CAR AGA

PART AERODROME CRISIS MANAGEMENT (PART ACM)

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RECORDS OF AMENDMENT

ISSUE	DATE OF ISSUE	DATE OF APPLICABILITY	CHANGES TO SUBJECT/AREA
01	25th July 2025	30th June 2026	CAR-AGA PART-ACM Issue 01 were developed based on EASA framework and ICAO SARPs, including key changes to crisis management, business continuity, emergency planning, rescue & firefighting, fire prevention and aerodrome works safety, superseding the following regulations: • CAR PART XI – ON AERODROME EMERGENCY SERVICES, FACILITIES AND EQUIPMENT Issue 04, • ACCEPTABLE MEANS OF COMPLIANCE 35 - INSPECTION AND TESTING OF RESCUE AND FIRE-FIGHTING EQUIPMENT - ISSUE 02, • ACCEPTABLE MEANS OF COMPLIANCE 45 - BREATHING APPARATUS OPERATIONAL GUIDANCE - ISSUE 02, and • ACCEPTABLE MEANS OF COMPLIANCE 72 - AIRCRAFT LANDING AREAS- PRIVATE USE - ISSUE 02 (CHAPTER 6 – AEROPLANE FIRE TEAM).

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SUBPART – DEFINITIONS (ACM.DEF)
SECTION A – GENERAL REQUIREMENTS

ACM.DEF.A.001 Applicability

(a) The definitions and terminologies are applicable the context of this regulation.

(b) Definitions are interpreted in the following order of precedence:

(1) The regulation specific to the discipline (CAR-ADR PART ACM);

(2) UAE Civil Aviation Laws and Regulations

(3) ICAO

(4) Commonly Accepted Meanings

ACM.DEF.A.005 Definitions

(a) Notwithstanding the definitions already contained in CAR DEF, CAR AGA and CAR SMS, the terms listed below have the following meaning within the context of this regulation:

(1) **Aerodrome Emergency Plan Manual (AEP Manual).** A manual that forms part of the application for an Aerodrome Certificate or and is maintained pursuant to these regulations. The Aerodrome Emergency Plan Manual, as determined by the aerodrome operator, reflects the nature of emergency planning and management of aircraft and non-aircraft emergencies at an aerodrome.

(2) **Aerodrome Rescue and Firefighting Service Operations Manual (ARFFS Operations Manual).** A document, as determined by the Aerodrome operator or a Service Provider, details the level of service delivery, organisation, risk management, operational procedures and quality assurance of the rescue and firefighting service.

(3) **Aerodrome Rescue and Firefighting Service Training Manual (ARFFS Training Manual).** A document, as determined by the Aerodrome operator or a Service Provider, details the competency-based training and assessment policies and procedures of the rescue and firefighting service.

(4) **Aerodrome Rescue and Firefighting Service Fitness Manual.** A document, as determined by the Aerodrome operator or a Service Provider, details the medical and physical fitness policies and procedures of the rescue and firefighting service.

(5) **Aircraft Firefighting.** The control or extinguishment of fire adjacent to or involving an aircraft following accidents or incidents.

(6) **Aircraft Rescue.** Actions taken to save or set free persons involved in an aircraft accident/incident by safeguarding the integrity of the aircraft fuselage from an external / internal fire, to support self-evacuation and to undertake the removal of injured and trapped persons.

(7) **Accepted by the GCAA.** Documented by the GCAA as suitable for the purpose intended. Below is the list of documents to be accepted by the GCAA

(a) Aerodrome Emergency Plan Manual

(b) Aerodrome Rescue and Firefighting Service Training Manual

(8) **Assessor.** A person acceptable to the aerodrome operator to make judgements about performance against the requirements of the training standards.

(9) **Augmented reality (AR).** An interactive experience that enhances the real world with computer-generated perceptual information. Using software, apps, and hardware such as AR glasses, augmented reality overlays digital content onto real-life environments and objects.

(10) **Certificate of conformity.** Certificate of Conformity is a document issued by manufacturers or an authorised testing centre, which certifies that the foam concentrate supplied meet the required firefighting performance standards complies with ICAO requirements. A certificate of conformity can be either in physical or electronic form and should be readily available for audit/inspection by the GCAA.

(11) **Certificate of competence.** This refers to documentary evidence confirming an individual has successfully demonstrated and achieved the necessary standard of competence for that particular training. A certificate of competence can be either in physical or electronic form and should be readily available for audit/inspection by the GCAA.

(12) **Competence.** The ability to apply knowledge, skills and attributes (KSA) in performing to the standards required in employment. This includes problems and meeting changing demands.

(13) **Competency-based training and assessment.** Training and assessment that are characterized by a performance orientation, emphasis on standards of performance and their measurement, and the development of training to the specified performance standards as defined in ICAO Doc 9868 PANS-TRG

(14) **Crisis Management Centre (CMC).** A focal point where an aerodrome operator ’s senior management together with other senior management of mutual-aid supporting agencies take overall responsibility for the multi-agency management of an incident, establish a

strategic framework and direction within which emergency operations centre and other coordinating groups will work at an aerodrome.

(15) **Critical Area Concept.** The critical area is a concept for rescue of the occupants of an aircraft. It seeks to control only that area of fire adjacent to the fuselage instead of attempting to control and extinguish the entire fire. The objective is to safeguard the integrity of the fuselage and maintain tolerable conditions for its occupants.

(16) **Control time (aircraft fire).** The time required to reduce the initial intensity of an aircraft fire by 90 per cent.

(17) **Debrief.** A means of analysing an outcome of workplace/ training/exercise activity, which confirms the success of the activity or identifies where there is an opportunity to promote improvements to personal and organisational performance.

(18) **Drainage time (foam).** Refers to the rate at which foam solution drains from a foam blanket may be a partial consideration in that foam blanket's efficiency in progressively controlling and extinguishing fires and subsequent post-fire security.

(19) **Emergencies (aircraft-related).**

(i) **Aircraft accident (ACC).** An emergency declaration made by Air Traffic Control and/or Incident Command that an aircraft accident/crash which has occurred on or in the vicinity of the aerodrome. This emergency declaration will trigger a full emergency response action by both on and off aerodrome agencies as detailed in the emergency plan.

(ii) **Aircraft ground incident (AGI).** An emergency declaration made by Air Traffic Control and/or Incident Commander when an aircraft on the movement area is in difficulty or is involved in an incident. The declaration will trigger the appropriate aerodrome emergency response actions and will normally require the attendance of on-aerodrome agencies as detailed in the emergency plan. Depending on the severity and complexity of the incident, the situation may trigger a full emergency response action similar to an aircraft accident as detailed in the aerodrome emergency plan.

(iii) **Full emergency (FEM).** An emergency declaration made by Air Traffic Control and/or Incident Commander upon notification by the Pilot-in-command that an aircraft approaching the aerodrome is, or is suspected to be, in such trouble that there is imminent danger of an accident (crash). The declaration of a full emergency will trigger the appropriate aerodrome emergency response actions and will require the full attendance of both on and off aerodrome agencies as the emergency plan.

(iv) **Local standby (LSB)**. An emergency declaration made by Air Traffic Control and/or Incident Commander upon notification by the Pilot-in-command that an aircraft approaching the aerodrome is known or is suspected to have developed some defect, but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing. The declaration of a local standby will trigger the appropriate aerodrome emergency response actions and normally require the attendance of on-aerodrome agencies as per the emergency plan.

(v) **Public health (PHE)**. An emergency declaration made by a responsible agency where there is increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport and severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff. This declaration triggers the appropriate actions to be taken by relevant on and off aerodrome agencies as detailed in the aerodrome emergency plan and/or communicable disease management plan.

(vi) **Weather standby (WSB).** An emergency declaration made by Air Traffic Control and/or Incident Commander when weather condition has deteriorated to such an extent as to render the landing of aircraft more difficult or more difficult to observe. This declaration will trigger the appropriate actions to be taken by on-aerodrome agencies as detailed in the emergency plan.

(vii) **Acts of Unlawful Interference (AUI).** An emergency declaration made by the responsible agency i.e police authority or security agency in the case of any unlawful act involving an aircraft in conjunction with local police/security agency. This emergency declaration will trigger the appropriate emergency response actions as detailed in the aerodrome security and/or emergency plan

(20) **Emergencies (non-aircraft related).**

(i) **Domestic incident (DOM).** An emergency declaration made by Air Traffic Control and/or Incident Commander in the event of any fires, operational or medical incident affecting aerodrome personnel, operations, facilities, infrastructure or in response to calls from public or other agency on humanitarian grounds. The declaration will trigger the appropriate emergency response actions by relevant on-aerodrome agencies. Depending on the severity and scale of the incident, the assistance of relevant off-aerodrome agencies may be required. Appropriate emergency instructions should be detailed in the emergency plan.

(ii) **Dangerous goods/hazardous material incident (DGI).** An emergency declaration made by Air Traffic Control and/or Incident Commander in the event of any accidental release of dangerous goods affecting aerodrome building, facilities, property, infrastructure or in response to calls from public or other agency on humanitarian grounds. The declaration will trigger the appropriate emergency response actions by on-aerodrome agencies as detailed in the emergency plan. Depending on the severity and scale of the incident, the assistance of relevant off-aerodrome agencies may be required.

(21) **Emergency operations centre (EOC).** A focal point for an aerodrome operator supported by all those agencies concerned with an incident at an aerodrome to act together in a concerted way, provides tactical coordination and support to the mobile command post.

(22) **Emergency exercise.** An exercise is a simulation of an emergency situation at an aerodrome. Exercises have three main purposes: to validate plans (validation), to develop staff competencies; and give them practice in carrying out their roles in the plans (training); and to test well-established procedures (testing). Types of emergency exercise:

(i) **Full-scale.** A full-scale exercise is to ensure the adequacy of the aerodrome emergency plan to cope with different types of emergencies.

(ii) **Partial exercise.** A partial exercise is to ensure the adequacy of the response to individual participating agencies and components of the aerodrome emergency plan.

(iii) **Table-top.** A test of the integration and capability of emergency response resources without the expense and disruption of services incurred by other emergency exercises.

(iv) **Modular test.** A modular test is to enable concentrated effort on specific components of aerodrome emergency plan.

(23) **Emergency planning order**. A high-level statement detailing an order in dealing with an emergency.

(24) **Emergency planning instruction.** An operational action or task to be taken to implement the emergency planning order.

(25) **Expansion ratio (foam).** Refers to the amount of air entrained into a foam stream governs its expansion, which in turn may affect the fluidity of the finished foam and therefore the rate of spread over the surface of burning fuels.

(26) **Extinguishing Agent.** An extinguishing agent is to extinguish and/or suppress a fire on which it is applied.

(i) A principal extinguishing agent is a type of foam for aircraft rescue and firefighting primarily intended to provide an air excluding blanket which prevents volatile flammable vapours from mixing with air or oxygen. Principal agent is to achieve permanent control of fire, i.e. for a period of several minutes or longer.

(ii) Complementary extinguishing agent is a type of chemical powder or halocarbon field to provide rapid fire suppression or quick knockdown but generally only offer a transient control, which is available during application.

(27) **Foam.** An aggregation of small bubbles used to form an air-excluding, vapor-suppressing blanket over the surface of a flammable liquid fuel.

(28) **Foam Concentrate.** A concentrated liquid foaming agent as received from the manufacturer.

(29) **Foam induction input-based testing.** A method of testing of the foam solution method by measuring the flow rate or volume of concentrate, or suitable substitute for concentrate, and comparing this flow rate or volume to the flow rate or volume of water used, then using those two numbers to calculate the proportions of concentrate and water in the foam solution. This method involves the use of an external device/pump connected to the vehicle to test the accuracy of the foam production system. (NFPA 440)

(30) **Foam induction output-based testing.** A method of testing the foam solution by collecting a sample of the solution after aerating and dispensing it, and using instruments and calculations to determine the sample's proportions of concentrate and water in the foam solution. This is standard method of testing the accuracy of the foam production system. (NFPA 440)

(31) **Frangible object.** An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft or vehicle. (*Note. — Guidance on design for frangibility is contained in the Aerodrome Design Manual (Doc 9157), Part 6.)*

(32) **Human factors principles.** Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

(33) **Human performance.** Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

(34) **Incident Management System (IMS).** An internationally recognised safe and effective system for managing an incident at an aerodrome. IMS is underpinned by the key principles of national guidance, which supports the delivery of a safe, effective and

efficient operational response, using planned and systematic processes to minimise personal and organisational risk.

(35) **Internal Quality Assurance (IQA).** A process which ensures the integrity and value of management system, plans, procedures, qualifications and/or assessments throughout their life cycle.

(36) **Low Visibility Conditions (LVC).** The meteorological conditions requiring approaches and landings in Category II and Category III, take offs in RVR less than 550 metres or for surface movements in meteorological conditions not permitting ATS to be carried out with visual reference.

(37) **Low Visibility Procedures (LVP).** The measures required to support safe operations at an aerodrome in Low Visibility Conditions (LVC).

(38) **Maintenance of Competence (MoC).** A structured learning framework that can be used to maintain skills and assess the competence of Rescue and Fire Fighting Service personnel.

(39) **Manoeuvring Area.** That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

(40) **Mobile Command Post (MCP).** A mobile facility capable of rapid deployment to an incident where an aerodrome incident commander in cooperation with mutual-aid supporting agency heads assemble to receive and disseminate information and make decisions pertinent to the rescue and firefighting operations at the scene of an emergency at an aerodrome.

(41) **Optimum visibility and surface conditions.** Defined as daytime, good visibility, no precipitation with normal response routes free of aircraft and surface contamination

(42) **Proficiency Check.** A formal assessment of competence carried out by an assessor at predetermined intervals in order to ensure competence in critical functions.

(43) **Qualified.** Denotes fitness or fit for the purpose. This may be achieved through fulfilment of the necessary conditions such as completion of required training, or acquisition of a diploma or degree, or through the gaining of suitable experience. It, also, includes the ability, capacity, knowledge or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege or status.

(44) **Rescue and Fire Fighting Service (ARFFS).** An international term describing a service provider or a specialised aerodrome unit responsible to immediately respond, create and maintain survivable conditions, to provide egress routes for aircraft occupants and to initiate the rescue of those occupants unable to make their escape without direct aid

during an aircraft accident/incident at an aerodrome. A ARFFS is also known as an aerodrome fire rescue service or aerodrome emergency services.

(45) **Response Time.** The time between the initial call to the ARFFS and the time when the first responding vehicle(s) is(are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in the table on minimum usable amounts of extinguishing agents appropriate to the level of aerodrome category.

(46) **Standby Position**. A pre-determined strategic location around the airfield within a safe distance from the runway for ARFFS vehicles to take up forward readiness position to respond immediately in the event of a full emergency or local standby declaration.

(47) **Structured Learning Programme (SLP).** A training programme that is organised in a manner that enables individuals to achieve competency in a particular set of roles and/or tasks according to their grade (Watchroom, Firefighter, Supervisor and Manager).

(48) **Task resource analysis (TRA).** A risk-based approach method using both qualitative and quantitative analysis supported by a workload assessment to determine the necessary level of ARFFS staffing to perform identified tasks in real-time before mutual-aid supporting agencies are needed based on credible worst-case aircraft accident or incident scenarios at an aerodrome.

(49) **Technology.** Any other suitable method of communicating which may include using telephone / video conferencing, that is not through the face-to-face medium.

(50) **Training facilities analysis.** A process to analyse the type and quantity of appropriate facilities and equipment required for the implementation of a training programme to ensure initial and continued competence.

(51) **Training frequency analysis.** A process to analyse how frequently training and assessments in particular areas should be repeated within a programme of training, to ensure continued competence.

(52) **Training needs analysis.** A process to identify and analyse the underpinning knowledge, skills and attributes (KSA) required to carry out the tasks required of ARFFS personnel in relation to their operational role (Watchroom, Firefighter, Driver, Supervisor and Manager).

(53) **Virtual Reality (VR).** A realistic visual stimulus used in many modern training and assessment scenarios as it confers a wide range of benefits in a safe and controlled environment.

SUBPART – ORGANISATIONAL REQUIREMENTS (ACM.OR)
SECTION A – GENERAL REQUIREMENTS

ACM.OR.A.005 Organisational requirements

INITIAL CERTIFICATION

(a) For initial aerodrome certification or initial landing area acceptance, a new applicant shall comply with applicable organisational requirements stated in **CAR AGA PART ADR.**

CONTINUED VALIDITY

(a) For continued validity of an aerodrome certificate or landing area acceptance, an aerodrome operator shall comply with applicable organisational requirements stated in **CAR AGA PART ADR.**

SUBPART – OPERATIONAL REQUIREMENTS FOR AERODROME CERTIFICATE HOLDERS (ACM.OPS.CERT)

SECTION A – PROVISION OF SERVICES AND/OR ACTIVITIES

ACM.OPS.CERT.A.005 Provision of services and/or activities

(a) The services and/or activities under this SUBPART shall be provided at the aerodrome by the aerodrome operator either directly or indirectly.

(b) Where the services and/or activities contained in this SUBPART are provided by a third party either fully or partially, an aerodrome operator shall establish and implement safety oversight of the provisions, in accordance with the operator's safety management system, to ensure compliance with the applicable requirements contained in this Regulation.

GM ACM.OPS.CERT.A.005(a) Provision of services and/or activities

PROVISION OF SERVICES AND/OR ACTIVITIES

(a) The services and/or activities contained in this SUBPART need to be provided at an aerodrome. In some cases, these services and/or activities are not directly provided by the aerodrome operator, but by a third-party organisation or combination of both. However, the aerodrome operator, being responsible for the operation of the aerodrome should have arrangements and interfaces with the third party to ensure that these services and/or activities are provided according to the legal requirements.

(b) The method described above meets with the intention of an integrated Safety Management System that helps the aerodrome operator to ensure the safety objective of the provision is being met.

AMC1 ACM.OPS.CERT.A.005(b) Provision of services and/or activities

THIRD PARTY

(a) Safety oversight of a third party should be part of the aerodrome operator's safety management system, that includes:

(1) establishing a formal agreement with the third party on the types and duration of the contracted services and/or activities;

(2) administering a committee for the planning, monitoring and evaluating the contracted services and/or activities;

(3) implementing risk management of the contracted services and/or activities;

(4) implementing performance monitoring of the contracted services and/or activities; and

(5) conducting audits and inspections of the contracted services and/or activities.

GM AMC1 ACM.OPS.CERT.A.005(b) Provision of services and/or activities

ESTABLISHING AND IMPLEMENTING SAFETY OVERSIGHT OF THIRD PARTY

Guidance on establishing and implementing safety oversight can refer to CAR SMS.

