command directly affect practices, conditions or actions of individuals or their working conditions and result in human error or unsafe situations.

33. Supervision factors are often part of the causal chain of events. As latent conditions, such factors found within the individual(s) immediate supervisory chain are not considered to be the direct cause of the occurrence. However, though they may lie dormant or undetected for a while, they can contribute to the final sequence of events to which they are associated by predisposing it to happen. In that sense, Unsafe Acts can be “set up” by Supervision factors. Supervision factors are sub-divided into: Level of Supervision, Planned Activities, Problem Correction and Supervisory Deviations.



**Figure 3 - Latent Conditions – Supervision Factors**

### Level of Supervision

34. The role of any supervisor is to provide the subordinates the opportunity to succeed. To do this the supervisor, regardless of the level, must provide leadership, sound professional guidance and oversight, doctrine, training opportunities, constructive feedback, motivation and the proper role model to ensure that the work is done safely and effectively. This category applies when supervision proves inappropriate or improper, and fails to identify hazards, recognize and control risk, provide guidance, oversight and / or training, which results in human error or unsafe situations.

- a. Inadequate Leadership / Supervision / Oversight / Guidance. Occurs when the availability, competency, quality or timeliness of leadership, supervision or oversight does not meet task / mission demands and creates unsafe situations.
  - (1) Inadequate communication (e.g. absence or unavailability of supervisor, inadequate feedback or handover, for example in terms of quality or timeliness).
  - (2) Inadequate oversight / guidance (e.g. inadequate tracking of performance / proficiency, inadequate tracking of qualifications, currency and authorizations, improper inspection of work).
- b. Training – Inadequate or Unavailable. Occurs when one-time or recurrent training programs, upgrade programs, transition programs or any other local training is inadequate or unavailable and creates unsafe situations.
  - (1) Training inadequate (e.g. some training provided, however inadequate in terms of quality, quantity, timeliness).
  - (2) Training unavailable (e.g. no training provided).
- c. Policy / Doctrine – Inadequate or Lacking. Occurs when policy or doctrine, or lack of policy or doctrine, leads to an unsafe situation.

- (1) Policy / doctrine inadequate (e.g. publications, technical data, procedures, operational doctrine not current or inadequate).
- (2) Policy / doctrine lacking (e.g. publication, technical data, procedure, operational doctrine lacking / inexistent).

### **Planned Activity**

35. A key role of supervisors is to properly assess risk and plan tasks / missions to achieve operational success at an acceptable level of risk. The Planned Activity category applies when supervisors fail to provide resources or adequately assess the hazards associated with an operation and allow for unnecessary risk and improper planning of activities, which in turn can adversely affect performance and put the safety of the task / mission at risk. Examples of such issues include supervisors who allow non-proficient or inexperienced personnel to attempt tasks or missions beyond their abilities, improper or inappropriate crew / team pairing for the task / mission, improper manning, improper work tempo or inadequate opportunity for rest.

- a. Improper Risk Assessment. Occurs when supervision does not adequately evaluate the risks associated with a task / mission or when pre-mission risk assessment tools or risk assessment programs are inadequate.
  - (1) Inadequate risk assessment of task / mission (e.g. some risk assessment done, however improperly, inadequate risk assessment tools / programs).
  - (2) No risk assessment of task / mission (e.g. no risk assessment done).
- b. Planning Beyond Ability / Capability of Personnel. Occurs when supervisors allow / authorize personnel to undertake a task / mission beyond their abilities, beyond the capabilities of their equipment or without appropriate rest.
  - (1) Authorized personnel not proficient for task / mission (e.g. authorization given for personnel with degraded or sub-optimal capabilities with regards to procedures and emergencies or with limited total experience to undertake task / mission).
  - (2) Authorized personnel not current for task / mission (e.g. authorization given for personnel who did not achieve number of hours to be flown and / or sequence to be performed over a specified period of time or with limited recent experience to undertake task / mission)
  - (3) Inadequate opportunity for rest (e.g. failure to provide appropriate length of time or adequate environment to rest properly).
  - (4) Improper work tempo (e.g. inadequate schedule or improper task prioritization leading to increased pace of work / work overload)
- c. Inadequate Provision of Resources. Occurs when the task / mission is planned without proper manning / resources or when the composition of the crew / team is inadequate.
  - (1) Insufficient resources – human (e.g. improper manning for the task / mission).
  - (2) Insufficient resources – other than human (e.g. insufficient number of tools, aircraft or vehicles provided for the task / mission).
  - (3) Inadequate crew / team composition (e.g. inadequate crew pairing for the complexity of task / mission).

### **Problem Correction**

36. The Problem Correction category refers to instances when deficiencies concerning individual(s), equipment, training or related safety areas are known to the supervisor, yet are allowed to continue uncorrected. The failure on the part of a supervisor to consistently correct or discipline inappropriate

behaviour or unsafe actions of individual(s) and the failure to correct known deficiencies in documents, processes or procedures, are examples of this category. As a consequence, this lack of supervisory action can certainly foster an unsafe atmosphere and create unsafe situations. This precondition often leads to a Routine or Exceptional Deviation.

- a. Inadequate Correction of Human Behaviour / Performance. Occurs when supervision does not correct inappropriate human behaviour or performance.
  - (1) Failure to correct personnel behaviours (e.g. when supervision does not adequately correct inappropriate conduct and / or behaviours of subordinates known to impede the safe completion of tasks / missions).
  - (2) Failure to correct training deficiencies (e.g. when supervision does not adequately correct known deficiencies related to the training of personnel that impede the safe completion of tasks / missions).
- b. Inadequate Correction of Equipment / Documentation. Occurs when supervision does not correct deficiencies in equipment or documentation
  - (1) Failure to correct equipment deficiencies (e.g. when supervision does not adequately correct known deficiencies related to equipment / tools that impede the safe completion of tasks / missions).
  - (2) Failure to correct deficiencies in documents / processes (e.g. when supervision does not adequately correct known deficiencies in documents, orders and processes that impede the safe completion of tasks / missions).

