



MINISTRY OF TRANSPORT AND COMMUNICATIONS
REPUBLIC OF THE UNION OF MYANMAR

AIRCRAFT ACCIDENT INVESTIGATION BUREAU

ACCIDENT SITE SAFETY MANUAL

SECTION 0	: MANUAL ADMINISTRATION
CHAPTER 1	: FOREWORD

1. This Accident Site Safety Manual is an internal document of the Aircraft Accident Investigation Bureau of Myanmar (AAIB). It contains operations procedures that address accident site safety issues.
2. Except for material that has been approved for public distribution, the contents of this Manual are not intended to be communicated to persons outside the AAIB without the consent of the Director of the AAIB.
3. This Manual is not regulatory in nature and is not a binding statement of procedures, and is not all inclusive. Deviation from the guidance offered in this Manual may at times be necessary to meet any specific need.
4. The Manual will be revised when necessary. The Investigators of Accidents and AAIB officers are encouraged to contribute ideas for improving the contents of this Manual.



AUNG MAW
HEAD
AIRCRAFT ACCIDENT INVESTIGATION BUREAU OF MYANMAR

SECTION 0	: MANUAL ADMINISTRATION
CHAPTER 2	: CONTENTS

<u>Sections/Chapters</u>	<u>Page</u>
SECTION 0	MANUAL ADMINISTRATION
Chapter 1	Foreword 0-1-1
Chapter 2	Contents 0-2-1
Chapter 3	List of effective pages 0-3-1
Chapter 4	Amendment record 0-4-1
Chapter 5	Manual amendment 0-5-1
SECTION 1	HAZARDS
Chapter 1	Hazards at accident sites 1-1-1
	Appendix 1: Environmental hazards 1-1-1A-1
	Appendix 2: Physical hazards 1-1-2A-1
	Appendix 3: Biological hazards 1-1-3A-1
	Appendix 4: Material hazards 1-1-4A-1
	Appendix 5: Psychological hazards 1-1-5A-1
SECTION 2	PROTECTIVE EQUIPMENT
Chapter 1	Personal protective equipment against biological hazards 2-1-1
SECTION 3	RISK MANAGEMENT
Chapter 1	Accident site risk management 3-1-1
	Appendix 1: Format for site assessment 3-1-1A-1
SECTION 4	REFERENCES
Chapter 1	Sources of technical information 4-1-1

SECTION 0	: MANUAL ADMINISTRATION
CHAPTER 5	: MANUAL AMENDMENT

1. The Manual will be updated or revised as and when necessary (e.g. to address feedback from operational experience and audits, and make corrections and editorial improvement).
2. The revision may be made by Director (AAIB) himself. He may also assign an officer to carry out the revision, in which case he will review and approve the revision eventually proposed by the officer concerned.
3. Upon the completion of the revision, Director (AAIB) or the officer concerned will make notes in the file to:
 - a. record the completion of the revision exercise; and
 - b. document the changes to be made to the Manual.
4. A distribution list of the hardcopies or CD copies of the Manual can be found in the file.
5. For amendment of the hardcopies of the Manual, Director (AAIB) or the officer concerned will prepare an amendment instruction and will arrange for the amendment instruction and the related new/amended pages to be distributed and inserted into the Manual.
6. For CD copies of the Manual, Director (AAIB) or the officer concerned will arrange for an updated CD version to be made and distributed.

SECTION 1	: HAZARDS
CHAPTER 1	: HAZARD AT ACCIDENT SITES

1. The handling of wreckage is inherently hazardous. A wide range of hazards may exist at an aircraft accident site, some of which may not be directly associated with the aircraft wreckage. This chapter identifies the potential hazards at an accident site that the investigators should be aware of and the precautions that they should take.
2. The Investigator-in-charge (IIC) or the assigned safety officer will have to assess the risk posed by hazards to the investigation personnel and implement control measures to reduce the risk. For the evaluation of hazards prior to accessing the accident site, the support of the firefighting and dangerous goods specialists or other experts should be sought. Risk management at accident sites is addressed in Chapter 1 of Section 3.
3. Hazards can be categorized as follows:
 - a. Environment – location (both geographic and topographic), fatigue (effects of travel and transportation), insects/wildlife, climate, security and political situation (see **Appendix 1**)
 - b. Physical – fire, stored energy, explosives, structures (see **Appendix 2**)
 - c. Biological – pathogens associated with human remains or cargo consignments and state of local hygiene (see **Appendix 3**)
 - d. Materials – exposure to and contact with materials and substances at the site (see **Appendix 4**)
 - e. Psychological – stress and traumatic pressures imposed by exposure to the aircraft accident, and interaction with those associated with the air carrier and related aviation activities (see **Appendix 5**)
4. Some hazards, as posed by fire, explosives, electrical discharges, lack of oxygen and chemicals, etc., may result in a risk of short duration. Other hazards may not be immediately observable but, through either single or multiple exposures, pose significant health risks over time. It is not unusual for hazards posing more immediate threats to be prioritised ahead of hazards threatening delayed symptoms, yet the hazards threatening delayed symptoms may eventually present a much greater degree of risk.
5. General precaution against hazards would include the use of protective clothing and appropriate equipment, and working in pairs, carrying a first-aid kit and having a means of communication.