SECTION B - CRISIS MANAGEMENT

ACM.OPS.CERT.B.005 Crisis management

CRISIS MANAGEMENT

(a) An aerodrome operator shall establish and implement a crisis management plan that:

(1) is commensurate with the aircraft operations and other activities conducted at an aerodrome;

(2) provides for the strategic direction in dealing with crises occurring at an aerodrome or in its surroundings; and

(3) contains procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

AMC1 ACM.OPS.CERT.B.005(a) Crisis management

ESTABLISHING AND IMPLEMENTING A CRISIS MANAGEMENT PLAN

(a) A crisis management plan should include:

(1) strategic orders and instructions in dealing with different crisis situations;

(2) a crisis management centre located within the aerodrome;

(3) a crisis management centre has sufficient personnel, equipment and resources readily available for use during an emergency;

(4) a crisis management group administered by the aerodrome operator for the strategic response to a crisis; and

(5) a person responsible to lead the crisis management group.

GM1 AMC1 ACM.OPS.CERT.B.005(a) Crisis management

ESTABLISHING AND IMPLEMENTING A CRISIS MANAGEMENT PLAN

(a) Where a crisis management centre is not located within the aerodrome, the activation of the centre and key personnel must not cause any delay and compromise the strategic response to the emergency.

(b) Arrangements are made for the aerodrome operator to co-chair the group if the crisis management group is not lead by the aerodrome certificate holder.

(c) Developing health and safety arrangements are necessary for the strategic commander and crisis management group especially in a protracted emergency.

GM2 AMC1 ACM.OPS.CERT.B.005(a) Crisis management

ESTABLISHING STRATEGIC CRISIS MANAGEMENT CAPABILITY

(a) Guidance in establishing and implementing a crisis management plan at an aerodrome can be referred to ISO 22361 – Security and Resilience: Crisis Management.

(b) Elements for consideration include:

(1) context, core concepts, principles and challenges;

(2) developing an organization's crisis management capability;

(3) crisis leadership;

(4) the decision-making challenges and complexities facing a crisis team in action;

(5) crisis communication; and

(6) training, validation and learning from crises.

(c) It is applicable to top management with strategic responsibilities for the delivery of a crisis management capability in any organization. It can also be used by those who operate under the direction of top management.

AMC2 ACM.OPS.CERT.B.005(a) Crisis management

TESTING AND EXERCISING A CRISIS MANAGEMENT PLAN

(a) Testing and exercising of the crisis management plan should include:

(1) personnel and agencies detailed in the crisis management plan;

(2) core elements of the crisis management plan and establish how and when these elements are tested;

(3) senior executives of the aerodrome operator actively participate in the exercises as per their assigned roles and responsibilities in the crisis management plan; and

(4) records of testing and exercising and ensure such records are readily available for audit and inspection by the GCAA.

GM AMC2 ACM.OPS.CERT.B.005(a) Crisis management

TESTING AND EXERCISING A CRISIS MANAGEMENT PLAN

Testing and exercising of crisis management plan may be combined with business continuity plan and/or emergency plan.

SECTION C – BUSINESS CONTINUITY

ACM.OPS.CERT.C.005 Business continuity

BUSINESS CONTINUITY PLANNING

(a) An aerodrome operator shall establish and implement a business continuity plan that:

(1) is commensurate with the aircraft operations and other activities conducted at an aerodrome;

(2) provides for the partial or full closure of facilities and operations occurring at an aerodrome or in its surroundings arising from crises; and

(3) contains procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

AMC1 ACM.OPS.CERT.C.005(a) Business continuity

BUSINESS CONTINUITY PLANNING ARRANGEMENTS

(a) Business continuity planning arrangements should include:

(1) a competent person responsible for establishing, implementing and maintaining all aspects of business continuity planning at an aerodrome;

(2) a business continuity planning committee administered by the aerodrome operator that:

(i) is lead under the direction of a senior management of the aerodrome operator;

(ii) includes representations from the agencies listed in the business continuity plan;

(iii) is responsible for preparing, accepting, and maintaining the business continuity plan;

(iv) develops arrangements based on the identification and availability of agencies and resources at, and in the vicinity of the aerodrome;

(v) establishes an exercise program to periodically test the business continuity plan;

(vi) review results from exercises and lessons from incidents/disruptions; and

(vii) ensure results and lessons contribute to continuous improvements to the business continuity plan.

GM1 AMC1 ACM.OPS.CERT.C.005(a) Business continuity

BCP COMPETENT PERSON

(a) The Airport Business Continuity Planning (BCP) Competent Person should possess the necessary knowledge, skills, and authority to manage business continuity efforts effectively, and to ensure

compliance with relevant standards, such as NCEMA 7000 and/or ISO 22301, as well as national and international aviation regulations.

(b) To be effective in their role, the Airport BCP Competent Person must possess a strong foundation of skills and expertise in both business continuity and aviation operations. Key competencies include:

(1) Technical Knowledge: A deep understanding of business continuity management principles, including NCEMA 7000 and/or ISO 22301, risk assessment methodologies, and recovery planning techniques, is essential. Additionally, the Competent Person must be familiar with airport operations, safety protocols, and regulatory requirements specific to the aviation industry.

(2) Leadership and Decision-Making Skills: The Competent Person must demonstrate strong leadership skills, with the ability to coordinate diverse teams and make critical decisions under pressure. In times of crisis, they must be able to provide clear direction, resolve issues quickly, and maintain control of the response efforts.

(3) Communication and Collaboration: Excellent communication skills are essential, as the Competent Person must regularly engage with internal and external stakeholders, ensuring clarity and consistency in the messaging around continuity planning and response efforts. The individual must be able to collaborate effectively with all levels of the organisation and external partners to ensure cohesive action during a disruption.

(4) Problem-Solving and Analytical Skills: The Competent Person must be adept at analysing risks, identifying vulnerabilities, and developing effective solutions to mitigate them. This requires the ability to think critically and remain flexible, adapting plans and strategies as new risks emerge.

(5) Experience and Qualifications: Ideally, the Competent Person should hold relevant certifications in business continuity (such as NCEMA 7000 and/or ISO 22301 Lead Implementer or Manager certifications) and have prior experience in managing business continuity or emergency planning efforts within complex operational environments such as airports.

GM2 AMC1 ACM.OPS.CERT.C.005(a) Business continuity

BUSINESS CONTINUITY PLANNING COMMITTEE

1. INTRODUCTION

(a) The Airport Business Continuity Planning (BCP) Committee is responsible for overseeing and implementing business continuity strategies to ensure airport operations continue

uninterrupted during disruptive events. Airports, as vital transportation and commerce hubs, must be prepared to withstand various risks including natural disasters, cyber-attacks, and operational disruptions. The Committee plays a key role in safeguarding the airport's infrastructure, personnel, and services, ensuring both safety and efficiency during and after an incident.

2. PURPOSE AND SCOPE

(a) The primary purpose of the Airport BCP Committee is to develop, implement, and monitor a comprehensive business continuity management system (BCMS) tailored to the unique challenges of the airport environment. This system is designed to mitigate disruptions, maintain critical airport operations, and facilitate swift recovery to minimize downtime and maintain passenger confidence and safety.

(b) The Committee's scope covers all areas of airport operations, including air traffic management, passenger services, security, ground handling, baggage systems, cargo services, fuel supply, and communication with external stakeholders such as airlines, regulatory authorities, and emergency responders.

3. ROLES AND RESPONSIBILITIES

(a) The Airport BCP Committee comprises senior management from key departments, including but not limited to:

(1) operations,

(2) safety,

(3) security,

(4) IT,

(5) communications, and

(6) human resources, as well as representatives from external partners such as airlines and government authorities.

4. RISK IDENTIFICATION AND IMPACT ANALYSIS

(a) In compliance with NCEMA 7000 and ISO 22301 requirements, the Committee conducts a detailed risk assessment to identify potential threats to airport operations. This includes evaluating natural hazards (e.g., severe weather, earthquakes), technological risks (e.g., cyber-attacks, system failures), and operational challenges (e.g., strikes, fuel shortages). A comprehensive Business Impact Analysis (BIA) is carried out to understand the criticality of various airport functions and the potential consequences of disruptions. Based on these

assessments, the Committee identifies priorities for recovery and sets recovery time objectives (RTOs) for each operational area.

5. DEVELOPMENT OF THE BUSINESS CONTINUITY PLAN (BCP):

(a) The Committee leads the development of the airport's BCP, which outlines step-by-step procedures for responding to and recovering from incidents. The plan includes detailed strategies for maintaining essential functions such as airfield operations, terminal management, passenger processing, and emergency services. The BCP is designed to be flexible and adaptable, ensuring that it can respond to a variety of scenarios, whether they involve immediate safety concerns or long-term infrastructure damage.

6. COORDINATION WITH STAKEHOLDERS:

(a) Airports rely on numerous external partners, including airlines, government agencies, and service providers. The Committee ensures ongoing collaboration with these stakeholders, fostering strong communication and shared continuity planning efforts. This coordination is essential for a unified response during an emergency and for ensuring that external stakeholders are aligned with the airport's recovery timelines and strategies.

7. RESOURCE ALLOCATION AND MANAGEMENT:

(a) The BCP Committee is responsible for identifying and allocating the resources needed to ensure the airport can respond effectively during an incident. This includes maintaining access to backup systems, emergency supplies, and trained staff prepared to implement continuity measures.

8. TRAINING, AWARENESS, AND PREPAREDNESS:

(a) The Committee ensures that all airport staff are aware of the BCP and their respective roles during a disruption. This involves regular training programs, simulations, and emergency drills that test the airport's ability to respond to incidents in real time.

9. PLAN TESTING AND EVALUATION:

(a) Continuous testing and review of the airport's BCP are key responsibilities of the Committee. The plan is tested through a variety of exercises, such as live simulations of operational disruptions, IT system failures, and emergency evacuations. After each test, the Committee evaluates the effectiveness of the response and recovery efforts, identifies areas for improvement, and updates the BCP accordingly. Regular reviews also ensure that the plan remains current.

AMC2 ACM.OPS.CERT.C.005(a) Business continuity

ESTABLISHING AND IMPLEMENTING A BUSINESS CONTINUITY PLAN

(a) Establishing and implementing a business continuity plan should include:

(1) recovery, resumption and maintenance of all aspects of the business;

(2) prioritization of business objectives and critical operations that are essential for recovery of aerodrome services and/or activities;

(3) development and maintenance of business continuity plans and procedures;

(4) sufficient contingency plans to cope immediately with the full or partial loss of a critical facility and infrastructure, which include but are not limited to runways, taxiways, aprons, air traffic control tower, passenger terminals, freight facilities, fuel facilities, road access, administration buildings and key facilities;

(5) determining the impact to key business processes and continuity of operations at an aerodrome after an emergency or operational disruption; and

(6) sufficient resources to implement and maintain the plan.

GM1 AMC2 ACM.OPS.CERT.C.005(a) Business continuity

ESTABLISHING AND IMPLEMENTING A BUSINESS CONTINUITY PLAN

(a) Guidance in establishing and implementing a business continuity plan can be referred to either:

(1) UAE National Business Continuity Management System AE/SCNS/NCEMA 7000. This document is developed for the concerned organizations in all sectors to comply with The National Standard For Business Continuity Management System by implementing the requirements of this standard, thereby enhancing the capacity of the UAE business community to cope with emergencies and crises, and this standard enables employees, through the training programs and applied models, to achieve comprehensive knowledge in business continuity management in accordance with the concept of vital functions in the organization; and/or

(2) ISO 22301 Security and resilience Business continuity management systems Requirements. ISO 22301 is the international standard for Business Continuity Management Systems (BCMS). It provides a framework for organizations to plan, establish, implement, operate, monitor, review, maintain, and continually improve a documented management system to protect against, reduce the likelihood of, and ensure recovery from disruptive incidents. This standard is crucial for organizations to enhance their resilience against various unforeseen disruptions, ensuring continuity of

operations and services. It helps in identifying risks, preparing for emergencies, and improving recovery time.

GM2 AMC2 ACM.OPS.CERT.C.005(a) Business continuity

DEVELOPING A BUSINESS IMPACT ANALYSIS

Guidance in developing a business impact analysis can referred to ISO 22317 Security and resilience Business continuity management systems Guidelines for business impact analysis.

AMC3 ACM.OPS.CERT.C.005(a) Business continuity

TESTING AND EXERCISING A BUSINESS CONTINUITY PLAN

(a) Testing and exercising of the business continuity plan should include:

(1) personnel and agencies as per their assigned roles detailed in the plan;

(2) core elements of the business continuity plan and establish how and when these elements are tested; and

(3) records of testing and exercising and ensure such records are readily available for audit and inspection by the GCAA.

GM AMC3 ACM.OPS.CERT.C.005(a) Business continuity

TESTING AND EXERCISING BUSINESS CONTINUITY PLAN

Testing and exercising of business continuity plan may be combined with crisis management plan and/or emergency plan. Where a business continuity plan exercise is part of a modular test plan, this requirement should be reflected accordingly.

SECTION D – EMERGENCY PLANNING

ACM.OPS.CERT.D.005 Emergency planning

AERODROME EMERGENCY PLANNING

(a) An aerodrome operator shall establish and implement an emergency plan that is in accordance with aerodrome certification requirements stated in **CAR AGA PART ADR**, that ensure:

(1) the plan commensurate with the type of aircraft operations and other activities conducted at an aerodrome;

(2) sufficient emergency planning arrangements are provided at an aerodrome;

(3) the plan provides for the command, control, coordination and communication of the actions to be taken in an emergency occurring at an aerodrome or in its vicinity;

(4) the plan coordinates the response or participation of all existing agencies which, in the opinion of the aerodrome operator, could be of assistance in responding to an emergency; and

(5) the plan observes human factors principles to ensure optimum response by all existing agencies participating in emergency operations.

(b) The aerodrome emergency plan shall be submitted to the GCAA for acceptance, as part of the initial certification and subsequent changes to the emergency plan shall be managed according to the aerodrome operator's safety management system.

GM1 ACM.OPS.CERT.D.005(a) Emergency planning

CERTIFICATION REQUIREMENTS

(a) An aerodrome emergency plan is an essential component of the aerodrome operator's overall safety management system in demonstrating the level of emergency preparedness and readiness in planning and dealing with the onset and aftermath of aviation emergencies occurring at an aerodrome and its immediate vicinity. The emergency plan is an essential document for the initial and continued validity of an aerodrome certificate or landing area acceptance, in accordance with **CAR AGA PART ADR** Certification Requirements.

GM2 ACM.OPS.CERT.D.005(a) Emergency planning

PURPOSE AND OBJECTIVE OF EMERGENCY PLANNING

(a) Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at an aerodrome or in its vicinity. The objective of aerodrome emergency

planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations.

(b) The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.

(c) The emergency plan is a critical component of the overall aerodrome's safety management system and its effectiveness heavily relies on the plan's commensurability with the size, complexities, risks and hazards of the types of aircraft operations and other operational activities conducted at an aerodrome. The efficacy of the plan is dependent on comprehensiveness of the emergency orders/instructions, response protocols and risk mitigation measures.

(d) To be operationally sound, a comprehensive aerodrome emergency plan (see Figure-1) should consider:

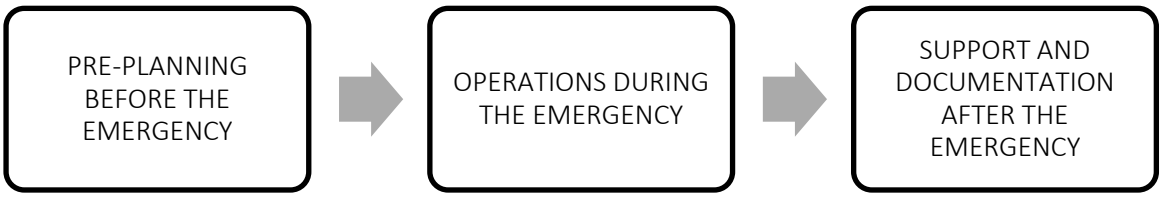


Figure-1: Comprehensive aerodrome emergency planning framework

(1) preplanning BEFORE an emergency;

(i) **"Before the emergency"** considerations include planning for the handling of all factors that could bear upon effective emergency response. Preplanning should define the organizational authority and the responsibilities for developing, testing and implementing the emergency plan.

(2) operations DURING the emergency;

(i) **"During the emergency"** considerations depend on the stage, nature and location of the emergency. The situation may change as the rescue work progresses. (For example, while the aerodrome fire chief or designee would normally be the first person in command of the emergency forces, this officer may thereafter become one of several staff officers as other responding officers from other agencies assume their specified roles at the command post under the jurisdiction of the designated "on-scene" commander.); and

(3) support and documentation AFTER the emergency:

(i) **"After the emergency"** considerations may not carry the urgency of preceding events, but transitions of authority and responsibility at the scene need to be thoroughly discussed and planned in advance. Some personnel, who in early stages have a direct operational assignment, subsequently may be required to remain on the scene and may assume a supportive role (i.e. police/security personnel, rescue and firefighting personnel, aerodrome operator and public works). Thus, it is also necessary to pre-plan for such supportive services, and to consider problems related to restoring or maintaining protective services to permit continuation of normal aerodrome/aircraft operations which may have been disrupted by the emergency. The need to communicate the termination of the emergency to supporting agencies (hospitals, ambulances, etc.) so they can return to "normal" operation should also be considered. Documentation of the various operations in an emergency is an aid to the gathering and organizing of data for various post-accident/incident reports. It also can provide the structure for a critique of the emergency and can be used as a format for improving the procedures and arrangements in the emergency plan.

(e) In some cases, the aerodrome emergency plan is part of an organisation's integrated Crisis Management Plan, and the responsibility for its development is assigned to another organisation, different from the aerodrome certificate holder. However, this does not prevent the aerodrome operator from preparing its own local emergency plan describing the actions that should be taken during an emergency, in cooperation with the organisation, which are responsible for the overall crisis plan.

(f) Irrespective of whose responsibility is the establishment and implementation of an emergency plan covering emergencies at or in the surroundings of an aerodrome, the emergency plan should ensure that there are provisions for:

(1) orderly and efficient transition from normal to emergency operations;

(2) delegation of authority;

(3) assignment of emergency responsibilities;

(4) authorising key personnel for actions contained in the plan;

(5) coordination of efforts to cope with the emergency; and

(6) safe continuation of aircraft operations or return to normal operations as soon as possible.

(g) Further guidance material in establishing aerodrome emergency planning is given in the ICAO Doc 9137 Airport Services Manual Part 7 – Aerodrome emergency planning.

GM3 ACM.OPS.CERT.D.005(a) Emergency planning

PLANNING AND TAILORING THE AERODROME EMERGENCY PLAN

(a) An aerodrome emergency plan is an important aspect of the aerodrome operator ’s safety management system. An emergency plan should be appropriately scaled and relevant to the hazards and risks arising from the different types of aircraft operations and operational activities conducted at an aerodrome. Considerations for the planning and tailoring the aerodrome emergency plan can be achieved by:

(1) Understanding Operations: Thoroughly understand the types of aircraft operations and activities conducted at an aerodrome. This includes the types and sizes of aircraft, the volume of traffic, cargo operations, passenger services, and any special activities such as maintenance or training flights.