### Supervisory Deviations

37. A Deviation represents the wilful disregard of orders, regulations or other rules. Supervisory Deviations are isolated departures from established rules or regulations (*wilful disregard*), are not necessarily typical of a supervisor's behaviour pattern and are not condoned by higher authorities. The Supervisory Deviations category is used for those instances when supervisors wilfully disregard existing instructions, regulations, rules or SOPs, which indirectly leads to an unsafe situation or FS occurrence (e.g. permitting or directing an individual to perform duties without current qualifications or authorization).

- a. Transgression of Orders / Directives / Regulations / SOP – Strategic. For example failure to enforce, or deviation from, B-GA-100-001/AA-000 National Defence Flying Orders, A-OA-148-001/AA-000 Manual of Instrument Flying, C-05-005-P03/AM-001 CF Maintenance Activity Authorizations and Training Standards.
- b. Transgression of Orders / Directives / Regulations / SOP – Wing, Base or Unit. For example failure to enforce, or deviation from, Wing Flying Orders, Unit SOPs.

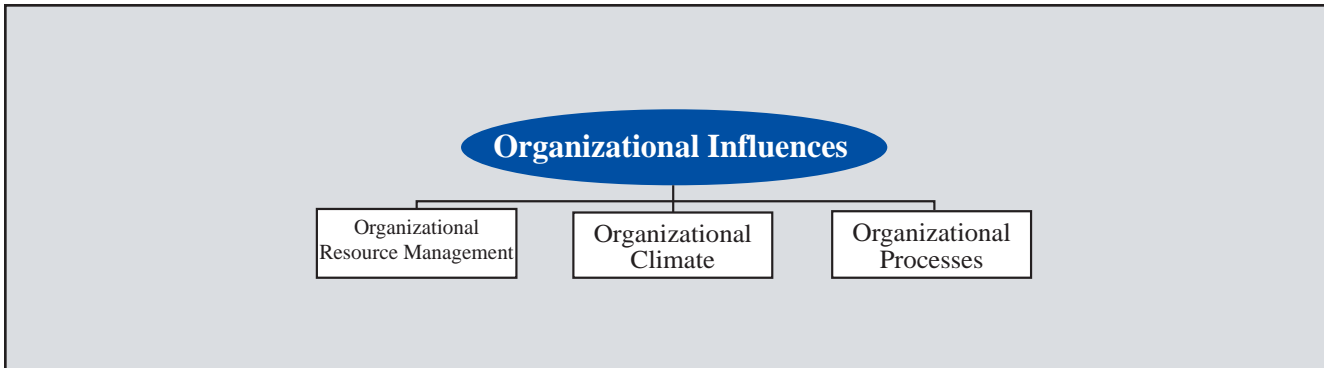
#### NOTE

There are no nanocodes under these streams. These streams are to be used as a final selection within this Supervisory Deviations sub-category.

### ORGANIZATIONAL INFLUENCES

38. Unsound decisions by upper-level leadership, although latent in nature, can have a direct impact on the organization; moreover, they can have a direct negative effect on supervisory practices or the conditions and actions of individuals. Although the impact of organizational influence on the areas in question is direct, it is considered an indirect latent condition because it does not play an active role in

the condition or act under examination. These latent Organizational Influences are sub-divided into three categories: Organizational Resource Management, Organizational Climate and Organizational Processes.



**Figure 4 - Latent Conditions – Organizational Influences Factors**

### Organizational Resource Management

39. This category refers to the management, allocation and maintenance of organizational resources such as personnel, financial and equipment / facilities. Personnel Resources refers to the management of operators, staff, support and maintenance personnel. Issues that directly influence safety include selection, training and staffing / manning. Financial Resources refers to the management of non-human resources, primarily monetary resources. For example, excessive cost cutting or a lack of funding for proper acquisition and safe utilization of equipment and resources may adversely affect safety. Finally, Equipment / Facility Resources refers to issues related to inadequate equipment, use of unsuitable equipment, inadequate design of workspaces or failure to correct known design flaws.

- a. Personnel Resources. Occurs when the management and allocation of human resources such as aircrew, maintenance personnel, staff and support personnel adversely influence safety. Deficiencies in aircrew selection, enrolment quotas, management of personnel attrition and availability of training programs are examples of this precondition.
  - (1) Deficiencies in selection (e.g. enrolment quotas, aircrew selection)
  - (2) Deficiencies in staffing / manning (e.g. allocation of personnel and supervisory staff to different units, management of personnel turn-arounds / attrition).
  - (3) Deficiencies in training (e.g. management of training quotas, elaboration of training programs, availability, use and maintenance of training facilities).
- b. Financial Resources. Occurs when the management and allocation of monetary resources adversely influence safety. Excessive cost cutting or a lack of funding for proper acquisition and safe utilization of equipment and resources are examples of this precondition..
  - (1) Lack of funding – capital expenditures / program.
  - (2) Lack of funding – operations and maintenance.
- c. Equipment / Facility Resources. Occurs when the management and allocation of equipment and facilities adversely influence safety. Equipment unsuitable for the task / mission or inadequate design of equipment or workspaces are examples of this precondition.

- (1) Inadequate equipment (e.g. inadequate design or use of unsuitable equipment such as aircraft, tools, support equipment or radar, failure to correct known design flaws).
- (2) Inadequate facility / workspace (e.g. inadequate design of workspaces such as control towers or hangar facilities, inadequate hangar space).

### **Organizational Climate**

40. This category refers to a broad class of organizational variables that adversely influence worker performance and safety. Organizational Climate is the prevailing atmosphere or environment within the organization. Organizational Structure, Policies and Culture are elements that affect the Organizational Climate. An organization's structure is reflected in the delegation of authority and communication channels. Organizations with maladaptive structures will be more prone to FS occurrences. Policies are official guidelines that direct leadership's decisions about such things as personnel management and the handling of documents and processes within the organization. When policies are ill-defined, adversarial or conflicting, or when they are supplanted by unofficial rules or values, safety may be compromised. Finally, culture refers to the unspoken or unofficial rules and norms, values, attitudes, beliefs and customs of an organization, i.e. "*the way things really get done around here*".