SECTION 1	: HAZARDS
CHAPTER 1	: ENVIRONMENTAL HAZARDS
APPENDIX 1	

1. Geographic or topographic location

On land, the accident site may be located in remote or built-up areas, at high altitude or in very difficult terrain. Marine (sea/river) situations may involve wreckage in shallow or deep water, or strong currents.

In urban area, hazards may include downed power lines, leaking natural gas, propane, heating oil or other flammable liquids and gases, and buildings that have become structurally unsound from fire or impact damage.

2. Extreme climate

- a. Investigators may be faced with extremes of heat and cold depending on the terrain and the time of the year. Investigators expecting to spend a few hours at a remote site could find themselves spending the night if their transport is unable to return for them. Before departure, the current and forecast weather conditions should be checked.
- b. Sudden changes in the weather can also pose problems. Even relatively small temperature changes can pose problems where wind and rain may be involved and when work is extended throughout a long day.
- c. In cold weather, the following precautions should be taken:
 - i. Wear sufficient protection to prevent frostbite and hypothermia.
 - ii. Wear layered clothing that will absorb perspiration.
 - iii. Be aware of white-out conditions – disorientation can occur in uniformly bright and white surroundings.
 - iv. Wear sunglasses and sun block.
 - v. Drink liquids to prevent dehydration.
- d. In hot weather, the following precautions should be taken:
 - i. Bring sufficient liquids for personal drinking needs.
 - ii. In situations involving high temperatures and humidity, combined with heavy exertion, drink at least half a litre of water or juice per hour.
 - iii. Be aware of symptoms of heat stress and heat stroke.
 - iv. Wear a wide-brimmed hat and loose-fitting clothing.
 - v. Wear sun block.

SECTION 1	: HAZARDS
CHAPTER 1	: PHYSICAL HAZARDS
APPENDIX 2	

1. Wreckage, damaged and unstable structures.

Hazards posed by damaged aircraft structures may not always be visible or obvious. Structural strength may be reduced by corrosion or the effects of fire fighting agents. Wreckage may shift or give way under foot, roll over or be suspended in trees and may need to be secured. The moving of large parts of wreckage should be supervised by investigators and carried out by professional operators using appropriate equipment. This applies in particular when cranes are used. In such instances, investigators should remain upwind of the wreckage so as to limit their exposure to soot, dust and other airborne substances. If, for some reason, a part of the wreckage is left suspended, no work should take place underneath it or nearby, in case the cables and chains should fail or the wreckage shift.

Some propellers have feathering springs, and if the hub is cracked, it can come apart forcefully. Investigators should not attempt to take apart a propeller assembly. Disassembly and inspection is best done at a properly equipped facility.

Modern materials, including composite structures, may appear undamaged externally but have lost structural integrity owing to impact and/or heat damage. They can also retain significant energy under the stress of impact, which, when released, may suddenly pose a significant hazard. In a relatively short period of time, for example, saltwater, by corrosion, may pose a risk to materials such as magnesium, reducing its structural strength.

Any firearms or ammunition on board the aircraft should be deactivated and removed by experts.

2 Fire and flammable substances

There is a high fire risk associated with most aircraft wreckage. Flammable liquids and gases can ignite or explode. In particular, fuel is a common fire hazard and is a harmful substance in itself (from inhalation of fumes, prolonged skin contact, etc.).

Precautions should be taken to ensure the safety of all personnel as well as to protect the wreckage:

- Smoking should not be permitted at the accident site.
- Firefighting equipment should be readily available while a high fire risk remains.