(2) Risk-Based Approach: Use a risk-based approach to identify and assess potential hazards and threats specific to the aerodrome's operations. This ensures that the emergency plan addresses the most significant risks and is tailored to the specific operational environment. Conducting a risk/hazard analysis can assist an aerodrome operator in this aspect.

(3) Considering Aircraft Types and Sizes: The emergency plan should account for the different types and sizes of aircraft e.g. fuel-based, electric, hydrogen, etc, that operate at an aerodrome. Larger aircraft may require more extensive firefighting resources and medical support, while smaller aircraft might have different evacuation and rescue requirements.

(4) Traffic Volume: Higher traffic volumes increase the likelihood of incidents and necessitate more robust emergency response capabilities. The plan should include provisions for managing multiple simultaneous incidents and ensuring sufficient resources are available. Periodic assessment of traffic volume may be necessary.

(5) Passenger Services: If the aerodrome handles large numbers of passengers, the emergency plan should include specific measures for mass evacuation, crowd control, and providing medical care and shelter to affected individuals.

(6) Cargo Operations: For aerodromes with significant cargo operations, the plan should address potential hazards associated with hazardous materials, large freight loads, and specialized cargo handling equipment.

(7) Special Activities: If the aerodrome supports special activities such as fuelling, maintenance, training, or military operations, the emergency plan should incorporate

procedures to handle specific risks associated with these activities, such as training accidents or hazardous material spills during maintenance.

AMC1 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY PLANNING ARRANGEMENTS

(a) Emergency planning arrangements should include:

(1) a competent person/s responsible for establishing, implementing and maintaining all aspects of emergency planning and preparedness at an aerodrome;

(2) an emergency planning committee administered by the aerodrome operator, that:

(i) is lead under the direction of a senior member of the aerodrome certificate holder;

(ii) includes representations from the agencies listed in the emergency plan;

(iii) is responsible for preparing, accepting, and maintaining the emergency plan;

(iv) develops emergency response arrangements based on the identification and availability of emergency response agencies and resources at, and in the vicinity of the aerodrome;

(v) establishes an exercise program to periodically test the emergency plan;

(vi) review results from emergency exercises and lessons from aviation accidents/incidents; and

(vii) ensure results and lessons contribute to continuous improvements to the emergency plan.

GM1 AMC1 ACM.OPS.CERT.D.005(a) Emergency planning

AEP COMPETENT PERSON

(a) It is important that a competent person is appointed with the overall responsibility to oversee and manage all aspects of aerodrome emergency planning and preparedness. The responsible person should have the necessary qualifications, competencies and experiences commensurate with the size and complexity of the aerodrome, at least, with the following knowledge, skills and understanding of:

(1) critical thinking skills;

(2) leadership and management skills;

(3) aerodrome emergency planning;

(4) business continuity management;

(5) crisis management;

(6) human factors in aviation;

(7) safety management system; and

(8) national and international standards and recommended practices.

(b) Depending on the size and complexity of the aerodrome, it may be necessary to form an emergency planning team led by the responsible person to ensure effective emergency planning, preparedness and management at an aerodrome.

GM2 AMC1 ACM.OPS.CERT.D.005(a) Emergency planning

AERODROME EMERGENCY PLANNING COMMITTEE

1. ESTABLISHING AN AERODROME EMERGENCY PLANNING COMMITTEE

(a) Depending on the size, complexity of the aerodrome and availability of different mutual aid agencies, aerodrome operator may consider further dividing the AEPC into two main groups - strategic level attended by senior management personnel and operational level attended by working level personnel, to manage the committee proceedings effectively. Forming sub-committees to further support the works of the AEPC may be consider including, but are not limited to:

(1) a review committee;

(2) an exercise committee; and

(3) a welfare committee, etc.

2. RESPONSIBILITIES OF THE AEPC

(a) The AEPC is primarily responsible for assisting the aerodrome operator in:

(1) preparing, accepting, and maintaining the AEP for the aerodrome;

(2) developing emergency response arrangements based on the identification and availability of emergency resources at, and in the vicinity of the aerodrome;

(3) establishing an exercise programme to periodically test the AEP; and

(4) revising and updating the AEP.

3. REPRESENTATION ON THE AEPC

(a) The AEPC should include representation from:

(1) local police service

(2) local fire service

(3) Local hospital or ambulance service;

(4) air traffic control;

(5) ground handling services; and

(6) any other agencies that may be required to assist in an emergency, as appropriate.

(b) Airlines and other support agencies should also be considered for inclusion on the AEPC

4. FREQUENCY OF AEPC MEETINGS

(a) At least once a year, the AEPC is to meet to review the adequacy of the AEP, and following each occasion of:

(1) the plan being activated;

(2) a test or exercise being held; and

(3) where the currency and procedural validity of the AEP needs to be addressed.

(b) A senior member of the aerodrome operator should chair the AEPC meetings, and a Terms of Reference should be established to ensure all committee members have a common understanding of their roles and responsibilities.

(c) A record of meeting should be documented and retained by the aerodrome operator for a minimum period of five years.

AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY PLAN DOCUMENT

(a) An emergency plan document should, at least, include:

(1) an incident management system;

(2) types of emergencies planned for – aircraft emergencies, security-related, dangerous goods, domestic fires, natural disasters, public health emergencies, etc.;

(3) on and off aerodrome agencies involved in the plan;

(4) roles and responsibilities of each agency for each type of emergency, the crisis management centre, the emergency operations centre and the mobile command centre including persons in-charge;

(5) information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency;

(6) emergency orders to deal with emergencies and emergency Instructions containing separate sections for display by various persons or services concerned, e.g. air traffic control, aerodrome rescue and firefighting service, police, ambulance, civil defence, etc;

(7) procedures for the safe management of persons evacuated from an aircraft or aerodrome buildings into airside; and

(8) a grid map of the aerodrome and its immediate vicinity.

GM1 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY PLAN DOCUMENT

(a) In order to ensure that an aerodrome emergency plan document fully serves its purpose, it should include the following:

(1) clear incident command and control policies and procedures.

(2) examples of emergencies are: aircraft emergencies, sabotage including bomb threats, unlawfully seized aircraft, dangerous goods occurrences, building fires, natural disaster and public health emergencies.

(3) examples of public health emergencies are increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport and severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

(4) details of tests for aerodrome facilities and equipment to be used in emergencies such as emergency operations centre, mobile command centre, firefighting vehicles and equipment, communication means, first aid medical supplies, etc., including the frequency of those tests;

(5) details of exercises to test emergency plans, including the frequency of those exercises;

(6) a list of organisations, agencies, and persons of authority, both on and off-aerodrome, for site roles; their telephone and fax numbers, e-mail and addresses, and the radio frequencies of their offices;

(7) the establishment of an aerodrome emergency planning committee to review incidents, discuss tactics, liaison, co-operative training, exercise planning, etc;

(8) the appointment of an aerodrome incident commander for the overall emergency operation; and

(9) details of the off-aerodrome areas for which the aerodrome ARFFS will provide a response, and the size and nature of the response.

GM2 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

CONTENTS OF EMERGENCY PLAN DOCUMENT

(a) This guide is to assists an aerodrome operator in developing the contents of an aerodrome emergency plan.

1. EMERGENCY PLAN

The purpose of the aerodrome emergency plan document is to provide all the required information to agencies and staff involved in an emergency. The document should be structured in such a

manner, that the required information is easily identifiable. For that purpose, the structure of the aerodrome emergency plan should be as follows:

2. COVER PAGE

The cover page has the title of the plan. It should include a date and identify the jurisdiction(s) covered by the plan.

3. ACCEPTANCE PAGE

The GCAA's acceptance is included in this page.

4. IMPLEMENTATION PAGE

Implementation page introduces the plan, outlines its applicability, and indicates that it supersedes all previous plans. It should include a delegation of authority for specific modifications that can be made to the plan and by whom they can be made without the senior official's signature. It should also include a date and should be signed by the Accountable Manager.

5. AMENDMENT RECORDS

Each update or change to the plan should be tracked. The record of changes, usually in table format, contains, at a minimum, a change number, the date of the change, the name of the person who made the change, and a summary of the change. Other relevant information could be considered.

6. DISTRIBUTION RECORDS

The record of distribution, usually in table format, indicates the title and the name of the person receiving the plan, the agency to which the recipient belongs, the date of delivery, and the number of copies delivered. Other relevant information could be considered. The record of distribution can be used to prove that tasked individuals and organizations have acknowledged their receipt, review, and/or acceptance of the plan. Copies of the plan can be made available to the relevant stakeholders.

7. TABLE OF CONTENTS

The table of contents should be a logically ordered and clearly identified layout of the major sections and subsections of the plan that will make finding information within the plan easier.

8. INTRODUCTION – PURPOSE, SCOPE AND OVERVIEW

Purpose.

The purpose sets the foundation for the rest of the AEP. The basic plan's purpose is a general statement of what the AEP is meant to do. The statement should be supported by a brief synopsis of the basic plan and annexes.

Scope.

The AEP should also explicitly state the scope of emergency and disaster response and the entities (e.g., departments, agencies, private sector, citizens) and geographic areas to which the plan applies.

Situation Overview.

The situation section characterizes the "planning environment," making it clear why an AEP is necessary. The level of detail is a matter of judgment; some information may be limited to a few specific annexes and presented there. At a minimum, the situation section should summarize hazards faced by the jurisdiction and discuss how the jurisdiction expects to receive (or provide) assistance within its regional response structures. The situation section covers a general discussion of:

- Relative probability and impact of the hazards
- Geographic areas likely to be affected by particular hazards
- Vulnerable critical facilities (e.g., nursing homes, schools, hospitals, infrastructure)
- Dependencies on other jurisdictions for critical resources
- The process used by the jurisdiction to determine its capabilities and limits in order to prepare for and respond to the defined hazards
- The actions taken in advance to minimize an incident's impacts, including short- and long-term strategies.

9. CONCEPT OF OPERATIONS

AEP stakeholders need to be able to visualize the sequence and scope of the planned emergency response. The CONOPS section is a written or graphic statement that explains in broad terms the aerodrome operator 's intent with regard to an emergency operation. The CONOPS should describe how the response organization accomplishes a mission or set of objectives in order to reach a desired end-state. Ideally, it offers clear methodology to realize the goals and objectives to execute the plan. This may include a brief discussion of the activation levels identified by the jurisdiction for its operations centre. The CONOPS should briefly address direction and control, alert and warning, and continuity matters that may be dealt with more fully in annexes. CONOPS is especially important for aerodrome dealing with multiple runway incidents. See guidance at **GM AMC7 ACM.OPS.CERT.D.005(a) Emergency planning.**

SECTION 1 — EMERGENCY TELEPHONE NUMBERS

This section should be limited to essential telephone, numbers according to the aerodrome needs, including:

- air traffic services unit;

- rescue and firefighting services (fire departments);
- airfield operations department;
- police and security;
- medical services:
    - hospitals;
    - ambulances; and
    - doctors — business/residence;
- aircraft operators;
- ground handling agencies;
- government authorities;
- civil defence; and
- others.

SECTION 2 — AIRCRAFT ACCIDENT ON THE AERODROME

- Action by air traffic services unit;
- Action by rescue and firefighting services;
- Action by police and security services;
- Action by the aerodrome operator:
    - vehicle escort; and
    - maintenance;
- Action by medical services:
- hospitals;
- ambulances;
- doctors; and
- medical personnel.
- Action by aircraft operator involved;
- Action by crisis management centre, emergency operations centre and mobile command centre;
- Action by government authorities;
- Communication network (crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities);
- Action by agencies organisations involved in mutual aid emergency agreements;
- Action by transportation authorities (land, sea, air);

- Action by public information officer(s);
- Action by local fire departments when structures involved; and
- Action by all other agencies.

SECTION 3 — AIRCRAFT ACCIDENT OFF THE AERODROME

- Action by air traffic services unit;
- Action by rescue and firefighting services;
- Action by local fire departments;
- Action by police and security services;
- Action by aerodrome operator;
- Action by medical services;
    - hospitals;
    - ambulances;
    - doctors; and
    - medical personnel.
- Action by agencies involved in mutual aid emergency agreements;
- Action by aircraft operator involved;
- Action by crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities;
- Action by government authorities;
- Action by communication networks (crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities);
- Action by transportation authorities (land, sea, air);
- Action by public information officer; and
- Action by all other agencies.

SECTION 4 — EMERGENCY OR SERIOUS MALFUNCTION OF AIRCRAFT IN FLIGHT (FULL EMERGENCY)

- On-aerodrome agencies:
    - Action by air traffic services unit;
    - Action by aerodrome rescue and firefighting service;
    - Action by aerodrome police and security service;
    - Action by aerodrome medical service (if any):
    - Action by the aerodrome operator;
    - Action by aircraft operator involved;

- Action by ground handling service; and
- Action by crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities.

- Off-aerodrome agencies:
  - Action by local fire service;
  - Action by local police and security service;
  - Action by medical services:
    - hospitals;
    - ambulances;
    - doctors; and
    - medical personnel.
  - Action by other agencies (if necessary).

SECTION 5 — MINOR PROBLEM OR MALFUNCTION OF AIRCRAFT IN FLIGHT (LOCAL STANDBY)

- Action by air traffic services unit;
- Action by aerodrome rescue and firefighting services;
- Action by the aerodrome operator;
- Action by aerodrome police and security services;
- Action by aerodrome medical services:
- Action by aircraft operator involved; and
- Action by ground handling service.

SECTION 6 — STRUCTURAL FIRES

- Action by air traffic services unit;
- Action by rescue and firefighting services (local fire department);
- Action by police and security services;
- Action by aerodrome authority;
- Evacuation of structure;
- Action by medical services:
  - hospitals;
  - ambulances;
  - doctors; and
  - medical personnel.

- Action by crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities;
- Action by public information officer; and
- Action by all other agencies.

SECTION 7 — SABOTAGE INCLUDING BOMB THREAT (AIRCRAFT OR STRUCTURE)

- Action by air traffic services unit;
- Action by crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities;
- Action by police and security services;
- Action by the aerodrome operator;
- Action by rescue and firefighting services;
- Action by medical services:
    - hospitals;
    - ambulances;
    - doctors; and
    - medical personnel.
- Action by aircraft operator involved;
- Action by government authorities;
    - Isolated aircraft parking position;
    - Evacuation;
    - Searches by dogs and trained personnel;
    - Handling and identification of luggage and cargo on board aircraft;
    - Handling and disposal of suspected bomb;
- Action by public information officer; and
- Action by all other agencies.

SECTION 8 — UNLAWFUL SEIZURE OF AIRCRAFT

- Action by air traffic services unit;
- Action by rescue and firefighting services;
- Action by police and security services;
- Action by the aerodrome operator;
- Action by medical services;
    - hospitals;

- ambulances;
- doctors; and
- medical personnel.

- Action by aircraft operator involved;
- Action by government authorities;
- Action by crisis management centre, emergency operations centre, mobile command centre and emergency reception facilities;
- Isolated aircraft parking position;
- Action by public information officer; and
- Action by all other agencies.

SECTION 9 — INCIDENT ON THE AERODROME

An incident on the aerodrome could require any, or all of the actions detailed in Section 2, 'Aircraft accident on the aerodrome'. Examples of incidents the aerodrome operator should consider to include: fuel spills at the ramp, passenger loading bridge, and fuel storage area; dangerous goods occurrences at freight handling areas; collapse of structures; vehicle/aircraft collisions; etc.

SECTION 10 — PERSONS OF AUTHORITY — SITE ROLES

To include, but not limited to, the following, according to local requirements:

- On-aerodrome:
  - Aerodrome ARFFS chief fire officer or the most senior ARFFS officer is the incident commander (IC);
  - Aerodrome authority;
  - Police and security — Officer-in-charge; and
  - Medical coordinator.
- Off-aerodrome:
  - Local fire service chief fire officer or the most senior fire officer - the IC will be designated as required from within the pre-arranged mutual aid emergency agreement;
  - Police and security service — officer-in-charge;
  - Ambulance and medical service — officer-in-charge; and
  - Other government authorities.

10. PLAN DEVELOPMENT AND MAINTENANCE

This section discusses the overall approach to planning and the assignment of plan development and

maintenance responsibilities. This section should, at least, include:

- Describe the planning process, participants in that process, and how development and revision of different "levels" of the AEP (plan, annexes, etc) are coordinated during the preparedness phase;
- Assign responsibility for the overall planning and coordination to a specific position; and
- Provide for a regular cycle of training, evaluating, reviewing, and updating of the AEP.

11. SUPPORTING ANNEXES

What follows is a discussion of the purpose and potential content of supporting annexes to the emergency plan. For consistency, the recommended structure for all annexes is the same as that of the plan.

- Incident command structure;
- Alerting and notification structure;
- Communication network;
- Grid map;
- Community map;
- Water response map (if any); and
- Other enclosures.

GM3 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

1. TYPES OF EMERGENCIES

(a) At least the following types of emergencies may be included in the aerodrome emergency plan:

(1) Aircraft emergencies – within aerodrome and its immediate vicinity;

(2) Aircraft ground incidents;

(3) Sabotage, including bomb threats;

(4) Unlawfully seized aircraft;

(5) Dangerous goods occurrences;

(6) Building fires;

(7) Natural disasters; and

(8) Public health emergencies.

2. AIRCRAFT EMERGENCIES

(a) The aircraft emergencies for which services may be required are generally classified as:

(1) 'Aircraft Accident': an aircraft accident which has occurred on or in the aerodrome surroundings;

(2) 'Full Emergency': an aircraft approaching the aerodrome is, or is suspected to be, in such trouble that there is imminent danger of an accident; and

(3) 'Local Standby': an aircraft approaching the aerodrome is known. or is suspected to have developed some defect, but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing; and

(4) 'Aircraft Ground Incident': where an aircraft on the ground is known to have an emergency situation other than an accident, requiring the attendance of emergency services; and

(5) 'Weather Standby: when weather conditions are such as to render a landing difficult or difficult to observe.

3. DOMESTIC EMERGENCY

(a) The classification 'Domestic Emergency' is given to any non-aircraft related emergencies such as fire or emergency involving building, structural, road/baggage tunnel, fuel storage facility, maintenance hangar, road traffic collision, etc.:

(1) On the aerodrome not included in the categories above.

(2) Outside the aerodrome boundary (other than aircraft accidents) which is liable to constitute a danger to flying or aerodrome property.