- a. Structure. Occurs when issues such as delegation of authority and communication channels within the organization adversely influence safety. Ambiguous or conflicting delegation of authority and adversarial communication are examples of this precondition.
  - (1) Deficiencies in delegation of authority (e.g. ambiguous or conflicting authority).
  - (2) Deficiencies in communication (e.g. adversarial communication, closed communication channels).
- b. Policies. Occurs when official directives and guidelines on personnel management and the handling of documents and processes within the organization adversely influence safety. Policies that are ill-defined, adversarial, conflicting or supplanted by unofficial rules or values are examples of this precondition.
  - (1) Deficiencies in personnel policies (e.g. policies on recruiting, promotion, posting, retention and release).
  - (2) Deficiencies in documents and processes (e.g. policies on the process of tracking amendments in CF Technical Orders (CFTO), policies on the handling of Records of Airworthiness Risk Management (RARM) and Unsatisfactory Condition Reports (UCR)).
- c. Culture. Occurs when unspoken or unofficial rules and norms, values, attitudes, beliefs and customs within the organization adversely influence safety.
  - (1) Misconceived rules and norms (e.g. unwritten, unspoken or unofficial agreement, approach or "*way of doing things*", such as the predisposition to "*bend the rules*" or tendency not to report FS occurrences, that exists within the organization and adversely influence safety and the way tasks / missions are conducted).
  - (2) Misaligned values, attitudes, beliefs and customs (e.g. elements of the organizational culture, such as the presence of *group think* behaviour, inexistent or disintegrating *esprit de corps* or ill-conceived traditions, that adversely influence safety and the way tasks / missions are conducted).

### **Organizational Processes**

41. This category refers to the formal processes by which things get done in the organization. Three



factors are included in this area: Operations, Procedures and Oversight / Guidance. Operations refers to the characteristics or conditions of work that have been established by leadership. These characteristics include operational tempo, time pressures, production quotas, incentive systems and schedules. When set up inappropriately, these working conditions can be detrimental to safety. Procedures are the official or formal directives that dictate how the job is to be done. Examples include performance standards, objectives, documentation and instructions about procedures. All of these can negatively impact supervision, performance and safety. Finally, Oversight / Guidance refers to leadership's monitoring and checking of resources, climate and processes to ensure a safe and productive work environment. Issues here relate to organizational self-study, risk management, and the establishment and use of safety programs.

- a.    Operations. Occurs when the characteristics or conditions of work that have been established by leadership adversely influence safety. Inappropriate schedules and workload, time pressures or ill-defined incentive systems are examples of this precondition.
  - (1)    Inadequate operational tempo / workload (e.g. inappropriate schedules, deployment rates, secondary duties).
  - (2)    Inadequate training / certification (e.g. inappropriate pace of on-going / development training or certification for newly trained aircrew or maintenance technicians).
- b.    Procedures. Occurs when the official or formal directives that dictate how the job is to be done (the “*how to*”) within the organization adversely influence safety. Ambiguous performance standards and objectives, unavailability of documentation and instructions about procedures are examples of this precondition.
  - (1)    Unclear doctrine (e.g. doctrine / guiding principles not clearly delineated, ambiguous, vague or confusing performance standards and objectives).
  - (2)    Unavailability of documentation / publications / SOPs (e.g. unavailability of the proper documentation, publications and instructions to safely complete the tasks / missions).
- c.    Oversight / Guidance. Occurs when the monitoring and scrutiny of organizational resources, climate and processes by upper level leadership are sub-optimal, which adversely influence safety and hinder a productive work environment.
  - (1)    Improper risk management (e.g. improper or inadequate risk assessment of flight safety related issues, improper or inadequate management of *RARM* and *UCR* or open flight safety PM).
  - (2)    Improper use of safety programs (e.g. improper monitoring and scrutiny of the CF Flight Safety program in terms of its implementation / performance within the organization).

## **MATERIEL CAUSE FACTORS**

- 42.    Materiel cause factors can only be assigned in cases which identify:
  - a.    flaws in the basic material used to manufacture a part;
  - b.    improper design, manufacture, construction or assembly by a non-CF organization (design); or
  - c.    failure or malfunction of components when there was no overstress, abuse or misuse, and proper maintenance practices were carried out (undetected progressive breakdown).

43. Materiel includes all aircraft and / or engines, equipment and facilities used in the conduct and support of air operations. Although most materiel failures may be traced ultimately to some human origin, personnel causes are assigned only when failures result from incorrect maintenance by CF or contracted parties or from incorrect operating procedures. It is preferable, both statistically and realistically, to consider the remaining cases as materiel failures of the items in themselves, regardless of the reason or mode of failure. Materiel cause factors are divided into the following categories.

#### **MATERIEL – AIRCRAFT OR ENGINE COMPONENTS**

44. Aircraft or engine equipment failure or malfunction. The failed or damaged component must be specified. If it is beyond the capability of the unit to precisely determine the technical nature of the fault, then the component need only be identified. For example, it may require a repair contractor to determine that a bushing has failed in a generator. The unit should specify “generator” as the component.

#### **MATERIEL – RELATED FACILITIES**

45. Failure or malfunction of facilities or equipment that is not part of, but relevant to, the operation of aircraft, such as maintenance support equipment. The nature of the item is to be specified, for example:

- a. ground vehicles, test stands, ladders, chocks, tow bars, helicopter ground handling wheels, and similar equipment used in the vicinity of aircraft;
- b. personal safety equipment;
- c. ground equipment supporting air navigation and ground / air communication; or
- d. helicopter securing device such as the bear trap used in shipborne helicopter operations.

46. Materiel cause factors should be amplified with a short descriptive narrative including, when possible:

- a. the mode of failure, e.g. fatigue, shear, corrosion, wear, seizure, overheat, out of adjustment; and
- b. the reason for failure, if known, e.g. improper design, manufacture, construction or assembly.

#### **ENVIRONMENTAL CAUSE FACTORS**

47. Environmental cause factors are applied to conditions that are beyond human control with the present state of the art. Care must be taken when considering the application of environmental cause factors. Environmental cause factors are not usually assigned in place of, but are normally assigned in conjunction with, personnel or materiel cause factors. Environmental cause factors apply only to those events where adequate and reasonable care and precautions were exercised. Reasonable precautions include, but are not limited to, full use of forecast information, use of airborne weather radar and requests for vectoring to avoid areas of hazardous weather.