SECTION 1	: HAZARDS
CHAPTER 1	: BIOLOGICAL HAZARDS
APPENDIX 3	

1. Biological hazards

Biological hazards include blood-borne pathogens such as the human immunodeficiency virus (HIV) and the hepatitis B virus (HBV). Biological hazards may be present in the cockpit, cabin, and cargo wreckage as well as on the ground where bodies and survivors have lain. Since it is not possible to readily identify contaminated blood and other commingled bodily fluid, it is prudent to take precautions when working around and in the wreckage, when handling the wreckage and when performing off-site examinations and tests on wreckage parts.

Precautions should be taken to prevent viruses from entering mucous membranes (such as eyes, nose and mouth) or open cuts and rashes. The accident site may be contaminated with liquid, semi-liquid and dried blood and other bodily fluids, fragmented bones, human or animal tissues and internal organs. In the dried state, there is a risk that particles of these substances may become airborne and come into contact with the unprotected eyes, nose and mouth.

2. Biological hazard precaution training

a. Investigators should have been trained in biological hazard precautions before they can be permitted to enter the accident site. They should also have been properly inoculated / vaccinated.

3. Personal protective equipment (PPE)

a. Each investigator should wear appropriate personal PPE. (See Chapter 1 of Section 2 on general guidelines on PPE). Only persons using appropriate PPE should be allowed access to the contaminated areas.

b. It should always be assumed that human tissue and bodily fluids are contaminated. As a minimum precaution, the investigators should don a face mask and wear latex gloves under their work gloves when examining wreckage known to contain blood or other fluids. The most common contaminated items include all cabin interior materials, i.e. seat belts/should harnesses, seat cushions, other upholstery and trim materials, and instrument panels. While wearing PPE in the biological hazard area, investigators should not eat, drink or smoke; apply cosmetics, lip balm or sun block; touch the face, eyes, nose or mouth; or handle contact lenses.

SECTION 1	: HAZARDS
CHAPTER 1	: MATERIAL HAZARDS
APPENDIX 4	

1 Hazardous materials

Materials used in the construction and operation of aircraft can be hazardous.

Examples:

- Metals and oxides
- Composite materials
- Chemicals and substances
- Radioactive materials

Dangerous goods may be present in cargo consignments. Such dangerous goods may include radioactive consignments, explosives, ammunition, corrosive liquids, liquid or solid poisons or bacterial culture.

When an accident occurs in an industrial area, new chemicals may be involved and may react with the aircraft and thus introduce additional hazards.

2 Metals and Oxides

All metal and oxide dusts and particles are hazardous to health when ingested into the body in sufficient concentrations.

Metals and oxides may react with other chemicals/substances, such as fire fighting agents.

3 Composite materials

Fibre-based composites are extensively used on aircraft and can be found in structural skin, control surfaces, access panel, cabin materials, cabin seats, rotor blades and propeller blades. Fibreglass is found in soundproofing blankets, cockpit and cabin panels, cargo bin liners and other aircraft furnishings.

When subjected to fires, free fibres and dusts from burnt composite materials may irritate the eyes, nose, throat and lungs or cause allergies.

Appropriate measures should be taken to limit exposure and reduce disturbance to prevent dusts and fibres from becoming airborne, and to minimise their hazardous nature when they do. The safety precautions include:

SECTION 1	: HAZARDS
CHAPTER 1	: PSYCHOLOGICAL HAZARDS
APPENDIX 5	

1 An accident may cause serious stress to persons involved in the work at the accident site. In particular, an accident with a large number of fatalities may induce psychological stress (sleep disturbance, intrusive thoughts and flashbacks) to investigators and those involved in the search and identification of bodies, resulting in post-traumatic stress disorder (PTSD).

2 Measures that can help prevent the development of trauma during field investigation include the following:

- Looking out for signs of traumatic stress on fellow colleagues, e.g. changes in emotions and behaviour (moods, errors, accidents, irritability, not eating)
- Team defusing stress through group activities (e.g. chatting, relaxing or having meals/drinks together)
- Welfare – suitable breaks and adequate rest periods
- Getting away from site activities (e.g. taking a day off from site)
- Keeping in touch with family and friends
- Proactive counselling

SECTION 2	: PROTECTIVE EQUIPMENT
CHAPTER 1	: PERSONAL PROTECTIVE EQUIPMENT AGAINST BIOLOGICAL HAZARDS

1 General

This chapter provides general guidelines on the personal protective equipment (PPE) to be used by accident investigators at the accident site. PPE may also be needed when performing off-site examinations and tests on wreckage parts.