(3) Which the Aerodrome Rescue and Fire Fighting Service should attend:

(i) according to an agreement with the local fire authority;

(ii) in response to calls for the public or police on humanitarian grounds.

4. OTHER EMERGENCY DUTIES

(a) The principal objective of the Aerodrome Rescue and Fire Fighting Service (ARFFS) personnel and equipment is to deal with aircraft accidents and rescue of people involved. Equipment and techniques recommended are generally directed towards this goal. However, aerodrome ARFFS personnel may be called upon to perform other duties that occur such as weather standbys (sometimes confined to standbys in conditions of poor visibility), domestic fires, special services or to provide precautionary cover during hazardous operations, e.g. fuel flow tests.

(b) Aerodrome operator s should include the action to be taken by the ARFFS and external emergency services in the event of such calls being received in the emergency plan.

5. UNLAWFUL ACTS OF INTERFERENCE

(a) Action to be taken in the case of any unlawful act will be contained in the aerodromes contingency plan which will be drawn up in conjunction with the local Police Authority.

6. OFF-AERODROME ACCIDENTS

(a) The aerodrome operator should ensure that emergency orders contain details of the action to be taken in the case of aerodrome accidents occurring outside the aerodrome boundaries

GM4 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

1. EMERGENCY ORDERS AND INSTRUCTIONS

(a) A set of emergency orders and instructions should be developed to ensure prompt response of rescue and firefighting, law enforcement, police/security, medical services, other agencies on and off the aerodrome and other competent, trained, expert personnel, sufficient to meet all unusual conditions.

Note: - Emergency orders are high-level statements of actions and emergency instructions are detailed course of actions to carry out the orders.

2. AIRCRAFT ACCIDENT ON THE AERODROME

(a) General

The aerodrome emergency plan should be implemented immediately upon an aircraft accident occurring on the aerodrome. For this type of emergency, responding agencies are expected to take action as described below.

(b) Action by air traffic services

(1) Initiate emergency response by using the crash alarm communication system.

(2) Notify the rescue and firefighting service and provide information on the location of the accident, grid map reference and all other essential details, including time of the accident and type of aircraft. Subsequent notification may expand this information by providing details on the number of occupants, fuel on board, aircraft operator, and any dangerous goods on board, including quantity and location, if known.

(3) Close the affected runway and minimize vehicle traffic on that runway to prevent disturbance of accident investigation evidence.

(4) If required, initiate communications to the police and security services, operator, and medical services in accordance with the procedure in the aerodrome emergency plan. Provide the contacts with grid map reference, rendezvous point and/or staging area and aerodrome entrance to be used.

(5) Issue the following Notice to Airmen (NOTAM) immediately:

(i) "Aerodrome rescue and firefighting service protection unavailable until (time) or until further notice. All equipment committed to aircraft accident."

(6) Verify by written checklist that the actions above were completed, indicating notification time(s) and name of person completing action.

(c) Action by aerodrome rescue and firefighting services

(1) A request to respond to an aircraft accident on the aerodrome will normally be issued by the air traffic services.

(2) When, however, a call is received from any other person, an accident is observed, or there is reason to consider that an accident is imminent, the aerodrome rescue and firefighting service will take action in the same manner as if the air traffic services had originated the request. The air traffic services will then be informed of the nature of the request/call and of the response initiated.

(3) Aerodrome rescue and firefighting services shall:

(i) proceed via fastest access routes to the site indicated by air traffic services;

(ii) advise mutual aid fire department(s) while en-route of the following:

(A) rendezvous point;

(B) staging area;

(iii) human resources and equipment required for support, if known;

(iv) any other pertinent information; and

(v) immediately establish a well identified command post. This is a temporary post until the mobile command post is available and operative.

(4) The aerodrome incident commander is the responsible officer in charge until the emergency has been stabilized.

(5) An aircraft/structural fire is unique because of the fire control problems with the presence of highly flammable fuel and the high structures normally found on an aerodrome. Control of the combined aircraft/structural fire will be predicated on mutual aid emergency agreements.

(6) Prior agreement should be reached between the on-aerodrome rescue and firefighting service and the off aerodrome mutual aid fire departments as to which is best equipped to fight fires in aircraft hangars or other aerodrome structures.

(7) Additionally, there should be prior agreement as to which agency will be in command when an accident involves an aircraft and an aerodrome structure.

(d) Action by police and security services

(1) The first security/police officer to arrive, in co-ordination with the on-scene commander, will assume security responsibility, immediately establish free traffic lanes on ingress and egress

roads for emergency vehicles, and request reinforcements as needed. This officer shall remain in command of security until relieved by the law enforcement authority who has jurisdiction over the area.

(2) Security personnel should establish an ambulance route to the triage area to enable those vehicles to proceed to the area, load and depart in an orderly line. The route should provide for the continuous, unobstructed flow of emergency vehicles without blockage or reversal into the casualty pick up area.

(3) Security personnel and police will be needed to handle traffic in the vicinity of the accident site, to admit authorized emergency personnel, to keep unauthorized persons from the accident site, and to assume custody of personal effects removed from the aircraft.

(4) Normal traffic should be routed away from or around the accident site.

(5) The emergency site shall be cordoned off as soon as possible to exclude intruders, press, sightseers, onlookers and souvenir hunters. Appropriate markings shall be prominently displayed to advise all persons of possible hazards which may cause them serious injury should they encroach on the area.

(6) Communications between all security check points and the command post and/or emergency operations centre should be implemented as soon as possible.

(7) Notification of other agencies as shown in Figure-2 should be carried out as soon as possible.

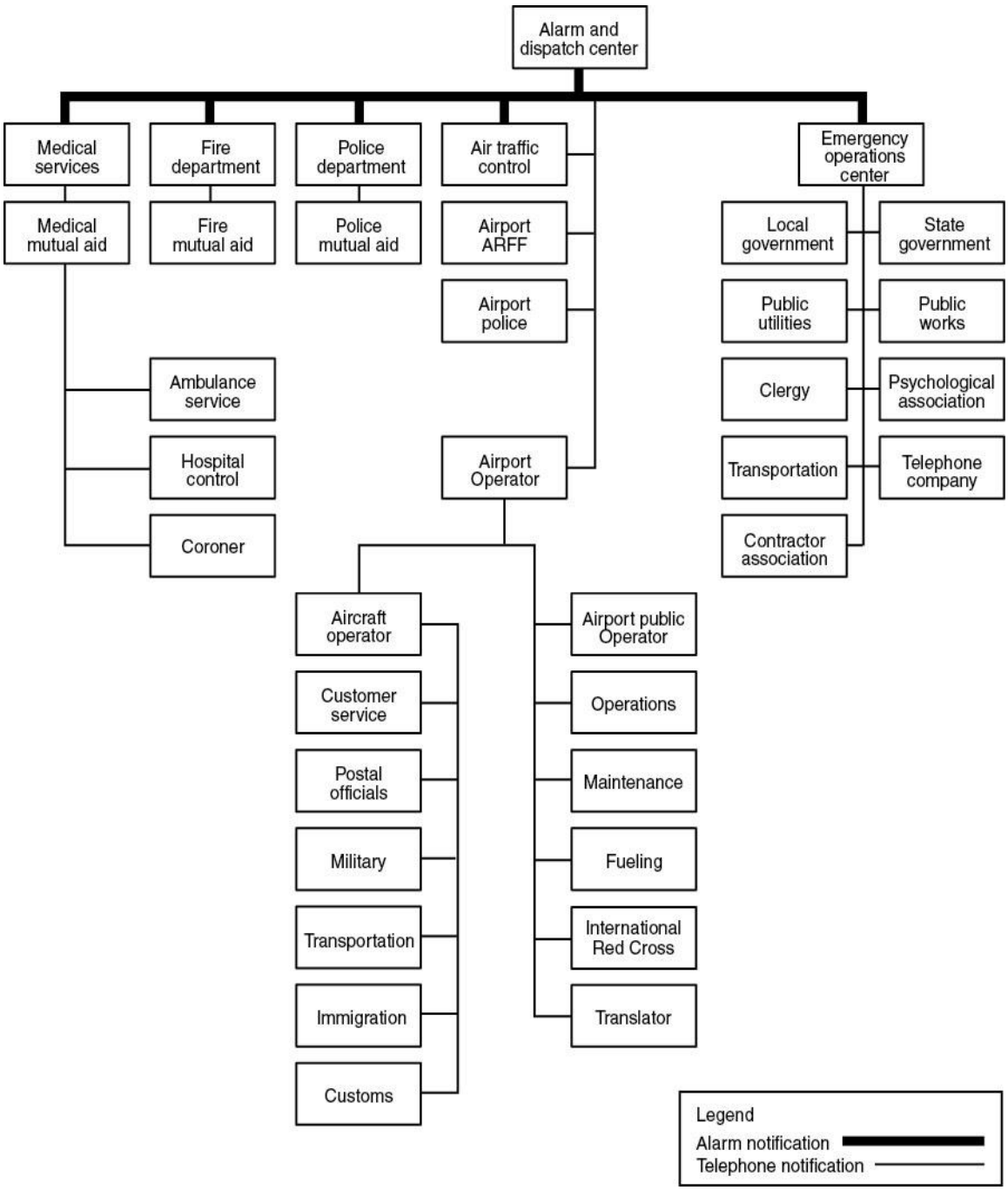


Figure-2: Chart showing notification of agencies

(8) Identifying arm bands, site passes, or I.D. tags should be issued by the controlling authority and monitored by the security police officer and the security police team.

(9) Special security provisions are necessary to protect the flight data and cockpit voice recorders. Additional security should be effected to protect any mail involved, secure any dangerous goods which may be present, or to protect personnel from exposure to radioactive materials.

(e) Action by aerodrome operator

(1) The aerodrome operator will go to the accident site and, when required, set up an easily identifiable mobile command post. The mobile command post should be sufficiently staffed by senior representatives capable of making decisions involving:

(i) aerodrome operations;

(ii) security operations;

(iii) medical operations;

(iv) aircraft operations; and

(v) aircraft recovery operations.

(2) The aerodrome operator will review the action checklist to verify that:

(i) the aerodrome emergency operations centre has been activated;

(ii) mutual aid police procedures have been initiated and secondary notification calls have been made;

(iii) mutual aid fire departments have been notified and escort has been provided for their access to the accident site and staging areas designated;

(iv) d) medical and ambulance services have been alerted and their arrivals at the designated rendezvous point or staging area have been verified;

(v) the affected aircraft operator has been notified and information obtained concerning any dangerous goods on board the aircraft (e.g. explosives, compressed or liquified gases, flammable liquids or solids, oxidizers,

(vi) poisonous substances, infectious substances, radioactive materials or corrosives), and this information has been passed on to appropriate participants;

(vii) liaison has been established with air traffic services concerning the closure of aerodrome areas, designation of emergency response corridors, issuing of voice advisories and NOTAM advising of reduced aerodrome rescue and firefighting protection;

(viii) government aircraft accident investigation authorities have been notified;

(ix) the meteorological department has been notified to make a special weather observation;

(x) arrangements have been made for the immediate survey and photography of the affected runway to identify the location of crash debris;

(xi) arrangements have been made to secure the crash debris pending release by the investigating agencies;

(xii) airspace reservation co-ordination offices (air traffic flow control office), if any, have been advised of reduced aerodrome capabilities; and

(xiii) if fatalities are involved, the Medical Examiner has been notified and temporary morgue facilities designated.

(3) In conjunction with mutual aid police, the aerodrome operator should:

(i) designate rendezvous points and staging areas for the inner and outer perimeters;

(ii) assign security personnel at the staging area and/or rendezvous point to escort vehicles so as to ensure the orderly flow of emergency vehicles, particularly ambulances, to and from the accident site; and

(iii) assign staging areas for escort vehicles and ambulances to ensure rapid dispatch.

(4) After consulting with the chief fire officer in charge, the aerodrome operator shall co-ordinate the activities of mutual aid rescue personnel and direct their activities to maximize their efforts.

(5) The aerodrome operator should also arrange the availability of the following services as required:

(i) portable emergency shelter for use by other than medical services;

(ii) lavatories;

(iii) drinking water;

(iv) ropes, barriers, etc.;

(v) food service;

(vi) mobile or portable lighting;

(vii) portable heating system;

(viii) cones, stakes, and signs;

(ix) machinery, heavy equipment, extraction tools;

(x) hydraulic extraction tools and shoring materials; and

(xi) communications equipment, such as megaphones, portable telephones, etc.

(6) The aerodrome operator will provide the initial briefing for the aerodrome public information officer and will then co-ordinate with the public information officer of the aircraft operator involved, when appropriate, any press releases and statements to the press.

(7) Upon concurrence of the chief fire officer, police/security chief and the medical co-ordinator, the aerodrome operator 's on-scene commander will notify all participating mutual aid organizations upon termination of the aerodrome emergency.

(f) Action by medical services

(1) It shall be the responsibility of the medical co-ordinator to supervise the medical services and to:

(i) verify the notification of mutual aid medical and ambulance services and their subsequent arrival at the rendezvous point or staging area;

(ii) organize the necessary actions for triage, treatment of the casualties, and their eventual evacuation by appropriate means of transportation;

(iii) control the flow of casualties and ensure, together with the transportation officer, the dispatch of the casualties to the appropriate hospitals by all available means of transportation;

(iv) maintain an accurate list of the casualties including their names and their final disposition;

(v) co-ordinate the transportation of the uninjured to the designated holding area with the aircraft operator concerned;

(vi) provide medical evaluation of ambulatory and uninjured survivors;

(vii) arrange for the replenishment of medical supplies, if necessary; and

(viii) organize, with the police, reception facilities for the dead.

(g) Action by hospitals

(1) Appoint a hospital co-ordinator responsible for the following:

(i) immediately provide and transport doctors and medical teams skilled in trauma care to the accident site upon

(ii) notification of the emergency;

(iii) provide medical care to the casualties when they arrive at the treatment area; and

(iv) ensure that sufficient doctors and nurses, operating rooms, intensive care units, surgical teams, blood and

(v) blood volume expanders are available for emergency situations, including aircraft accidents.

(h) Action by aircraft operators

(1) The senior aircraft operator representative will report to the mobile command post to co-ordinate the aircraft operator activities with the person in charge. In the event the aircraft operator is not an aerodrome tenant, the aerodrome operator should designate the most capable operator on the aerodrome to handle emergencies involving transient aircraft until such time as the aircraft operator involved can arrive at the scene.

(2) The senior representative of the aircraft operator will provide information regarding passenger load, flight crew complement and the existence of any dangerous goods together with their loading position. Dangerous goods include explosives, compressed or liquified gases (which may be flammable or toxic), flammable liquids or solids, oxidizers, poisonous

substances, infectious substances, radioactive materials and corrosives. Information concerning dangerous goods should be relayed, as soon as possible, to the chief fire officer and the medical co-ordinator.

(3) The senior aircraft operator representative shall make arrangements for transportation of uninjured persons from the accident site to the designated uninjured holding area. Transportation of the "walking injured" from the scene should be permitted only after consultation with the medical co-ordinator.

(4) The aircraft operator staff shall proceed to the designated uninjured holding area. The senior aircraft operator representative at the uninjured holding area will appoint qualified receptionists, registrars, and welfare co-ordinators from the staff.

(5) The aircraft operator representative who is in command of the uninjured holding area will oversee those operations by making arrangements for additional medical services (if required), commissary items, clothing, telephone facilities, etc.

(6) The receptionists should meet the transporting vehicles as they arrive from the scene of the accident and direct the passengers to the registrars' tables where they will be processed. The receptionists should know where toilet facilities are located. Migration from the holding area should be prevented until each person transported to the holding area is identified and processed according to the aerodrome emergency plan.

(7) The registrars will record the passenger's name on the manifest and determine desired reservation requirements, i.e. hotel accommodations, air transportation or other modes of transportation, etc. Registrars should list any persons to be notified of the passenger's physical and/or mental condition and potential plans. The registrar will then place an identification tag or sticker on the passenger. The registrars will direct the passengers to the welfare co-ordinators when registration has been completed. See Figure-3 for a sample of registrar form.

ABC AERODROME PTE LTD **REGISTRAR FORM**	
PASSENGER DETAILS:	
Full Name (as in passport):	
Nationality:	
Residence Address:	

Contact Number:	
Accommodation/Hotel Address:	
Flight Details (Current/Future):	
Local Transportation:	
Contact Details (within 72 hours):	
NEXT OF KIN OR PERSON(S) TO BE NOTIFIED:	
Full Name:	
Relationship:	
Contact Details:	

Figure-3: Example of a registrar form

(8) Welfare co-ordinators and mental health specialists trained in stress management should:

(i) give support and comfort to relatives and friends of passengers and crew members on board the aircraft;

(ii) register relatives and friends waiting at an aerodrome for information about persons on board; and provide care, comfort, and assistance to the "walking injured", uninjured survivors and responding personnel (if required).

(9) The aircraft operator or its representative will provide notification of the aircraft accident to:

(i) health and welfare agencies;

(ii) customs, where applicable;

(iii) immigration, where applicable;

(iv) post office; and

(v) environmental agencies, where applicable.

(10) A senior aircraft operator official will be responsible for the initial notification of relatives and friends.

(11) News releases by aircraft operators will be prepared in co-ordination with the aerodrome public information officer and liaison officers from other agencies involved in the accident.

(12) The aircraft operator or its' appointed person/organisation is responsible for the removal of the wrecked or disabled aircraft, but only after receiving authorization from the aircraft accident investigation authority. For further information, refer to ICAO Airport Services Manual (Doc 9137), Part 5 — Removal of Disabled Aircraft.

(i) Action by government authorities

(1) The following government authorities may be required to take appropriate action as indicated in their emergency plan:

(i) government accident investigation personnel;

(ii) health and welfare;

(iii) post office;

(iv) customs;

(v) immigration;

(vi) agriculture;

(vii) public works; and

(viii) environmental agencies.

(j) Action by the media/public information officer

(1) All press personnel will be directed to a designated press staging area for press personnel authorized to cover an aerodrome emergency. At this area the following will be provided:

(i) briefing;

(ii) communications; and

(iii) transportation service to and from the accident site, when permissible.

(2) Only members of the press, free-lance reporters and photographers wearing a valid press card will be admitted to the briefing area, to the designated press staging area, or transported to the scene of the accident.

(3) In general, responsibility for news releases concerning an aircraft emergency should be that of:

(i) a public information officer designated by the aerodrome operator; and

(ii) the representative of the aircraft operator involved.

(4) Under no circumstances will the press or any other personnel not involved in life saving or firefighting operations be permitted inside security lines until all rescue operations have been completed. Establishment of security lines should consider the interests of media coverage as much as rescue operations permit.

3. AIRCRAFT ACCIDENT OFF THE AERODROME

(a) General

The aerodrome emergency plan, as well as the mutual aid emergency agreement, should be implemented immediately upon an aircraft accident occurring off the aerodrome. For this type of emergency, responding agencies are expected to take action as described below.