#### **ENVIRONMENT – WEATHER**

48. Phenomena such as cloud, hail, lightning, rain, snow, sea state and wind.

#### **ENVIRONMENT - SURFACE OPERATING AREA**

49. The condition of an area of land, deck or water used for take-off, landing and surface manoeuvring of aircraft, which caused the occurrence and could not have been detected or avoided.

**ENVIRONMENT – BIRD STRIKE**

50. Self-explanatory. Applicable only when reasonable avoidance measures have been taken.

**ENVIRONMENT – UNUSUAL PHENOMENA**

51. Reserved for environmental conditions that cannot be specifically assigned under other categories, e.g. tidal waves, earthquakes and landslides.

**ENVIRONMENT - REDUCED ATMOSPHERIC PRESSURE AND SIMULATORS**

52. Assigned when personnel suffer adverse physiological consequences during or after exposure to reduced atmospheric pressure or simulators.

**NOTE**

This selection could be assigned independently in specific circumstances. For instance, when the investigation reveals that an individual exposed to such an environment suffered from decompression sickness, a trapped gas disorder, hypoxia, etc. and that no further incident / accident or safety of flight compromise resulted from Personnel actions / inactions (as it would most often be the case in an hypobaric chamber), then no Personnel Cause Factor assignment is needed in addition to the Environmental one.

**OPERATIONAL CAUSE FACTOR**

53. This factor can be assigned only when the CAS or the Comd 1 Cdn Air Div or higher authority has accepted the high risk (in accordance with B-GA-100-001/AA-000 National Defence Flying Orders, Volumes 1 and 3):

- a. to meet a commitment related to the preservation of national security;
- b. to conduct a flight essential to the interests of the Government of Canada; or
- c. to conduct a specific search and rescue flight.

54. Assignment of an Operational cause factor acknowledges that no other controllable circumstances contributed to the event. Therefore, this cause factor shall not be assigned in conjunction with, or in addition to, any other cause factor. When this cause factor is assigned, it must be recommended by either the Comd 1 Cdn Air Div or, for occurrences resulting from Development Test and Evaluation (DT&E) or Engineering Test and Evaluation (ET&E), the CO AETE. All Operational cause factor recommendations will be forwarded through Comd 1 Cdn Air Div to CAS for approval.

**UNIDENTIFIED FOREIGN OBJECT DAMAGE (FOD) CAUSE FACTOR**

55. The Unidentified FOD cause factor is applied to an occurrence where an unidentified foreign object has caused or has the potential to cause aircraft damage or personal injury. This cause factor shall not be assigned in conjunction with, or in addition to, any other cause factor. Identifiable foreign objects shall be assessed under the appropriate Personnel, Material or Environmental cause factor. Examples of FOD that should not be assessed using an Unidentified FOD cause factor are systems or component failures, loose or lost parts or pieces, lost personal equipment and bird or ice ingestion.



**NOTE**

If the evidence presented in the investigation can only eliminate any two of the three main cause factor categories (Personnel, Materiel or Environmental), the remaining cause factor becomes probable and shall be assigned even if the precise malfunction or failing cannot be identified. The cause factor narrative will list the possible cause factors.

**UNDETERMINED CAUSE FACTOR**

56. An Undetermined cause factor shall be assigned only when the investigation does not provide enough evidence to reasonably determine a specific cause factor. Prior to assigning an Undetermined cause factor, the investigation shall consider assigning cause to one or more of the three main cause factor categories (Personnel, Materiel and or Environmental). If the evidence eliminates all other cause factors as causal, then an Undetermined cause factor should be assigned. An Undetermined cause factor should only be assigned as a last resort when all investigative avenues have been exhausted.



## **CHAPTER 11 – PREVENTIVE MEASURES AND ANALYSIS**

### **APPLICATION OF TERMINOLOGY**

1. Common terminology accepted by the CF shall, with few exceptions, meet the aims of this manual and maintain consistency. Where terms or words have taken on meanings specific to FS, they are defined below.

### **ANALYSIS PURPOSE**

2. The goal of the FS System is to prevent accidental loss of CF aviation resources. The analysis and subsequent PM steps are the most important of investigation activities because the successful implementation of PM is means to achieve the goals of the FS Program and the Airworthiness Investigation activity. This is met through the clear identification of hazards and the effective implementation of practicable PM. Such measures normally modify some aspect of procedures in the manufacture, support, operation or maintenance of aircraft or components. Further, by investigating occurrences, the FS System obtains valuable feedback and develops PM so that similar occurrences can be reduced, mitigated and ideally eliminated. Feedback also allows lessons learned by a unit to be used by other units not directly involved and raise the awareness of personnel.

3. FSOs at all levels should make every effort to ensure that PM / corrective actions are monitored to ensure they are implemented and assessed for effectiveness. Feedback shall be provided to subordinate units and HQ as to the status and effectiveness of these measures.

### **DEFINITION**

#### **PREVENTIVE MEASURE (PM)**

4. A PM is any step that can be taken to decrease the likelihood of an aircraft occurrence. When practical, one or more PM should be applied to each cause factor assigned to an occurrence.

### **ANALYSIS METHODOLOGY**

5. Most types of analysis involve statistics. Statistics can be misleading, and methods for avoiding the more common pitfalls are described in the paragraphs that follow. It is suggested the following data be considered:

- a. the number of occurrences involving a formation in any given period;
- b. the most common types of occurrences and cause factors (look for trends and their root causes);
- c. the most common PM (have they been implemented and are they effective?);
- d. trends in individual aircraft and / or components, equipment, stages of operation, units, sections and personnel and the probable reasons for these trends;
- e. environmental and seasonal factors; and
- f. the effects of exercises, competitions and deployments.

#### **OCCURRENCE RATE**

6. The rate of occurrences is expressed as the number of occurrences per 10,000 flying hours. It is calculated with the formula: (# of accidents) / (incidents) / (occurrences) X 10000 ÷ (# flying hours). E.g. four air accidents in 30,000 flying hours would result in an accident rate of 1.33.