Investigators and site-essential experts should be properly trained in the use of PPE, and be closely monitored to ensure their safety during the use and disposal of this PPE.

2 Personal protective equipment (PPE) for investigators

2.1 PPE consist typically of the following items (the quantity of the items may vary according to the accident site condition, tasks at hand, and required duration of work):

- Face masks
- Half-face and full-face respirators
- Disposable coveralls
- Latex gloves
- Disposable work gloves (leather, nitrile)
- Disposable heavy duty work gloves
- Kevlar cut-resistant gloves with lined palm and fingers
- Protective boots with sole and toe protection
- Disposable shoe covers
- Hard hat
- Eye protection: either safety glasses or safety goggles
- Hearing protection: either ear muffs or ear plugs
- Hand and equipment wipes
- High visibility vest
- Chemical or duct tape

2.2 Other equipment:

- Cleaning/disinfectant chemicals and supplies
- Biological hazard disposal bags
- Drinking water
- First aid kit
- Foul weather clothing
- Insect protective solutions and medication, if recommended
- Extra batteries and power supply adaptors for electronic equipment

SECTION 3	: RISK MANAGEMENT
CHAPTER 1	: ACCIDENT SITE RISK MANAGEMENT

1. General

No aircraft accident site can be absolutely free of risk, but many activities around the site can be controlled to minimise risk to an acceptable level. If the risk remains unacceptably high, certain activities may have to be delayed or modified, with priority being placed on the safety of all investigators.

Note: While this chapter refers to hazards and risk at aircraft accident sites, risk management should also be undertaken at off-site investigation facilities as appropriate.

- 1.2 The Investigator-in-charge (IIC) or an assigned safety officer should brief the investigation team as appropriate and maintain effective communication with all investigators at the accident site, to ensure that any hazards identified are clearly communicated in a timely manner. The investigators should also be informed of any possibility of the need to abort or terminate an activity prematurely.
- 1.3 A list of all investigators at the site should be prepared, with information as to the type and currency of the immunisation each investigator received. Investigators who have not been appropriately immunised may be assigned tasks that will not expose them to the biological hazards.

2. Risk management at aircraft accident sites

- 2.1 A typical process of risk management at an aircraft accident site is as follows:
 - Identification of hazards
 - Determining the exposure level for the identified hazards
 - Evaluation or assessment of the associated risk
 - Introducing control measures to mitigate the risk
 - Reviewing and revision of the initial risk assessment or when conditions change

3 Identification of hazards

- 3.1 As early as possible, the accident site should be surveyed for biological hazards in the form of visible blood or other fluids. When there are serious injuries or fatalities, there will often be bodily fluids remaining after the dead and injuries are removed. Areas contaminated by spilled blood or bodily fluids should be identified and roped off and have only a single point of entry/exit.

SECTION 3	: RISK MANAGEMENT
CHAPTER 1	: FORMAT FOR SITE ASSESSMENT
APPENDIX 1	

Accident Site Hazards Assessment

Accident details: _____ Aircraft: _____
 Location: _____ Assessment date/time: _____

CATEGORY	HAZARD	CONDITION	LOCATION	CONTROL MEASURES	RESIDUAL RISK
Fire	Fuel and fuel tanks				
	Flammable fluids				
	Leaking oxygen				
	Leaking or hot batteries				
	Smouldering materials				
	Cutting tools and other heat generating sources				
	Pyrotechnics				
	Hot brakes and tyres				
High pressure systems	Brakes and tyres				
	Hydraulic systems				
	Pneumatic systems				
	Shock struts				
	Engine fire bottles				
Explosive	Hot brakes and tyres				
	Munitions and weapons				
	Ejector seat components				
	Pressurised bottles				
	Rocket-deployed parachute systems				
	Escape systems				
	Ballistic recovery systems				
	Cartridge operated devices: Weapons pylons, cable cutters, fire bottles, escape systems				

SECTION 4	: REFERENCES
CHAPTER 1	: SOURCES OF TECHNICAL INFORMATION

Listed below are useful materials that all Investigators of Accidents should familiarise themselves with:

- ICAO Technical Instruction for the Safe Transport of Dangerous Goods by Air (Doc 9284)
- IATA Dangerous Goods Regulations
- ICAO Circular on Hazards at Aircraft Accident Sites (Circular No. 315)
- ICAO Emergency Response Guidance for Aircraft Accidents involving Dangerous Goods (Doc 948)