(b) Initial notification

Initial notification of an off-aerodrome accident normally will be made by a witness to the local police, fire department, or Alarm and Dispatch Centre, if available. The Alarm and Dispatch Centre is the centralized notification system for any emergency situation that alerts appropriate responding agencies, depending on the nature of the emergency.

(c) Action by air traffic services

(1) Initiate emergency response by using the alarm communications system. See Figure-4: Sample Notification Chart for Off Aerodrome Aircraft Accident.

(2) Notify the emergency services having jurisdiction over the area, providing information on the location of the accident, giving grid map reference and all other essential details. These details should include the time of accident and the type of aircraft involved. Subsequent notification may expand this information by giving details on the number of occupants, fuel on board, aircraft operator, if appropriate, and any dangerous goods on board, including quantity and location, if known.

(3) Initiate notification of the aerodrome rescue and firefighting service, police and security services, aerodrome authority, and medical services in accordance with the procedure in the aerodrome emergency plan, giving grid map reference.

(4) If required, issue the following NOTAM as soon as possible:

(i) "Aerodrome rescue and firefighting service reduced to category (indicate category number) or zero aerodrome rescue and firefighting category until further notice."

(5) Confirm that the actions above were completed, by written checklist, indicating notification time(s) and name of person completing action.

(d) Action by aerodrome rescue and firefighting services

(1) Notification of an aircraft accident off the aerodrome will normally be received from the air traffic services, local police or local fire departments. Designated vehicles will be sent in accordance with the existing mutual aid fire department agreement.

(2) Aerodrome rescue and firefighting services shall:

(i) proceed via the most suitable access routes to the off-aerodrome accident site in co-ordination with the local police responsible for ingress and egress roads;

(ii) co-ordinate with mutual aid fire department(s); and

(iii) while en-route, exchange information with the fire department having jurisdiction over the area concerning:

(A) rendezvous point and/or staging area;

(B) human resources and equipment responding; and

(C) any other pertinent information.

(3) The senior aerodrome rescue and firefighting service officer will report to the senior fire officer of the local fire authority having jurisdiction over the area and will request instructions.

(4) Prior agreement should be reached between the aerodrome rescue and firefighting service, the local fire department in command, and mutual aid fire departments as to which is best equipped to fight fires involving aircraft and/or structures. Additionally, there should be agreement as to which agency will act in command when an accident involves both an aircraft and an aerodrome structure.

(e) Action by police and security services

(1) The first security/police officer to arrive will immediately assume security responsibility, establish free traffic lanes on ingress and egress roads for emergency vehicles, and request reinforcements as needed. He shall remain in command of security until relieved by the appropriate law enforcement authority who has jurisdiction over the area.

(2) Traffic flow and site security are the primary responsibility of police and security personnel. They should notify the appropriate communications centre of the location of the accident and available means of access and egress. After consultation with the on-scene commander, they should initiate traffic control measures in order to aid responding emergency vehicles.

(3) Security personnel and police will be needed to handle traffic in the vicinity of the accident site and to prevent disturbance of material scattered over the accident site.

(4) The emergency site shall be cordoned off as soon as possible to exclude intruders, press, sightseers, onlookers and souvenir hunters. Appropriate markings should be displayed prominently, advising all persons of possible hazards that may cause serious injury should they encroach on the area. In order to prevent ignition of fuel vapours, flares should not be used within a distance of approximately 100 m of the accident site.

(5) Communications between all security check points and the command post and/or emergency operations centre should be implemented as soon as possible.

(6) Notification of other agencies as shown in Figure-4 should be carried out as soon as possible.

(7) Identifying arm bands, site passes, or I.D. tags should be issued by the controlling authority and monitored by security and police officers.

(8) Special security provisions are necessary to protect the flight data and cockpit voice recorders, to protect mail, to secure any dangerous goods which may be present, and to protect personnel from exposure to radioactive materials, if necessary.

(f) Action by aerodrome operator

(1) Agreements for emergency mutual aid with the surrounding community enable the aerodrome operator to take the following actions:

(i) respond to the accident site;

(ii) activate the aerodrome crisis management centre, emergency operations centre and the mobile command post (if required);

(iii) extend as much emergency aid as requested by the jurisdiction agency in command of the off-aerodrome accident/incident;

(iv) notify the aircraft operator involved;

(v) notify other agencies; and

(vi) provide medical equipment and personnel.

(g) Action by medical services

(1) Local fire authority and other local authorities normally will be responsible for organizing the medical response. However, the medical response from the on-aerodrome medical service should also be applicable to mass casualty accidents occurring off the aerodrome.

(2) According to the mutual aid emergency agreement with the surrounding community, the aerodrome operator may provide, if requested and if available, a part of its medical equipment, supplies (i.e. first aid equipment, stretchers, body bags, mobile shelters, etc.) and assistance of first-aid personnel at the accident site.

(h) Action by hospitals

(1) Ensure that sufficient doctors, nurses, and operating room, intensive care, and surgical teams are available for emergency situations, including aircraft accidents.

(2) Provide medical care to the injured when they arrive.

(i) Action by aircraft operators

(1) The senior representative of the aircraft operator or a designee will report to the command post to co-ordinate the aircraft operator activities with the person in charge.

(2) The senior representative of the aircraft operator will provide information regarding passenger load, flight crew complement and the existence of any dangerous goods together with their loading position. Dangerous goods include explosives, compressed or liquified gases (which may be flammable or toxic), flammable liquids or solids, oxidizers, poisonous substances, infectious substances, radioactive material or corrosives. Information concerning

dangerous goods should be relayed, as soon as possible, to the chief fire officer and the medical co-ordinator.

(3) The senior aircraft operator representative shall make arrangements for transportation of uninjured persons from the accident site to the designated uninjured holding area. Transportation of the "walking injured" from the scene should be permitted only after consulting with the medical co-ordinator.

(4) The aircraft operator staff shall proceed to the designated uninjured holding area. The senior aircraft operator representative at the uninjured holding area will appoint qualified receptionists, registrars and welfare co-ordinators from staff.

(5) The aircraft operator representative who is in command of the uninjured holding area will oversee those operations by making arrangements for additional medical services (if required), commissary items, clothing, telephone facilities, etc.

(6) The receptionists should meet the transportation vehicles as they arrive from the scene of the accident and direct the passengers to the registrars' tables where they will be processed. The receptionists should know where support facilities are located, i.e. toilet facilities, telephones, clothing, drinking water, etc.

(7) The registrars will record the passenger's name on the manifest and determine desired reservation requirements, i.e. hotel accommodations, air transportation or other modes of transportation, etc., and any persons to be notified of the passenger's physical and/or mental condition and potential plans. The registrar will use an identification tag or sticker, to place on the passenger. The registrars will direct the passengers to the welfare co-ordinators when registration has been completed.

(8) The aircraft operator will provide notification of the aircraft accident to:

(i) state licensing and accident investigation authorities, as required;

(ii) health and welfare agencies;

(iii) customs, where applicable;

(iv) immigration, where applicable;

(v) post office; and

(vi) environmental agencies.

(9) A senior aircraft operator representative will be responsible for the initial notification of relatives and friends.

(10) News releases by aircraft operators will be prepared in co-ordination with the aerodrome public information officer and liaison officers from other agencies involved in the accident.

(11) The aircraft operator or its appointed person/organisation is responsible for the removal of the wrecked or disabled aircraft, but only after receiving authorization from the aircraft accident investigation authority. For further information refer to ICAO Airport Services Manual (Doc 9137), Part 5 — Removal of Disabled Aircraft.

(j) Action by government authorities

(1) The following government authorities, after being notified, may be required to take appropriate action as indicated in their emergency plans:

(i) government accident investigation personnel;

(ii) health and welfare;

(iii) post office;

(iv) customs, immigration and agriculture; and

(v) environmental agencies.

(k) Action by the public information officer

(1) The responsibility for news releases concerning an off-aerodrome emergency should be that of:

(i) the representative of the aircraft operator;

(ii) a public information officer designated by the particular government authority in command; and

(iii) a public information representative designated by the aerodrome operator.

(2) Only members of the press, reporters, and photographers wearing valid passes will be admitted to the briefing area, permitted to the designated press staging area, or transported to the scene of the emergency.

(3) In general, responsibility for news releases concerning an aircraft emergency should be that of:

(i) a public information officer designated by the aerodrome operator; and

(ii) the representative of the aircraft operator involved.

(4) Under no circumstances should the media or any other personnel not involved in the firefighting, rescue or emergency medical care be permitted inside security lines until all rescue operations have been completed and the area is declared safe for entry by the on-scene commander/chief fire officer.

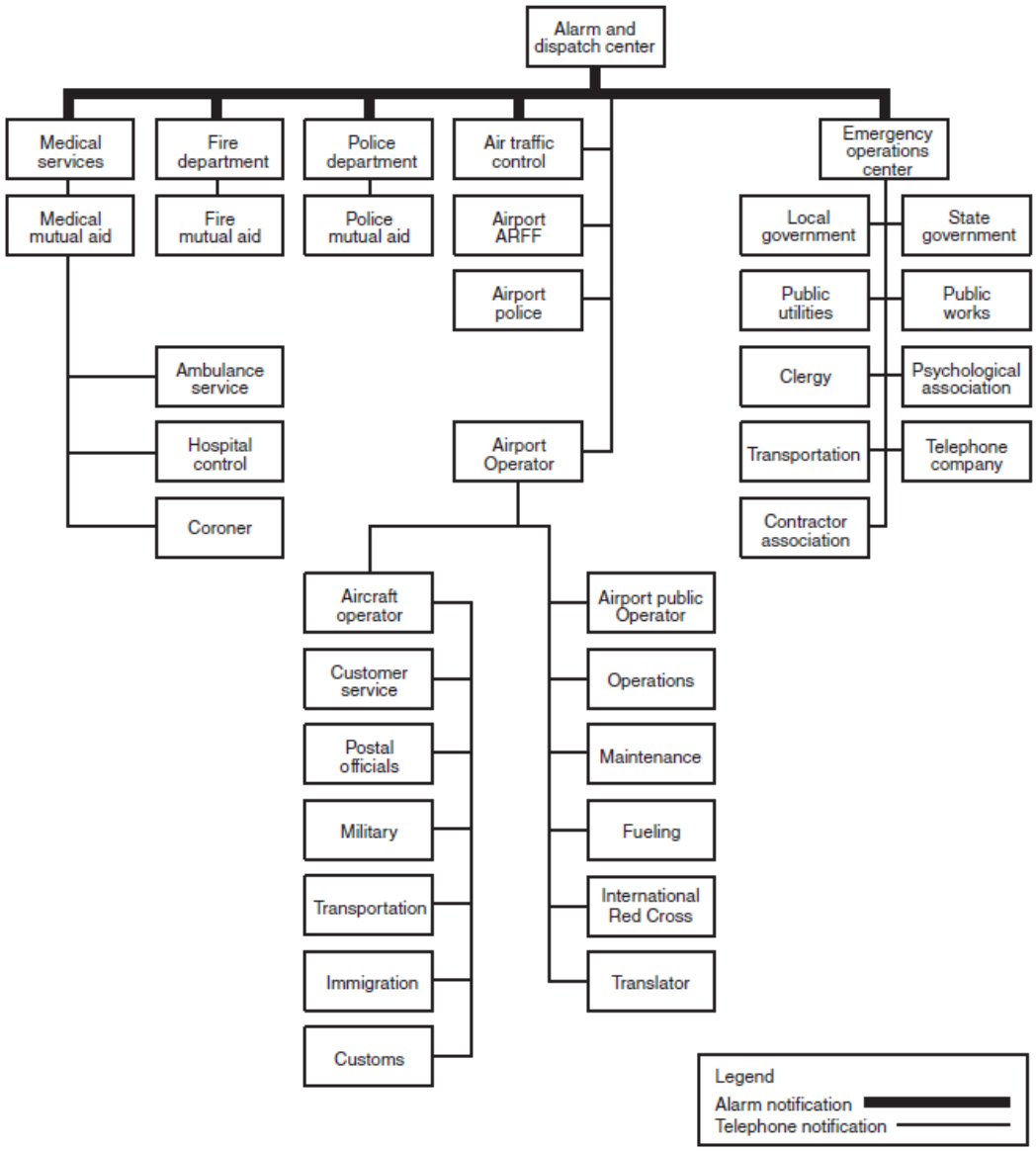


Figure-4: Sample Notification Chart — Aircraft Accident Off-Airport

4. FULL EMERGENCY

(a) General

The agencies involved in the aerodrome emergency plan should be alerted to "full emergency" status when it is known that an aircraft approaching the aerodrome is, or is suspected to be, in such trouble that there is a possibility of an accident.

(b) Action by air traffic services

(1) Notify the aerodrome rescue and firefighting service to stand by at the predetermined ready positions applicable to the planned runway and provide as many of the following details as possible:

(i) type of aircraft;

(ii) fuel on board;

(iii) number of occupants, including special occupants — handicapped, immobilized, blind, deaf;

(iv) nature of trouble;

(v) planned runway;

(vi) estimated time of landing;

(vii) aircraft operator, if appropriate; and

(viii) any dangerous goods on board, including quantity and location, if known.

(2) Initiate notification of the mutual aid fire department(s) and other appropriate organizations in accordance with the procedure prescribed in the aerodrome emergency plan, providing, if necessary, the rendezvous point and aerodrome entrance to be used.

(c) Action by other agencies

(1) The specific responsibilities and roles of the various agencies corresponding to an aircraft accident on the aerodrome can be paralleled for "full emergency" as required by local operating requirements.

5. LOCAL STANDBY

(a) General

(1) The agencies involved in the aerodrome emergency plan should be alerted to "local standby" status when an aircraft approaching the aerodrome is known or is suspected to have developed some defect but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing.

(b) Action by air traffic services

(1) Notify the aerodrome rescue and firefighting service to stand by as requested by the pilot, or stand by as local aerodrome agreements require at the predetermined ready positions applicable to the runway to be used. Provide as many of the following details as possible:

(i) type of aircraft;

(ii) fuel on board;

(iii) number of occupants, including special occupants — handicapped, immobilized, blind, deaf;

(iv) nature of trouble;

(v) planned runway;

(vi) estimated time of landing;

(vii) aircraft operator, if appropriate; and

(viii) any dangerous goods on board, including quantity and location, if known.

(c) Action by other agencies

(1) The specific responsibilities and roles of the various agencies corresponding to an aircraft accident on the aerodrome can be paralleled for "local standby" as required by local operating requirements.

6. AIRCRAFT GROUND INCIDENTS

(a) General

(1) The agencies involved in the aerodrome emergency plan should be alerted to "aircraft ground incident" status when an aircraft on the movement area is in difficulty or is involved in an incident (whether or not another aircraft, vehicle or personnel is concerned).

(b) Action by air traffic services

(1) Notify the aerodrome rescue and firefighting service to stand by as requested by the pilot, or stand by as local aerodrome agreements require at the predetermined ready positions applicable to the runway to be used. Provide as many of the following details as possible:

(i) type of aircraft;

(ii) fuel on board;

(iii) number of occupants, including special occupants — handicapped, immobilized, blind, deaf;

(iv) nature of trouble;

(v) planned runway;

(vi) estimated time of landing;

(vii) aircraft operator, if appropriate; and

(viii) any dangerous goods on board, including quantity and location, if known.

(c) Action by other agencies

(1) The specific responsibilities and roles of the various agencies corresponding to an aircraft ground incident on the aerodrome are dependent on the severity of the incident as required by local operating requirements.

7. NON-AIRCRAFT ACCIDENT-RELATED AERODROME EMERGENCIES

(a) General

(1) Procedures and techniques developed for responding to non-aircraft accident-related aerodrome emergencies should be similar to the techniques in handling aircraft accident emergencies. It should be recognized that medical and fire emergencies can arise at any location where large numbers of persons work or congregate. This problem can be severe at

aerodromes because of the exposure associated with commonplace activities, such as arriving and departing passengers and sightseers, and the use of public service facilities (i.e. automobile movement and parking areas, restaurants, bars, baggage handling and storage areas, etc.). Additionally, aerodromes can be selected by malcontents as locations to demonstrate their anger against any group or activity.

(2) The diverse character of persons travelling by air suggests the need for the aerodrome operator to arrange to have available emergency medical services to treat conditions such as cardiac arrest, abdominal pains, burns, cuts, abrasions, and other medical problems. Such conditions may require immediate care facilities and detailed mutual aid plans with outside agencies.

8. UNLAWFUL ACTS AGAINST CIVIL AVIATION

(a) General

(1) Detailed information on procedures for dealing with unlawful interference is given in the Aerodrome Security Plan. The subsequent responsibilities and roles of the various agencies for responding to an emergency should be developed, as required, in accordance with Aerodrome Security Plan requirements and procedures. For further guidance refer to ICAO Security Manual.

(2) An aircraft which is subjected to a threat of sabotage or unlawful seizure should be parked at an isolated aircraft parking position until the act of unlawful interference is terminated. Such an area should be located at least 100 m away from other aircraft parking positions, buildings or public areas as specified in ICAO Annex 14. In such cases it may be necessary to evacuate passengers without the aid of loading ramps provided at the passenger terminal. Motorized loading ramps may be available which could be driven to the site; otherwise, built-in aircraft stairs or the aircraft slides may be used.

9. OCCURRENCES INVOLVING DANGEROUS GOODS

(a) General

(1) Detailed information on procedures for dealing with Occurrences Involving Dangerous Goods is given in the ICAO Emergency Response Guidance for Aircraft Incidents involving Dangerous Goods (Doc 9481).

(2) Many types of dangerous goods can be shipped by air. These include explosives, compressed or liquified gases (which may be flammable or toxic), flammable liquids or solids, oxidizers, poisonous substances, infectious substances, radioactive material or corrosives. Packages containing dangerous goods may be found in aerodrome cargo buildings, on aircraft loading

ramps, in aircraft cargo compartments, etc. Rescue and firefighting personnel need to be aware of the potential hazards of any dangerous goods and be prepared to deal with related emergencies. Accidents involving aircraft carrying dangerous goods present special rescue and fire control problems, although the existence of such cargoes may not be immediately known. Aircraft operators should report without delay the presence, or possible presence, of dangerous goods on board aircraft involved in an accident. Packages containing dangerous goods can be identified by the distinctive diamond-shaped dangerous goods labels. Rescue and firefighting personnel should familiarize themselves with the various labels.

(3) If a package containing radioactive materials ruptures and spillage occurs, the vehicles or persons that come near or cross through the area may become contaminated. If radioactive material is disturbed, winds or a thermal column from an aircraft fire could carry and spread the radioactive material over a great distance, endangering a wide area. Provision for decontamination of responding personnel and equipment should be included in emergency planning procedures. If packages containing radioactive material are damaged, the assistance of radiological experts will be required without delay. The most appropriate organization able to provide such assistance should be determined. This may well be one of the specialist agencies.