#### **ANALYSIS OF LOCAL OCCURRENCES**

7. Comds and FSOs at every level must evaluate the effectiveness of their FS Programs. To achieve this, FSOs must maintain records of every FS occurrence involving facilities, equipment and personnel. The FSOMS is the primary tool used to aid this process and is useful for identifying trends.

#### **ANALYSIS AVAILABLE FROM FSOMS**

8. The FSOMS trending tools can provide FS staff with a comprehensive range of data for use in identifying problem areas and implementing PM. FSOs can contact DFS either directly or through their D/FSO for assistance in generating or interpreting an analysis.

#### **USE OF RESULTS**

9. Regular in-depth analysis can indicate where additional PM are required. Recommendations should be made to the first level authorized to implement them.

#### **PM MANAGEMENT PROCESS**

10. PM are the final outcome from investigations (for both Occurrences and Hazards) which, when implemented may prevent accidents. Considering this is the ultimate aim of the entire Flight Safety program, there needs to be a formal management process to address PM from formulation to final closure.

11. Annex B details the process flow for the development and tracking of PM completion.

#### **DEVELOPMENT OF EFFECTIVE PM**

12. PM are to be implemented so that they will have lasting effects despite frequent changes in personnel. New accidents are rare; usually it is simply a matter of new people being involved in “old” accidents. Short-term PM, such as briefing aircrew or maintenance personnel, have little lasting effect and may allow hazards to reoccur when new people arrive.

13. The guidelines for developing effective PM are listed below:

- a. PM should, when applicable, target the lowest level in the chain of command that is able to deal effectively with the PM;
- b. PM must treat the cause of a problem and not its effect;
- c. PM must be realistic and practicable, and their effects on operational capability should be considered. PM must also be judged according to cost-effectiveness, training and manpower requirements and implementation time;
- d. PM need not be limited to the cause of a specific incident, as other hazards may surface during the course of an investigation;
- e. occurrences resulting from personnel cause factors should lead to a search for PM in management, training and supervision;
- f. PM resulting from an occurrence should be consistent with and developed logically from the cause;
- g. similar occurrences in the past or with other fleets should be reviewed for ideas;
- h. the organization responsible for ensuring that PM are completed should be identified and target dates set for all follow-up action;
- i. when a hazard is identified that requires immediate action, comds and FSOs should

- address the particular problem immediately and independently;
  - j. units shall action PM contained in SRs from other units if applicable; and
  - k. lessons learned shall be identified and disseminated when applicable.
14. When preparing the SR, the FSO should focus on PM that can truly mitigate or eliminate the chance of future accidents, like improving a training syllabus, amending SOPs and modifying equipment, to name a few.

15. The Human Factors Intervention matrix (HFIX®) is a tool that can be used for mapping intervention strategies related to the human errors identified in the HFACS model. HFIX can help a FSO to systematically generate comprehensive PM that directly target the underlying systemic causes of errors. The HFIX matrix has been posted on the DFS Web site under the FSOMS Ops Guidance page at [http://airforce.mil.ca/fltsafety/fsoms/docs/HFIX\\_Checklist.pdf](http://airforce.mil.ca/fltsafety/fsoms/docs/HFIX_Checklist.pdf).

## **REVIEWING PM**

### **1 Cdn Air Div Review**

16. On review of the occurrences and hazards reported, 1 Cdn Air Div will:
- a. implement the appropriate PM within their authority;
  - b. recommend additional PM and, where applicable, identify the responsible offices and target dates for follow-up action;
  - c. provide recommendations for PM that are beyond their capabilities; and
  - d. consider whether or not specific PM should also apply to other aircraft types under their cmd.

### **DFS Review**

17. On review of the occurrences and hazards reported, DFS shall:
- a. coordinate with other agencies for action as necessary;
  - b. establish target dates for outstanding items;
  - c. disseminate PM and information back to 1 Cdn Air Div, wings, bases, and units;
  - d. consider the application of PM to other aircraft types; and
  - e. produce educational material for distribution to units.

## **RESPONSIBILITY FOR IMPLEMENTING PM**

18. Comds at all levels, with advice from their FS staffs, are responsible for devising and instituting PM and for advising higher HQ of required PM that are beyond local capabilities.

## **TRACKING OF PM**

19. Tracking means monitoring all PM until they have been fully implemented or rejected by the appropriate authority. Tracking is the responsibility of Comds at all levels, with advice from their FS staffs. Tracking also ensures that the entire user community is kept up to date on the nature, status and effectiveness of PM. Additionally, it ensures that PM are not forgotten. Further guidance is provided at Annex B.

## **MAPPING CF DATA TO ICAO DATA**

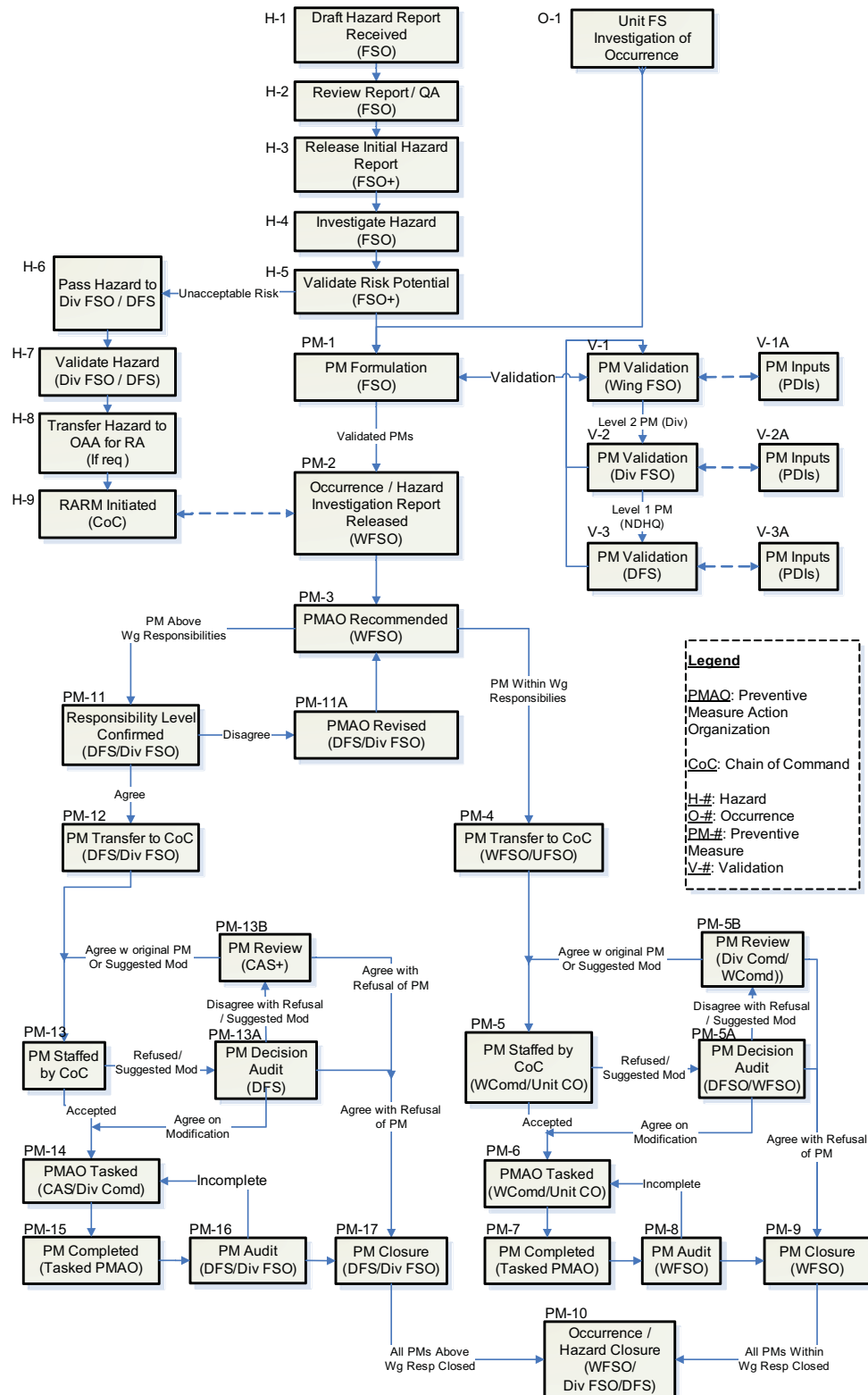
20. For data comparison and exchange of information, the FSOMS is required to be mapped to ICAO data. Annex A details the relationship between the CF occurrence categorization system and the ICAO occurrence categorization system.

21. In order to map FSOMS data to ICAO data, CF FS occurrences are divided into three major occurrence classes. Appendix 1 to this Annex details the specific mapping.

- a. 100 Accident Class. A 100 accident is defined as any occurrence categorized as an “A”, “B” or “C” category occurrence. It involves a CF aircraft, its equipment or its operation having caused someone to be missing (Grey) or have received fatal (Black), very serious (Red) or serious (Yellow) injuries or illness, or where the CF aircraft is either destroyed, missing or left with serious damage which adversely affects the structural strength, performance or flight characteristics of the aircraft and would normally require major repair or replacement of the affected component(s).
- b. 200 Serious Incident Class. A 200 serious incident is defined as any “D” or “E” category occurrence involving a CF aircraft, its equipment or its operation where there was extreme to medium potential for a serious accident or where someone received a minor injury or where the CF aircraft sustained minor damage. A list of likely serious incidents can be found at Appendix 1 of Annex A.
- c. 300 Incident. A 300 incident is defined as any “D” or “E” category occurrence involving a CF aircraft, its equipment or its operation where a low potential for an accident or serious incident existed.

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## APPENDIX 1 – PM MANAGEMENT PROCESS DIAGRAM







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## **ANNEX B – OCCURRENCE / HAZARD PM MANAGEMENT PROCESS**

Reference: C-05-005-P12/AM-001 Policy and Procedures Aircraft Weapon Systems Engineering – Aerospace Equipment and Program Management Division Engineering Process Manual, Part 12 Airworthiness Risk Management

1. This Annex details the steps required to develop and track PM until completion. Although Hazards and Occurrence have completely different triggering mechanism (Proactive Vs Reactive), the method used to resolve any noted deficiencies highlighted in the FS investigation will be through the formulation of PM.
2. Although the procedures documented in this Annex standardize the PM management process across the CF, especially for PM tasked above the wing, it is understood that each wing could use local procedures to deal with PM within their sphere of responsibility. This is deemed acceptable provided the Chain of Command maintains visibility and responsibility for the implementation of PM. Further, the intent of the principles described in this Annex are adequately documented in local unit / wing procedures (e.g. FS program, or AF9000 procedures).
3. This Annex should be read in conjunction with the flow chart at Appendix 1. This annex aims to achieve the following:
  - a. show how to identify risks to the chain of command (usually resulting from hazard reports);
  - b. describe the process to be used for validation of PM;
  - c. describe how to transfer PM addressed outside the unit;
  - d. detail the essential steps needed for traceability;
  - e. recommend a method to transfer the PM(s) from the FS network to the Chain of Command (CoC);
  - f. recommend a method for the CoC to task organizations under their command; and
  - g. describe the process to use when the CoC does not agree with the proposed PM; and
4. Record of Airworthiness Risk Management (RARM). In the case of Hazards, the reporting form (Chapter 7, Annex A) includes an identification of “Hazard severity” and “Probability”, which can be used to determine a level of risk according to the RARM (reference A). The individual filing the Hazard form will not necessarily be familiar with the risk management process; therefore the risk should be validated prior to be entered in FSOMS. If after an initial investigation of the hazard (Block H-4), the risk exceeds the acceptable level of safety, the information needs to be passed along to the Division FS office (Block H-6), which will be passed-on to the OAA (Senior Staff Officer Operational Airworthiness – SSO OA) after validation. The SSO OA will initiate a risk evaluation and a RARM will be created if deemed necessary. In cases where a RARM is completed, a copy will be provided to the WFSO, to include the appropriate reference in FSOMS.
5. PM Validation Process. The validation process detailed in the flow chart (originated at block PM-1), has four steps:

- a. Assignment of the PM to the proper FS level (UFSO, WFSO, Div FSO, or DFS);
- b. verification of the PM to determine if PM is acceptable and suggest the Action Organization (AO);
- c. pre-coordination of the PM between the FS network and the AO; and
- d. feedback to the investigator accepting and confirming the validity of each PM.