(4) Where broken containers are found which could cause injury to or affect the health of exposed aircraft occupants or rescue personnel (particularly from radioactive, aetiological, or toxic materials), special precautions should be taken. Personnel trained to deal with the special problems involved shall be utilized. If damaged packages of dangerous goods are found, especially if they are radioactive, infectious or poisonous materials, precaution should be taken to safeguard the health of exposed aircraft occupants and rescue personnel. Fire fighters and other rescue workers should be trained to deal with the special problems that could arise.

(5) In the event radioactive materials are suspected, the following general procedures should be followed:

(i) the nearest nuclear energy facility, hospital with a radiological unit, military base or local fire authority organization should be required to dispatch immediately a radiological team to the accident site;

(ii) persons coming in contact with radioactive material should be segregated until examined by radiological team physicians;

(iii) suspected material should be identified but not handled until it has been monitored and released by authorized personnel. Clothing and tools used at the accident scene should be segregated until released by a radiological emergency team;

(iv) food or drinking water suspected of contamination should not be used;

(v) only properly attired rescue and firefighting personnel should remain on the scene; all other persons should be kept as far from the scene as possible; and

(vi) all hospitals shall be notified immediately that radioactive materials are involved so they can establish radioactive decontamination areas in the hospital.

(6) The basic regulations for the carriage of radioactive materials by all forms of transport are published by the International Atomic Energy Agency (IAEA). These regulations form the basis for many national regulations.

(7) Food or drinking water suspected of contamination by aetiological or toxic materials should not be used.

(8) The public health and veterinary authorities should be informed immediately.

(9) Any casualty or person exposed to dangerous materials should be removed from the scene of the occurrence and transported to the appropriate medical facilities for suitable treatment as soon as possible.

(10) Many publications are available which deal with the handling of dangerous goods. These include ICAO's Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284), the International Air Transport Association's Dangerous Goods Regulations, the International Atomic Energy Agency's Regulations for the Safe Transport of Radioactive Materials and Emergency Response Planning for Transport Accidents Involving Radioactive Materials. Particularly useful to fire departments would be the United States National Fire Protection Association's Fire Protection Guide on Hazardous Material.

10. NATURAL DISASTER

(a) <u>General</u>

(1) The natural disasters to which aerodromes may be subjected include storms, floods, earthquakes, and seismic sea waves. The vulnerability of an aerodrome to any of these will, in good measure, be affected by geography, since the more dangerous occurrences are often defined by certain areas or belts. While nothing can be done to avert them, there are actions that can be taken to minimize damage and expedite restoration of aircraft operations.

(2) Development of weather patterns, prediction and tracking of movement of storms, and notification to the public of potential danger will normally be carried out by a meteorological service in the area.

(3) The aerodrome emergency plan should provide for initial protective measures, emergency supplies pertinent to local disaster exposure, personnel shelter, and post-storm clean up and restoration. Aircraft operations will usually be impossible for several hours before and after the storm.

(4) As soon as severe storm warnings are received, all owners of aircraft based or located at an aerodrome should be notified. Warnings should be issued to all aircraft pilots en route to the aerodrome. Aircraft owners and pilots should be responsible for their aircraft. If possible, all aircraft on the ground should be evacuated to aerodromes outside the storm area. Aircraft in flight should be advised to divert to an alternate destination. Aircraft on the ground that cannot be dispersed should be put under cover or tied down so as to face into the approaching winds.

(5) Power interruptions are common during a natural disaster, either by damage to generating plants or by destruction of transmission lines. Aerodromes located in severe storm areas should take measures to ensure minimum interruption to power supply, either by providing standby engine generators or dual sources of commercial power.

(6) Specific personnel assignments for building protection to collect or secure all loose objects that may be blown about by the winds should be made in the aerodrome emergency plan. It may be necessary to fill and place sandbags if there is any possibility of flooding.

(7) Natural disasters require large quantities of specific equipment for use in earthquakes, floods, tsunamis, etc. A survey of the quantity and type of emergency supplies available from each individual agency should be made to provide a consolidated list of supplies available for the region.

11. EMERGENCIES AT AERODROMES BORDERING WATER AREAS

Many aerodromes are located adjacent to large bodies of water which requires additional emergency services. Aircraft may sink rapidly making the danger of drowning or hypothermia a major problem for the occupants. Some aircraft are not equipped with life vests, rafts or inflatable slides. Floatation devices sufficient to carry the number of occupants of the largest aircraft regularly using the aerodrome should be carried on amphibious rescue vehicles capable of rapid deployment.

GM5 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

RENDEZVOUS POINTS

(a) A rendezvous point is a prearranged reference point, i.e. road junction, crossroad, main access/entry point or other specified place, to which personnel/vehicles responding to an emergency situation initially proceed to receive directions to staging areas and/or the accident/incident site.

(b) The following Rendezvous Points will be used by the Local Authorities - Fire, Police and Ambulance Services:

(1) Rendezvous Point ..... Telephone at..... Ext .....

(2) Rendezvous Point ..... Telephone at..... Ext .....

(c) Specifications for Rendezvous Point Signs

(1) The signs should be designed in accordance with local road transport authority requirements and recognised by Local Emergency Services - Police, Fire and Ambulance. The sizes given are the minimum likely to allow them to be recognised easily by attending local emergency services.

(2) Rendezvous Point (RVP) Signs

(i) Rendezvous Point signs should be displayed at the point(s) designated by the Aerodrome Emergency Plan as the rendezvous point(s) for all responding Emergency Services. Signs should be clearly visible from any direction from which responding Emergency Service vehicles/personnel are likely to approach when attending aircraft accidents/incidents within the response area defined by or cross-referenced in the Aerodrome Manual. See Figure-5.

(ii) Signs should have nominal dimensions 1000 mm x 1000 mm and comprise bright, white letters '**EMERGENCY SERVICES RENDEZVOUS POINT**' on a contrasting green background. (The white lettering may also be retro-reflective.) The sign should have a bright, contrasting yellow border of 25 mm dimensions. (The border may also be retro-reflective).

Figure-5: Examples of an Emergency Services Rendezvous Point and Directional Signs

(3) Rendezvous Point Directional Arrow Signs

(i) Sufficient signs bearing RVP directional arrows should be placed in such a manner that 'off-aerodrome' Emergency Service vehicles/personnel responding to an incident on the aerodrome are directed expeditiously to any previously designated RVP. See Figure-5 for examples.

(ii) Sign(s) should be placed within and around the aerodrome perimeter so that they are visible and legible from any practicable direction of approach.

(iii) Sign(s) should have nominal dimensions 525 mm x 625 mm and comprise a bright, white arrow and the letters 'RVP' on a contrasting green background. The sign should have a bright, contrasting yellow border of 25 mm dimensions. (The lettering and border may also be retro-reflective).

(iv) Where appropriate, RVP signs and RVP Directional Arrow signs should be illuminated.

GM6 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

MANAGING AIRCRAFT EVACUATION

(a) In the event of an aircraft accident or incident on operational runway or active movement area, passengers and crew members who are able to evacuate from the aircraft are susceptible to the risk of injury if they are not quickly move away from the aircraft to a safe area. There were actual cases where evacuating passengers from aircrafts had strayed into the runway or active movement area. While it is expected that an aerodrome ARFFS will be the first arriving unit at the scene, they will however be actively engaged in trying to suppress any resulting fires or dealing with immediate hazards and rescuing those injured passengers and crew. In order to facilitate the safe evacuation process of passengers and crew at an aircraft accident scene, some aerodromes have implemented passenger evacuation management systems (PEMS). The aerodrome ARFFS or other first arriving unit at the scene can facilitate the immediate evacuation of passengers and crew to a designated safe location, normally sited upwind and uphill from the incident scene.

(b) A passenger evacuation management system (PEMS) has emerged as a recent innovation at certain aerodromes, serving to facilitate the lead and guide evacuated crew and passengers from the impacted aircraft to a relatively safe and secure area. They differ in design from one aerodrome to another, but primarily they are illuminated signs with a loud speaker capability (visual and audible directions) and are carried on the rear of dedicated ARFFS vehicles and/or airfield operations vehicles. These large signs and loudspeaker giving verbal instruction **"ALL PASSENGERS ASSEMBLE HERE"** are located at safe and secure area selected by the PEMS officer within the boundary of inner and outer cordon, where it is can be easily visible and heard by

the evacuating passengers and crew. Figure-6 shows an example of an aircraft passenger evacuation management system mounted on an airfield operations vehicle deployed at an aircraft accident scene.

(c) Sufficient emergency planning procedures should be established for evacuated aircraft passengers and crew to be guided and directed towards these vehicles. Passengers and crew who require medical treatment should be assisted or carried to this location for triage by the responding ambulance crews.

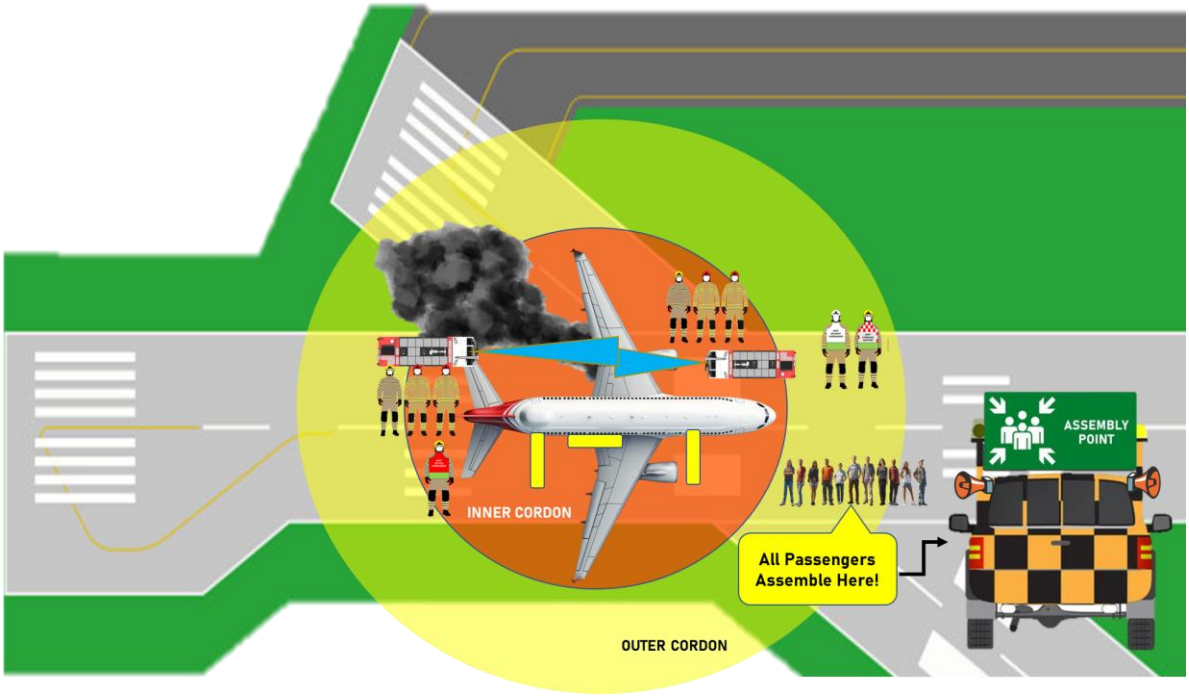


Figure-6: Example of siting an aircraft passenger evacuation management system.

GM7 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

MANAGING BUILDING EVACUATION

Policies and procedures for managing evacuation of persons from aerodrome buildings and facilities to airside should be part of the aerodrome building fire and emergency evacuation plan. For more details, refer to **GM1 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention**.

GM8 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning

GENERAL

(a) A system for locating and reaching each accident site in minimum time, with sufficient rescue, firefighting and medical equipment, should be employed at each aerodrome. A detailed grid map(s) will be beneficial in this regard. The grid maps should reflect a distance of at least 1 000 m beyond the threshold and the aerodrome perimeter. Studies of the ICAO Accident Incident

Data Reporting (ADREP) System show that a large (more than 25 percent) portion of accidents occurred on the area (1 000 m long and 60 m width) beyond the runway end.

(b) A detailed grid map(s) of the aerodrome and its vicinity (with date of revision) should be provided in the emergency operations centre. Similar small-size maps should be available in the control tower, fire station, rescue and fire fighting vehicles and all other supporting vehicles responding to an emergency. Copies should also be distributed to the agencies involved in the plan.

(c) It is preferable that two (2) grid maps be provided; one map should depict the confines of aerodrome access roads, location of water supplies, rendezvous points, staging areas, etc (See Figure-7 for a sample of aerodrome grid map). The other map should include surrounding communities and depict appropriate medical facilities, access roads, rendezvous points, etc. within a distance of approximately 8 km from the centre of the aerodrome. See Figure-8 for a sample of aerodrome community grid map.

(d) It is absolutely essential that where more than one grid map is used, the grids do not conflict; they should be immediately identifiable to all participating agencies. Use of different colour grids as in Figures-7 & 8 preclude misinterpretation of grid maps.

(e) The grid map which shows the available medical facilities should contain information on potential bed availability and medical specialities at the different hospitals. Each hospital should be individually numbered and treatment specialty indicated with distinct data such as beds, personnel, etc.

(f) It is essential that whenever the grid map is revised, an updated copy should be provided to all participating agencies and the old map destroyed.

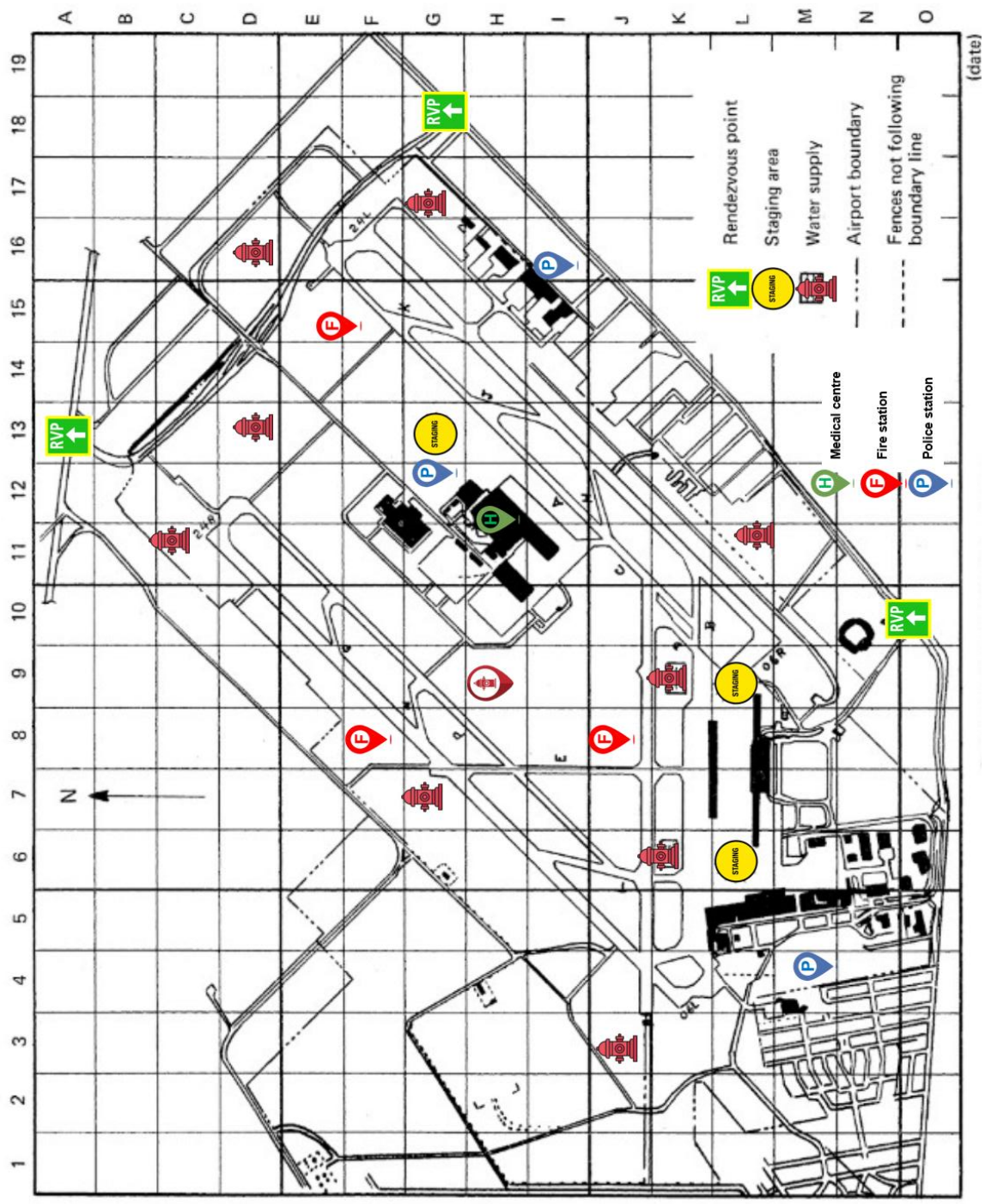


Figure-7: Example of an aerodrome grid map

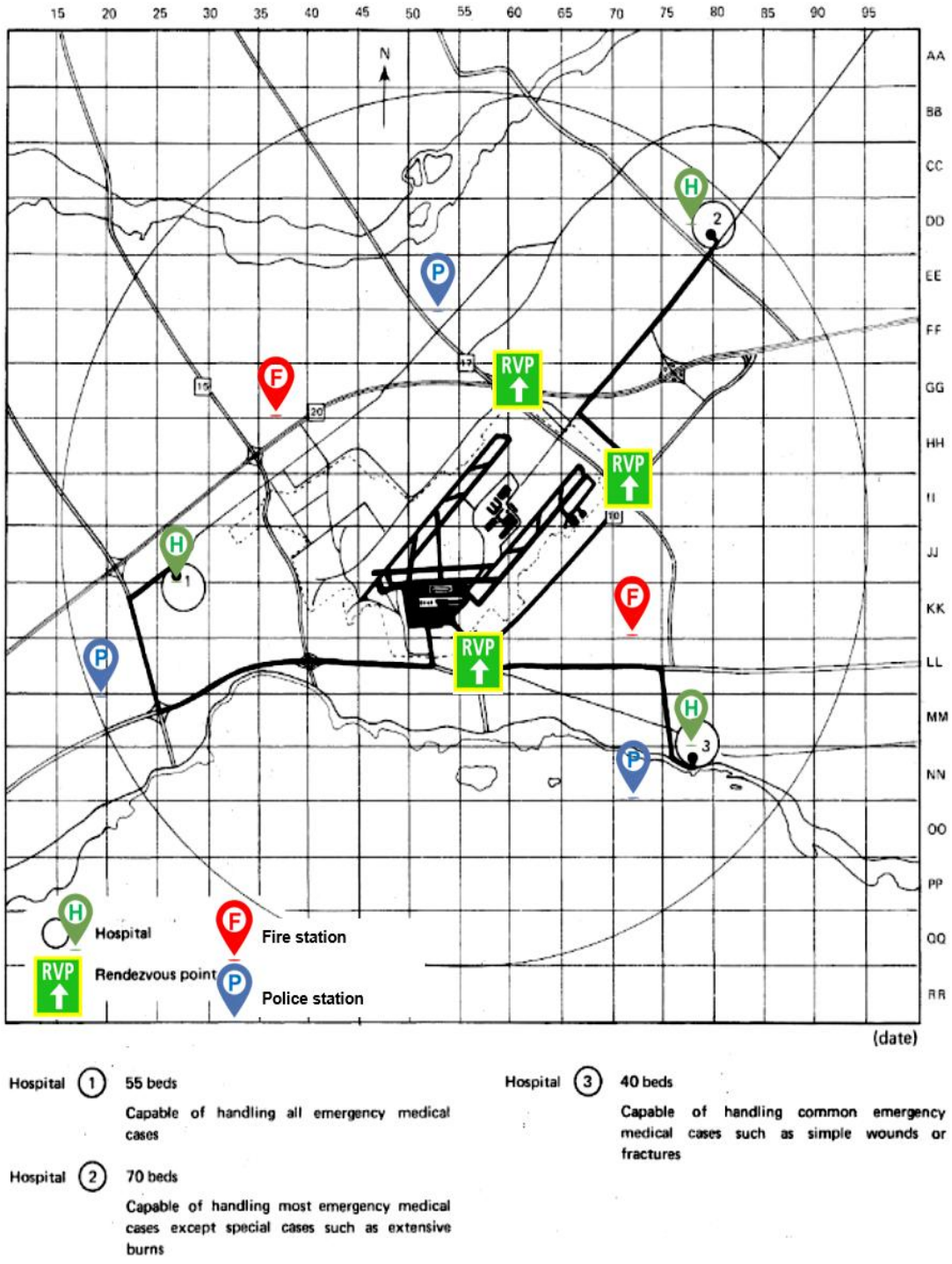


Figure-8: Example of an aerodrome community map

AMC3 ACM.OPS.CERT.D.005(a) Emergency planning

INCIDENT MANAGEMENT

(a) A management system for dealing with an incident should be established and implemented at the aerodrome that includes:

(1) a scalable command and control structure for the type of emergency detailed in the emergency plan, the agency assigned to each emergency, specify the roles and responsibility of these agencies necessary to deal with each emergency; and

(2) procedures for inter and intra operability of all mutual-aid agencies required to deal with the different emergencies at the aerodrome and its immediate vicinity.

GM AMC3 ACM.OPS.CERT.D.005(a) Emergency planning

INCIDENT MANAGEMENT

(a) This guidance document is to assist an aerodrome operator in establishing and implementing a comprehensive incident management system at an aerodrome.

(b) The guidance document contains three sections including:

(1) Section A – Aerodrome incident command. This section explains the framework of incident command at an aerodrome.

(2) Section B – Aerodrome incident command competence. This section explains the necessary knowledge, skills and understanding in the application of incident command at an aerodrome.

(3) Section C – Mutual-aid emergency services interoperability plan. This section explains the interoperability plans and procedures when working with mutual-aid emergency services needed to support the aerodrome operator s and emergency response services during an aviation incident.

INTRODUCTION

1. The aim of this document is to establish a national aerodrome incident management system by providing suitable guidance to aerodrome operator s, emergency planners and emergency response services, collectively known as Aerodrome Emergency Response Organisation (AERO), to establish and implement a robust incident management system at an aerodrome.
2. This document supplements the UAE National Response Framework in dealing with any aviation incidents at an aerodrome or in its immediate vicinity. It is essential for all commanders at strategic, tactical and operational levels, emergency response services personnel, aerodrome operations personnel and any other personnel involved in responding to aviation incidents to understands the contents of this document.
3. References for the development of this document are derived from:
   - UAE National Response Framework
   - UK National Operational Guidance on Incident Command

- UK National Operational Guidance on Incident Command – knowledge, skills and competence
- UK Joint Emergency Services Interoperability Principles (JESIP)

4. Operational response is hazardous and varied. Some incidents need only simple actions and procedures to be dealt with effectively and safely, as risks are low. Others are more challenging and may quickly increase in size, complexity and duration.
5. The document contains three sections including:
   - **Section A** – Aerodrome incident command. This section explains the framework of incident command at an aerodrome.
   - **Section B** – Aerodrome incident command competence. This section explains the necessary knowledge, skills and understanding in the application of incident command at an aerodrome.
   - **Section C** – Mutual-aid emergency services interoperability plan. This section explains the interoperability plans and procedures when working with mutual-aid emergency services needed to support the aerodrome operator s and emergency response services during an aviation incident.
6. Given the interdependencies of the materials contained in this document, it is important that this document should be read in its entirety.

SECTION A – AERODROME INCIDENT COMMAND

A. THE INCIDENT COMMAND SYSTEM AND THE ROLE OF INCIDENT COMMANDERS

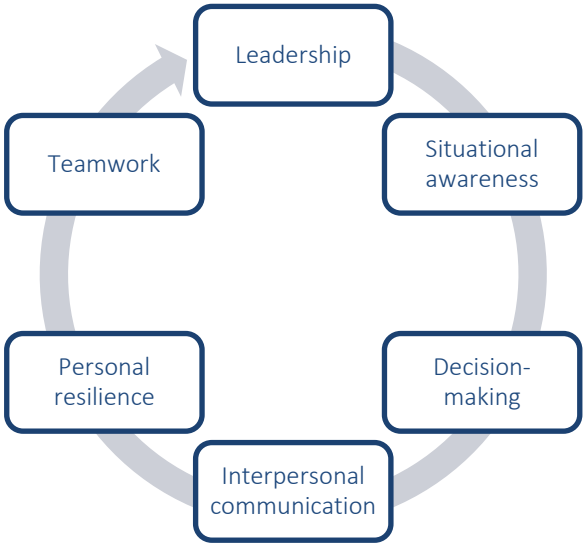
1. The incident command system is an all-hazards approach, providing a progressive, scalable and flexible system of operational command, control and organisation. The system is designed to help an incident commander manage and fulfil their incident plan. It encourages a controlled and systematic approach to resolving incidents.
2. The key components of the incident command system include:
   - Clear, defined and visible lines of command
   - Manageable spans of control
   - A communications infrastructure
   - Appropriate responsibility and authority
   - Clearly defined and understood roles and responsibilities
   - Sectorisation of the incident

3. It is the role of incident commanders to effectively and safely organise resources to obtain the best resolution to an incident. It is the role of all personnel, who may attend or are involved with an incident, to be familiar with the requirements of the incident command system and know how to operate safely and effectively in it. This applies equally to those who will perform a command role and those who will be operating under the command of others, including the fire control room.
4. Incident command and support activities start on receipt of the emergency call to the fire control room and continue to the conclusion of the incident.
5. Operations on the incident ground should be well-organised and controlled. The incident command system provides the incident commander with a clear framework to help them structure, organise and manage an emergency. It can be adapted to all sizes and types of incident and helps incident commanders to deploy and use resources effectively.
6. The incident command system will only be successful when applied with good command skills. It is not the incident command system that achieves the outcome; it is how the incident commander makes and applies sound operational decisions within it.
7. The incident command system allows the incident commander to use health and safety arrangements, policies or procedures, which are tailored to the characteristics of an incident and the objectives of the incident plan. This helps to achieve a balance between risk and benefit.
8. Incident commanders should be aware of becoming overburdened and having too broad a span of control. This can result in ineffective leadership, poor decision-making and poor communications, leading to a failure of situational awareness. Incident commanders should consider the issues of team dynamics to get the best from the resources available to them.
9. Aerodrome emergency response organisation has a responsibility to provide their incident commanders with the necessary training, equipment and resources to effectively apply the incident command system to any incident.

B. COMMAND SKILLS AND THE ROLE OF THE INCIDENT COMMANDER

1. The use of command skills by incident commanders is as important as the effective implementation of the incident command system, policies and procedures. Command skills complement these technical skills and together are critical for assertive, effective and safe incident command.
2. In exceptional circumstances, if no policies or procedures exist, or if following them could be a barrier to resolving an incident, a commander should use their command and technical skills to inform their professional judgement and apply operational discretion if appropriate.

3. Command skills are social, personal and cognitive skills that come under the heading of human factors. They enable commanders to function effectively when in charge of an incident. The safety-critical command skills are:



4. In a hazardous, fast-moving, emotion-charged and pressurised situation, an incident commander is expected to be able to cope and competently perform their role even if information about the incident is incomplete. To achieve this, they should use their command skills proficiently to gather and interpret information, and to decide on, communicate and implement a plan. If an incident commander omits or performs a command skill poorly, this may lead to dangerous consequences.
5. Aerodrome emergency response organisation should recognise the importance of incident commanders having effective command skills. Without good command skills, a commander will lack the ability to successfully implement their technical knowledge to command an incident. A failure to effectively use a command skill may expose personnel or others to unacceptable risks and cause harm, but when performed well contribute to safe and effective operations.
6. For example, if a commander fails to demonstrate assertive, effective and safe leadership this may result in others not trusting their judgement or competence. This may adversely affect the communication, co-ordination and co-operation of personnel or members of other agencies; in turn, this may place personnel and others at greater risk of being harmed.
7. The application of command skills and the implementation of the incident command system may be regarded equally as control measures to ensure safe and effective incident command.
8. Incident commanders should have a range of qualities, and effectively use command skills, to deal with the wide-ranging nature of incidents. Assertive and effective incident commanders:

- Are confident and self-aware
- Are well-trained and competent
- Have sound situational awareness
- Are able to lead, direct and instruct others
- Can communicate effectively
- Are able to plan and implement
- Can apply sound judgement and effective decision-making
- Are able to adapt to changing and challenging situations
- Are calm and controlled

9. An incident commander should possess the technical knowledge and command skills to underpin their judgements, decisions and behaviours. Incident command: Knowledge, skills and competence provides detailed information for the role, based on research and incident ground observations.
10. The application of these skills on the incident ground is key to incident ground safety and the implementation of an effective operational plan. Services should have safe systems of work to support incident commander decision-making at incidents to reduce the risk of human factors affecting safety.
11. The effective practice of these skills is enhanced within a learning culture that encourages empowerment and the acceptance of responsibility and accountability. This includes systems and processes to actively monitor the performance of command skills by incident commanders in training and at operational incidents.
12. Post-incident reviews and safety event investigations should examine the use of command skills by incident commanders to highlight the impact of human factors on operational outcomes. Similarly, a service's operational policies and procedures should be consistent with its approach to incident command. Its command ethos should be clearly articulated to help ensure incident commanders are aware of the service's expectations.

C. SELECTION, TRAINING AND REVALIDATION OF INCIDENT COMMANDERS

1. Aerodrome emergency response organisation should establish robust selection processes to identify suitable personnel to be developed for the role of incident commander. The processes should ensure that people who perform incident command functions are capable of doing so under the expected pressures of incidents and can deal with situations where there is sustained pressure and stress.

2. Aerodrome emergency response organisation should ensure they appropriately train, assess and revalidate their incident commanders, to ensure they understand, have practised and revalidate the skills they need for command. Aerodrome emergency response organisation should also equip incident commanders with the operational knowledge that is required to resolve the full range of foreseeable incidents.
3. Section B - Incident command competence provides detailed information on these topics, including:
   - Selection of effective incident commanders
   - Training for incident commanders
   - Command competence
   - Validation and revalidation of commanders

D. LEGISLATION

1. Aerodrome emergency response organisation should assure themselves that all relevant legislation and regulations for their area are considered when developing policies, procedures and training. Legislation and regulations may affect operational decisions; some of the key pieces for incident command include:
   - Civil Aviation Law
   - Civil Aviation Regulations
   - Civil Defense Act
   - National Response Framework
   - National Business Continuity Management Standards
   - National Occupation Health and Safety Management System Standard

E. RISK MANAGEMENT PLAN

1. Emergency planning and management are critical elements of the overall aerodrome aerodrome operator's safety management system. Each aerodrome emergency response organisation should develop their strategic direction through their risk management plan. To determine the extent of their firefighting capability, strategic managers will consider their statutory duties and the foreseeable risk within their area.
2. Work to identify risk and prepare operational plans should consider all stakeholders, including local emergency planning groups and the aerodrome emergency response organisation risk management plan.

F. RESOURCING

1. As part of their risk management plan each aerodrome emergency response organisation should consider the resources they need to mobilise to an incident to support effective incident command at operational events.
2. For incident command the risk management plan should include:
   - The role and level at which incidents will be commanded, for example, Level 1 incident, crew manager and watch manager
   - The types of equipment to provide command support functions, such as command boards and control units, and the size of incidents at which each will be used
   - The arrangements for command teams and any support vehicles
   - The need for competent and skilled officers to be available for command support and functional or support sectors, such as water, foam or inter-agency liaison

G. RESPONSIBILITY OF AERODROME EMERGENCY RESPONSE ORGANISATION

1. Aerodrome emergency response organisations are responsible, under legislation and regulations, for developing policies and procedures and to provide information, instruction, training and supervision to their personnel about foreseeable hazards and the control measures used to reduce the risks arising from those hazards.
2. This guidance sets out to provide Aerodrome emergency response organisation with sufficient knowledge about the potential hazards their personnel could encounter when attending incidents. Aerodrome emergency response organisation should ensure their policies, procedures and training cover all of the hazards and control measures contained within this guidance.

H. INTRAOPERABILITY AND INTEROPERABILITY

1. Other agencies should base their expectation of the aerodrome emergency response organisation response to multi-agency incidents on the incident command system contained in this guidance. Therefore, adoption of this guidance will support intraoperability and interoperability.
2. Using common language and components will ensure aerodrome emergency response organisation can more effectively resolve local, cross-border and national incidents.

INTRAOPERABILITY

3. Clearly defined roles, particularly the specialist roles performed by personnel from dedicated departments such as fire control or hazardous materials, will support intraoperability and the establishment of effective command teams.

4. Risk management plans, and other pre-planning, should consider incidents that may involve working with the resources or assets of other Aerodrome emergency response organisation, or the National Resilience capabilities.

INTEROPERABILITY

5. Interoperability is delivered through the mutual-aid emergency services interoperability plan detailed in Section C. Aerodrome emergency response organisation should be aware of the aspects of interoperability that exist when identifying, assessing and preplanning for all incident types and eventualities they may attend.
6. In addition to the community risk register, personnel have a wealth of local knowledge of risks or potential scenarios areas that would benefit from a multi-agency response.
7. It is essential that all components of Aerodrome emergency response organisation, including fire control personnel, operational planning departments and incident commanders, identify and liaise with relevant partner agencies. This ensures that in the event that they are required to respond to different incident types, all agencies are fully aware of the assistance available to maximise effectiveness in saving lives and reducing harm.
8. It is possible that other agencies who attend an incident will have risk-critical information. Incident commanders should request risk-critical information in the joint agency briefing as well as sharing any information they have. They should ensure this information flows throughout the incident.
9. As well as the common agreed principles contained within MAESIP, there is a legal framework to share information between responders in an emergency situation. There may also be formal information sharing agreements (ISAs) between agencies.

MUTUAL-AID EMERGENCY SERVICES INTEROPERABILITY PLAN (MAESIP)

10. The MAESIP framework advocates the use of the M/ETHANE model for information gathering and sharing between emergency responders, their control rooms and other agencies.
11. This model should be used when passing information between emergency responders, their control rooms and other agencies so that shared situational awareness can be established:
    - Major incident declared?
    - Exact location
    - Type of incident e.g. explosion or building collapse
    - Hazards present, potential or suspected
    - Access - routes that are safe to use

- Number, type and severity of casualties
- Emergency services now present and those required

12. The broader principles of intraoperability and interoperability at the pre-incident stage are captured above, and the principles will be augmented by the on-scene interoperability information contained in the Section C.

SECTION B – AERODROME INCIDENT COMMAND COMPETENCE

A. INTRODUCTION

1. This section complements and supports Section A - Incident command, providing the detail required for assertive, effective and safe incident command to be practised and applied.
2. The content aims to support aerodrome emergency organisation when establishing a robust emergency response for incident command. It is an essential guide for the safe systems of work required at incidents and provides essential reading for all commanders, operational personnel and fire control personnel.
3. Aerodrome emergency response organisation should have simple and straightforward policies and procedures that identify legal considerations in place. They should also have systems and processes in place to prepare commanders at all levels to understand, interpret and apply the incident command system appropriately to every incident.
4. The incident command system provides commanders with a clear framework to structure, organise and manage an incident. It can be adapted to all sizes and types of incident and will help them deploy and use resources in an efficient and safe way. The incident command system allows commanders to use health and safety arrangements, including operational procedures, tailored to the characteristics of an emergency. This helps commanders to achieve an appropriate balance between the benefit of undertaking planned actions, and the risks associated with them.
5. Operational response is hazardous and varied. Some incidents may need only simple actions and procedures to deal with them effectively and safely, as risks are low. Others are more challenging and may quickly increase in size or complexity, or become protracted.
6. The incident command system should commence from when the first call is received about an incident and remain in place until the last appliance leaves an incident. During that time, it is used to:
   - Identify tasks and hazards
   - Assess risk
   - Manage and review control measures

7. Usually, the last activity at the incident ground is to hand over responsibility for health and safety to the appropriate person or agency.
8. Commanding operational incidents is different to managing controlled and defined situations or workplace scenarios. Commanders need a range of qualities, together with command skills, to deal with the wide-ranging nature of emergencies.
9. Assertive and effective commanders:
    - Are confident and self-aware
    - Are well trained and competent
    - Have sound situational awareness
    - Are able to lead, direct and instruct others
    - Can communicate effectively
    - Are able to plan and implement
    - Can apply sound judgement and effective decision-making
    - Are able to adapt to changing situations
    - Are calm and controlled
10. Aerodrome emergency response organisations have a responsibility to apply selection processes to ensure that personnel who are responsible for performing command functions are capable of doing so. Commanders should be able to demonstrate clear potential to deal with stressful situations where there is sustained pressure. Once appointed they should periodically be required to demonstrate competence in their role.
11. Aerodrome emergency response organisations should appropriately train and assess their commanders. They should continually ensure that relevant personnel understand and have sufficient time and facilities to practise the skills they need for command. Training should provide commanders with the operational knowledge and understanding needed to resolve the full range of reasonably foreseeable incidents and enable them to adapt to those that are not.
12. A framework of competence for commanders should aim to equip them with:
    - Appropriate behaviours
    - Command skills
    - Knowledge of policies and procedures
    - An understanding of their responsibilities for the health, safety and welfare of others
    - Familiarity with relevant legislation

THE SAFETY MAXIM

1. There is a balance between ensuring emergency response personnel safety and carrying out the role of the emergency response service. This is known as the Safety Maxim, and is as follows:
2. "At every incident the greater the potential benefit of emergency response actions, the greater the risk that is accepted by commanders and personnel. Activities that present a high risk to safety are limited to those that have the potential to save life or to prevent rapid and significant escalation of the incident."
3. The Safety Maxim acknowledges that firefighters operate in hazardous environments whilst recognising the legal duty to ensure, as far as is reasonably practicable, the safety of everyone our operations may affect and the professional dilemma of maintaining safety and taking action to effect a rescue or mitigate an emergency.
4. This Safety Maxim will apply at every incident. It describes how an incident commander will consider the benefits of our activities and the risks to those involved. This should not necessarily be seen as a balance of one against the other, but more as an assessment of whether the benefit is worth the risk; for example, where lives are in danger, the benefit of saving life is high, then a higher risk to firefighters may be accepted.
5. Where the incident has high risk but with low benefit, commanders should only tolerate a limited risk to firefighters. Activities in the hazard area are unlikely to take place until the risk is reduced. An example might be a property where fire is confirmed with no persons missing and the fire has not ventilated. Here the crews are unlikely to enter the building until ventilation has been carried out and the risk of backdraught reduced. There is still benefit to be gained in saving the building once the higher risks have been reduced.
6. At some apparent high risk, low benefit incidents, additional information may emerge, which means the benefit increases. An example of this would be where people are later reported to be missing in a fire.