6. PM Assignment Process. For all PM with an AO outside the unit, the relevant PM will be forwarded to the WFSO. Similarly, the WFSO will forward the PM with AO outside the wing to the Div FS team, who will forward PM with AO outside the Division's responsibility to DFS. It is expected that before a PM is passed to the next level (up the FS chain), the FS officer will ensure that the PM meets the criteria of an effective PM (Chap 11 para 13).

7. PM Verification and Pre-coordination Process. Once the proper level is reached, the FSO of that organization will confirm that an appropriate AO has been assigned. In most cases, a pre-coordination should be performed with the AO, ensuring a buy-in from the start, and possibly a quicker implementation of the PM. It must be noted that often, many PM are implemented prior to the release of the final report.

8. PM Feedback Recording Process. For each PM staffed up the FS chain, there shall be a record providing feedback to the WFSO, confirming that the PM is valid and has the proper AO assigned.

9. PM Assignment to AO Above Wing. Once the final report is released (Block PM-2), the PM will be transferred formally (e-mail is acceptable) to the responsible FS organization level (Block PM-3). If the validation process was completed adequately, there should not be any PM that were wrongly assigned; however it is possible that some PM will be returned to the WFSO if the PM is not supported by the FS Chain (Block PM-11A).

10. PM Transfer to Chain Of Command (CoC). Following an investigation, a clear transfer of all PM from the FS network to the appropriate level of the Chain of Command is required (Blocks PM-4 and PM-12).

11. PM Refusal or Modification. The responsibility to implement a PM rests with the CoC. In some cases, the implementation of a PM may not be possible or practical. In such situation, a PM may be refused, or modified in an attempt meet the original intent. In such a situation, correspondence with the appropriate FS level (Block PM-5A or PM-13A) should take place. If the FSO of the appropriate organization agrees with the recommendation or suggested modification, the rationale shall be inputted in FSOMS with the pertinent record and the PM closed or amended as required. However, if the FSO does not agree with the recommendation, he can raise his reasoning one level up in the chain of command (Bloc PM-5B and PM-13B), for final vetting.

12. PM Tasking by CoC. Once the PM have been accepted, a formal tasking should be done by the commanders at all levels. This is a necessary step that not only formally tasks the appropriate AOs, but confirms acceptance of the PM by the CoC.

13. PM Closure. PM can be closed once the PM is implemented to the satisfaction of the responsible FS level (WFSO, 1 Div FSO, or DFS). It is not necessary to go back to the originator of the occurrence report (normally UFSO) to accept closure.
14. PM can be closed when NOT implemented, only under two conditions:
  - a. When a RARM documenting the issue has been signed by the CoC. This will avoid duplication of effort in providing updates, and the RARM process will provide the necessary traceability; or
  - b. When a PM is refused by the CoC and undergoes the review detailed at para 11 above.
15. Once a PM is completed, the AO will provide the specific records / documentation to the appropriate FS network. If the FS officer concurs, he will close the PM and include the details in FSOMS (Blocks PM-9 and PM-17). Also, the appropriate documentation will be forwarded to the FSO that originated the occurrence for tracking purposes.
16. In the case where a PM is closed when not implemented as per para 13 above, the appropriate reference (signed RARM or correspondence from CoC refusing the PM) will be included in FSOMS before the PM is closed.
17. Occurrence Report / Hazard Report Closure. Once all PM for a specific Occurrence or Hazard are completed, that specific investigation will be formally closed in FSOMS, by the originator.
18. PM Tracking. Although the Commanders at all levels are responsible for the tracking of PM, the FS staff will provide all necessary tools (regular reports) to facilitate this function, and ensure that no PM are forgotten. For traceability purposes, the FS Representative will update FSOMS using the following guidelines stipulated in Table 1.

**NOTE**

In the case of Unsatisfactory Condition Report (UCR)/Publication Deficiency Report (PDR)/Statement of Capability Deficiency (SOCD), the PM will remain open until it is fully implemented on the fleet. IF the UCR/PDR/SOCD is rejected at higher level, the situation will be reviewed by the FS team as if the PM was rejected (para 11).

**NOTE**

For the purpose of tracking the PM, the responsible organization, in FSOMS, will change as the UCR/PDR/SOCD is staffed up the chain.

FLOW CHART BLOCK	ACTION TO RECORD	REQUIREMENTS
H-6	Transfer Hazard to CoC for Risk Assessment	Date stamp / Full reference <sup>3</sup>
PM-4 & PM-12	PM Transfer to CoC	Date stamp / Full reference
PM-5A & PM-13A	PM Refused or modified	Full reference
PM-6 & PM-14	PM Tasked	Date stamp / Full reference
PM-8 & PM-16	PM Audit (When considered incomplete)	Date stamp / FSO Name / comment field
PM-9 & PM-17	PM Closure	Date stamp / FSO Name/ comment field

**Table A1: Information to be recorded in FSOMS Appendix 1**

**NOTE**

Full reference is defined as follows: WFSO to keep a copy of the correspondence (e-mail, letter or message) on file; FSOMS to include reference details with a short description (in free text field)

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## **APPENDIX 1 – LIST OF SERIOUS OCCURRENCES**

1. The incidents listed are typical examples of incidents that are likely to be serious. The list is not comprehensive and only serves as guidance to the definition of serious incident.
  - a. Near collisions requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or when an avoidance action would have been appropriate;
  - b. Controlled flight into terrain (CFIT) only marginally avoided (near CFIT);
  - c. Aborted take-off on a closed or occupied runway;
  - d. Take-off from a closed or occupied runway with marginal separation from obstruction;
  - e. Landing or attempted landing on a closed or occupied runway;
  - f. Gross failure to achieve predicted performance during take-off or initial climb;
  - g. Engine fire or fire and smoke in the passenger cabin or cargo compartment, even though such fires were extinguished with extinguishing agents;
  - h. Event requiring the emergency use of oxygen by the flight crew;
  - i. Aircraft structural failure or engine disintegration not classified as an accident;
  - j. Multiple malfunctions of one or more aircraft systems seriously affecting the operation of the aircraft;
  - k. Flight crew incapacitation in flight;
  - l. Fuel quantity requiring the declaration of an emergency by the pilot;
  - m. Incidents such as runway undershoot or overshoot or running off the side of a runway;
  - n. System failure, weather phenomenon, operation outside the approved flight envelope or other occurrences that could have made controlling the aircraft difficult; and
  - o. Failure of more than one system in a series of redundant systems mandatory for flight guidance and navigation.



## **ABBREVIATIONS**

AA: Airworthiness Authority  
ADL: Aircraft Damage Level  
ADM (Mat): Assistant Deputy Minister (Materiel)  
AERE: Aerospace Engineer  
AETE: Aerospace Engineering Test Establishment  
A/FSIR: Abbreviated Flight Safety Investigation Report  
AFSO: Aviation Fluids Services Officer  
AGL: Above Ground Level  
AIA: Airworthiness Investigative Authority  
AIG: Address Indicator Group  
AIM: Airworthiness Investigator Manual  
AI: Advance Investigator  
ALSE: Aviation Life Support Equipment  
AOC: 1 Canadian Air Division Air Operations Centre  
ATESS: Aerospace and Telecommunications Engineering Support Squadron  
ATI: Access to Information  
AMO: Aircraft Maintenance Officer  
AOIs: Aircraft Operating Instructions  
AWO: Air Weapons Officer  
AWS: Air Weapons System  
AWSTM: Air Weapons Safety Technical Member  
BI: Basic Investigator  
BOI: Board of Inquiry  
Canada COM: Canada Command  
CANSOFCOM: Canadian Special Operations Forces Command  
CAS: Chief of the Air Staff  
CAT: Clear Air Turbulence  
CDLS: Canadian Defence Liaison Staff  
CDS: Chief of the Defence Staff  
CEFCOM: Canadian Expeditionary Forces Command  
CF: Canadian Forces  
CFAO: Canadian Forces Administrative Order  
CFMO: Canadian Forces Medical Order  
CFQAR: Canadian Forces Quality Assurance Region  
CFR: Aircraft Crash, Firefighting and Rescue  
CFTO: Canadian Forces Technical Order  
CoC: Chain of Command

COMSEC: Communication Security  
CPI: Crash Position Indicator  
CTAISB: Canadian Transportation Accident Investigation Safety Board  
CVR: Cockpit Voice Recorder  
CR: Combined (Initial and Supplementary) Flight Safety Investigation Report  
DAEPM: Director Aerospace Equipment Program Management  
DAOD: Defence Administrative Orders and Directives  
DCDS: Deputy Chief of the Defence Staff  
DCIEM: Defence and Civil Institute of Environmental Medicine  
DF: Direction Finding  
DFS : Director/Directorate of Flight Safety  
DGAEPM: Director General Aerospace Engineering and Project Management  
DGQA: Director General Quality Assurance  
DGRC: Director General Reserves and Cadets  
Div FSO: Division FS Officer  
DND OI: Department of National Defence Office of Information  
DPLS: Director Personnel Legal Services  
DPM: Director Preventive Medicine  
DPSA: Director Procurement and Supply Aerospace  
DQA: Directorate of Quality Assurance  
DRDC: Defence Research and Development Canada  
D Stdzn C: Director Standardization Coordination  
ESR: Enhanced Supplementary Flight Safety Investigation Report  
FDR: Flight Data Recorder  
FLU: French language unit  
FOD: Foreign Object Damage  
FS: Flight Safety  
FSI: Flight Safety Investigation  
FSIR: FS Investigation Report  
FSO : Flight Safety Officer  
FSOMS: FS Occurrence Management System  
FSOS (W): Flight Safety Officer Specialist (Weapons)  
FSS: FS Specialist  
FTI: From the Investigator  
HALE UAV: High-altitude Long Endurance UAV  
HFACS: Human Factor Accident Classification System  
HUD: Head-Up Display  
IAS: Indicated Airspeed



IAW: In accordance with  
ICAO: International Civil Aviation Organization  
IFR: Instrument Flight Rule  
IIC: Investigator-In-Charge  
IR: Initial Flight Safety Investigation Report  
IRT: Instrument Rating Test  
JAG: Judge Advocate General  
MALE UAV: Medium altitude long endurance UAV  
MOU: Memorandum of Understanding  
MOSID: Military Occupation  
MRP: Mobile Repair Party  
NATO: North Atlantic Treaty Organization  
NBCW: Nuclear, Biological and Chemical Warfare  
NDHQ: National Defence Headquarters  
NDQAR: National Defence Quality Assurance Region  
NDOC: National Defence Operations Centre  
NOTAM: Notice to Airmen  
NRCC: National Research Council of Canada.  
OAA: Operational Airworthiness Authority  
PAO: Public Affair Officer  
PAR: Precision Approach Radar  
PCL: Personnel Casualty Level  
PDI: Persons with a Direct Interest  
PIREPS: Pilot Reports  
PM: Preventive Measure  
PMAO: Preventive Measure Action Organization  
POL: Petrol, Oil and Lubricants  
QA: Quality Assurance  
QETE: Quality Engineering Test Establishment  
RA: Risk Assessment  
RO: Repetitive Occurrence  
RASO: Recovery and Salvage Officer  
RCR: Runway Condition Report  
SAMA: Senior Aircraft Maintenance Authority  
SFCL: Safety of Flight Compromise Level  
SOAP: Spectrometric Oil Analysis Program  
SOP: Standard Operating Procedure  
SITREP: Situation Report

SR: Supplementary Flight Safety Investigation Report

STANAG: NATO Standardization Agreement

TAA: Technical Airworthiness Authority

TCN: Transport Control Number

TSB: Transportation Safety Board of Canada

TSN: Time since new

TSO: Time since overhaul

UAV: Uninhabited Aerial Vehicle

VCDS: Vice Chief of Defence Staff

VFR: Visual Flight Rule