B. COMMAND COMPETENCE

1. Aerodrome emergency response organisation commanders can be called upon at any time to respond to a wide range of emergency situations; they are expected to work in complex, dynamic and hazardous environments.
2. In responding to such incidents, services should ensure that individuals undertaking a command role have the necessary knowledge, skills and attributes. Command competence is the ability for a commander to effectively, safely and assertively demonstrate this in practice; they should

recognise the risks in operational activities and apply the right measures to control and manage those risks, as they bring an incident to conclusion.

3. Competence is described as "…the combination of training, skills, experience and knowledge that a person has and their ability to apply them to perform a task safely. Other factors, such as attitude and physical ability, can also affect someone's competence". They also state that 'Competence in health and safety should be seen as an important component of workplace activities, not an add-on or afterthought'.
4. The incident command system (ICS) is an all-hazards approach to aerodrome emergency response organisation incident management. Due to the complexity and hazardous environment in which they work, to demonstrate competence commanders need to have an effective understanding of the National Operational Guidance for Incident command, and the roles of those working within the complete ICS.
5. Commanders should have a detailed understanding of the application of command principles and practice for the levels of command both above and below their area or responsibility. To ensure they can safely and effectively function within the overall command structure, they should also have a good understanding of the breadth of incident types they may be presented with.

OPERATIONAL STANDARDS FOR INCIDENT COMMAND

6. Aerodrome emergency response organisations need to select individuals with the potential to achieve the required operational standards. They should have an effective system for the training and development of personnel in place.
7. At key points during training and development, individuals should be assessed and validated against the operational standards that are relevant to their roles. Once the individual has demonstrated the effective appropriate knowledge, skills and attributes in the training environment, aerodrome emergency response organisation should assess their competence through an appropriate operational effectiveness framework.

SELECTION OF INCIDENT COMMANDERS

8. When selecting operational commanders, aerodrome emergency response organisation should first ensure that candidates have the potential to demonstrate the necessary knowledge, skills and attributes that are required to undertake a command role.
9. There are well-established methods for progression that exist in roles requiring operational sector competence, from initial firefighter training through supervisory, middle, senior and

strategic roles. However, aerodrome emergency organisation may wish to consider attracting diverse skills and experience from direct entry candidates, or those in non-operational roles when filling management vacancies. This may include the potential for some roles being considered for command duties.

10. Aerodrome emergency organisation may wish to consider individuals for command roles, where the individual has not previously undertaken operational duties. In this situation it will be necessary to undertake a risk assessment and gap analysis to determine if the candidate has the potential to demonstrate assertive, safe and effective command, within the overall ICS. In doing so, aptitude, for assimilation of technical knowledge, and attributes that support command skills should be assessed, together with prior learning or experience, which may be transferable.
11. While this does not guarantee future competence, the process should provide a basis for undertaking a training needs analysis (TNA). This gap analysis should enable Aerodrome emergency organisation to establish the development activities required, and the associated resource requirements, of implementing such activities.
12. Where candidates are being considered for command roles at initial, intermediate or advanced command (Levels 1, 2 or 3), development programmes for those without previous operational and command experience are likely to be extensive. This is due to the wide-ranging, complex, dynamic and hazardous environments a commander is required to operate in at the scene of an incident.
13. Where entry is considered at Levels 2 or 3, significant development may be at the lower command levels, and candidates may also require initial firefighter training. In all cases where candidates are being considered for an operational role at command Levels 1, 2 or 3, they should meet the relevant health and fitness standards adopted by their service.
14. Where candidates are being considered for Level 4 strategic command roles, development programmes should also ensure a clear understanding of the application of command principles and practice for initial, intermediate and advanced levels of command.
15. Aerodrome emergency organisation should seek to validate the knowledge, skills and attributes of candidates following appropriate training, development and support for all levels of command. Operational assurance assessments to confirm the demonstration of competence should be carried out following suitable exposure of candidates to operational incidents.

16. Carrying out validation and assessment of competence should satisfy Aerodrome emergency organisation that the candidates will deliver an assertive, safe and effective, all-hazards command to safeguard the public and operational personnel.

TRAINING, DEVELOPMENT AND ASSESSMENT

17. Aerodrome emergency response organisations should take account of the competence of relevant employees when conducting risk assessments, to assist in deciding what level of information, instruction, training and supervision is required. Aerodrome emergency organisation should have arrangements in place to effectively train and develop commanders, for entry into each level of command roles and ongoing maintenance. Initial knowledge acquisition may be achieved through consideration of command qualifications. Notwithstanding this, appropriate assessments of commanders should be carried out.
18. Aerodrome emergency organisation should have a robust method for assessing commanders and recording the outcome of the assessment; this may require implementing an appropriate assessment system. Any system used should be compatible with the aerodrome emergency response organisation's systems for operational effectiveness, assurance, performance and review.
19. The incident command system (ICS) operates within a wider framework of policies and an in-depth understanding of operational issues that should be considered by all personnel. The key elements of effective incident command are in three functional areas:
    - Command skills – considers the knowledge, skills and understanding required by an incident commander, and the importance of developing and maintaining such competencies
    - Safety management – the principal consideration of the incident commander is the safety of their personnel; when developing their tactical plans, the incident commander should achieve an appropriate balance between the benefit of undertaking planned action and the associated risks
    - Organisation at an incident – this gives the incident commander a recognised system from which to work, when organising and using personnel and resources at an incident
20. In consideration of these functional areas, the following provides some context for each level of command. All personnel, from firefighter, require the full range of knowledge and core skills, as well as having an understanding of the ICS.
21. An operational incident commander at a relatively small-scale incident needs a highly-detailed knowledge and understanding of all operational considerations. As the wider political or social

implications factor less in the resolution of smaller-scale incidents, there is less emphasis on these and more on the operational requirements to resolve the incident.

22. A tactical commander at an intermediate or advanced level requires a balance of skills, which incorporate not only the detailed understanding and capability of operational breadth, capacity capability, but also how these interface in the wider context of political, environmental and societal aspects of the incident.
23. In contrast, a strategic manager at a major incident, involving strategic command needs a detailed understanding of the political, social and environmental implications the incident may generate. The operational knowledge and understanding of strategic managers does not need to be as technically detailed as that of an operational incident commander.
24. Strategic commanders need to understand the capabilities and limitations of operational knowledge and skills, and be able to apply incident command skills in a complex, multi-agency environment while also considering the potential political impact.
25. In considering the above, key aspects of operational deployment that will require candidates to demonstrate competence include:
    - Technical skills – personnel and commanders having the required knowledge, skills and understanding to perform their routine duties
    - Command and control – having the required knowledge, skills and understanding to perform their duties on the incident ground
    - Management and leadership skills – in the sense of setting direction, managing their allotted activities, prioritising and balancing the demands of the role and developing their confidence and resilience
    - Working with others – problem- solving and dealing with change in an organised, safe and systematic way
    - Multi-agency collaboration – working as part of a team and in partnership with other agencies to save life, reduce harm and safeguard communities
26. When considering assessments, the following provides a brief overview of key aspects for candidates at each command level.
27. Initial commanders (Level 1) should:
    - Have a comprehensive understanding of the core skills of operational personnel
    - Have a thorough knowledge of their service's policies, procedures, capabilities and limitations
    - Demonstrate command and control of personnel at all operational incidents

- Be capable of making critical decisions in pressured situations to ensure the deployment of additional resources as an incident escalates
- Demonstrate they can develop their own specialist knowledge and skills
- Demonstrate they can use specialist knowledge and draw on the skills of others

28. Intermediate and advanced tactical commanders (Level 2 and Level 3) should:
    - Have a working understanding of the core skills of operational personnel
    - Have a thorough knowledge of their service's policies, procedures, capabilities and limitations
    - Have a comprehensive knowledge of the command skills of their operational commanders
    - Demonstrate command and control at complex and escalating incidents
    - Demonstrate effective working at a multi-agency level
    - Demonstrate they can develop their own specialist knowledge and skills
    - Demonstrate they can use specialist knowledge and draw on the skills of others
29. Strategic commanders (Level 4) should:
    - Have a thorough knowledge of their service's policies, procedures, capabilities and limitations
    - Be capable of providing strategic support at complex and escalating operational incidents
    - Be capable of operating in a multi-agency environment
    - Demonstrate they can develop their own specialist knowledge and skills
    - Demonstrate they can use, and when required, manage the specialist knowledge and skills of others
30. In addition to command competencies, Level 2, Level 3 and Level 4 commanders are required to acquire, demonstrate and maintain specialist skills commensurate with their role. This may include working as a tactical adviser (TacAd) within the command structure for the following fields:
    - National Inter-agency Liaison Officer (NILO)
    - Urban search and rescue (USAR)
    - High volume pumps (HVP)
    - Flood response
    - Hazardous materials
    - Chemical, Biological, Radioactive, Nuclear (explosive) (CBRN(e))
    - Radiation protection
    - Marine

- Waste fires
- Communications
- Fire investigation

31. Aerodrome emergency response organisation should have assessment systems in place to validate candidates and also confirm competence for each of these specialist roles.

C. VALIDATION AND REVALIDATION

1. The ability to lead and resolve operational incidents safely is a key attribute for individuals who are charged with incident command responsibilities. Aerodrome emergency organisation should assure themselves that command skills are maintained.
2. Incident commanders are expected to work in challenging and high-pressure situations. It is therefore important to ensure that incident commanders are provided with the opportunity to develop and maintain incident command skills. Personnel also have a responsibility towards their own continuous development.
3. Aerodrome emergency organisation need to ensure commanders have the time and opportunity to engage in incident command practice and development.
4. Command validation and revalidation should:
5. Ensure consistent standards of maintenance of competence are applied to incident commanders across all levels
6. Provide evidence that officers have the required knowledge and command skills for their level of command
7. Provide evidence that officers are consistently performing incident command at the required level
8. Provide an auditable trail of incident command skills and development
9. Encourage continuous improvement through the uptake of professional development opportunities

PRINCIPLES OF VALIDATION AND REVALIDATION

10. Validation of command competence should be established at operational incidents, following an individual completing training, development and validation in simulated environments.
11. Following an individual being established as competent, an ongoing cycle of operational deployment and continuous training and development should be used to revalidate commanders to ensure they maintain competence.

12. Revalidation should be undertaken by all personnel who have incident command responsibilities and are competent in their role; this should form part of the training needs analysis (TNA) and training frequency assessment processes. It should also apply to any personnel who have been assessed to perform incident command duties in a temporary capacity.
13. Incident commanders should be revalidated against the level at which they are operating in a command capacity. Where personnel are in development, the processes to move from development to competent in role should apply.
14. If personnel are commanding at a level above their substantive role, Aerodrome emergency organisation should have a procedure to assure themselves that an individual has the appropriate knowledge and skills to do so; this should be in line with any training needs analysis process that is in place.
15. To effectively revalidate incident command competence, several key component areas should be examined in the process, as shown in the table below. To maintain command competence all three areas of the incident command revalidation process should be passed.

Revalidation areas	**Method of assessment**	**Frequency of assessment**
Technical and procedural knowledge	Knowledge test	Every two years
Application of command skills	Incident command exercise	Every two years
Evidence of application of knowledge and skills in the workplace	Minimum command hour requirement and recording of continuous professional development (CPD)	Continuous

VALIDATION OF TECHNICAL AND PROCEDURAL KNOWLEDGE

16. This validation confirms that an incident commander's technical and procedural knowledge is at a level appropriate to their role, as identified in the organisation's training needs analysis process.
17. The validation should be undertaken at least every two years or in compliance with a recognised awarding body, or where a significant change in the requirements for a role has taken place.
18. Validation should be based on elements including:
    - Accepted operational standards
    - Relevant scenarios, relevant to incident command

- Other relevant guidance according to the identified risks in the organisation's risk management plan, and subsequent training needs analysis process and relevant incident types
- Local policies and procedures

19. The validation of knowledge will identify areas of strength and areas for improvement. The outcomes should be discussed with the commander undertaking the check and should inform their training and development activities during the period of revalidation.
20. Aerodrome emergency response organisation should ensure an appropriate method of recording and monitoring activities is in place.
21. If someone fails to obtain a satisfactory level of technical knowledge, there should be a process in place to provide appropriate interventions, ensuring any gap in knowledge is appropriately bridged to ensure an appropriate level of competence is maintained.

APPLICATION OF COMMAND SKILLS

22. The technical and procedural knowledge check should be supported by confirmation of command skills. This could be in the form of an incident command exercise, or another appropriate occasion where an incident commander can suitably demonstrate the required skills for the role being assessed. The exercise should include a focus on command decisions.
23. It is good practice to ensure command skills are considered as part of the assessment process.
24. A reduction in the assessment timescale period may be appropriate if there are extenuating circumstances such as:
    - Safety events where a failure of or ineffective command was a contributory factor
    - Individual underperformance, evidenced by operational assurance measures
    - Significant procedural change
    - A prolonged period of absence from operational duties
    - If an individual who lacks confidence requests an assessment
    - If an individual has not commanded an incident for a significant period

RECORDING CONTINUOUS PROFESSIONAL DEVELOPMENT

25. Aerodrome emergency organisation should ensure they have a process to allow incident commanders to accurately evidence incident command experience and development activity. This may inform future training and development opportunities or be used to support commanders involved in post-incident investigations.

26. Where possible, there should be opportunities for reflective learning following an incident or training event.
27. Continuous professional development (CPD) may record activities such as:
    - Operational incidents attended, including details of the incident type, role and activities undertaken; for unusual or high-impact incidents, this process could include contemporaneous notes that would support future investigations
    - Incident command simulation, such as attendance at exercises
    - Incident command development activities, including tactical decision exercises, policy notes reviewed, theoretical input and e-learning packages reviewed
    - Areas of strength and areas of improvement identified though confirmation of knowledge, confirmation of command skills checks, self-reflection or any other means
    - Attendance at Incident command seminars or accredited training

MINIMUM COMMAND HOURS

28. Annual targets for time spent practising incident command will ensure sufficient exposure to maintain currency of skills. Target hours also ensure that a corporately agreed volume of opportunities have been provided to prepare individual commanders.
29. Hours included will be those undertaken as an incident commander, and those in supporting roles such as operational and functional sector command. Time spent in operational roles where command decisions are not made should not be counted; for instance, operational monitoring or assurance roles, or tactical adviser (TacAd) roles.
30. In addition to incidents, command hours at practical and simulated exercises may also be valid.
31. Aerodrome emergency organisation should consider the number of hours that commanders should achieve in relation to their local context. They may wish to consider including minimum hours for incident types, depending on their local risks.
32. Aerodrome emergency organisation should have a process for recording command hours. Where possible, this should be the same place that continuous professional development for command is recorded.
33. To ensure effective command experience is captured, it is recommended that Aerodrome emergency organisation cap the amount of command hours that each incident or simulation can count towards the annual target, and that they can evidence experience at appropriate intervals. This will ensure that the most beneficial hours are maintained and will discourage commanders from keeping an incident for an extended period of time to gain additional hours.

An example may be capping command hours for an incident at a maximum of two hours towards the annual target.

FURTHER INTERVENTIONS

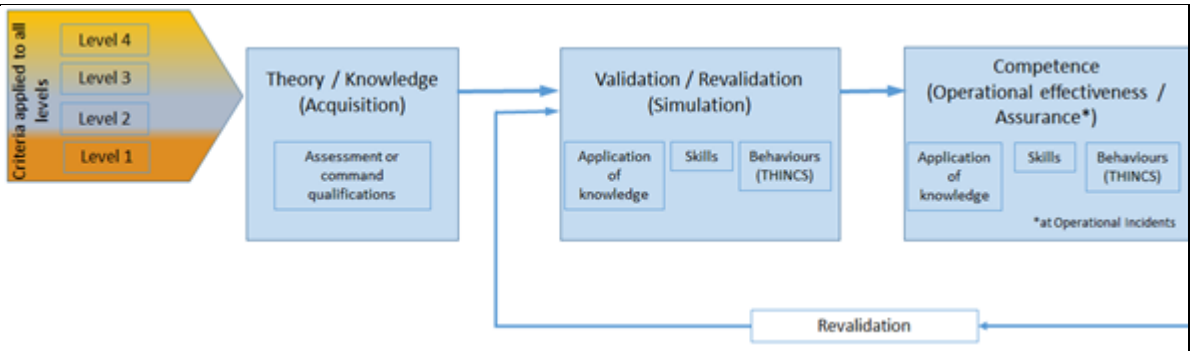
34. There may be occasions where personnel do not reach the required standards, despite initial interventions. Additional support and scrutiny may be required to assist individuals to reach the required standard.
35. Additional interventions could include:
    - Incident command courses
    - Intensive development plans
    - Operational monitoring options
    - Operational shadowing options
    - Coaching and mentoring options
    - Phased implementation to command
36. Aerodrome emergency organisation should consider the threshold at which they would consider an individual's performance is deemed to present a serious safety risk, and the circumstances under which they may be removed from operational duties.
37. A mechanism should be in place to monitor the outcomes of the revalidation process to assure aerodrome emergency organisation that commanders are operating at the requisite standard.

FAILURE TO ATTAIN OR MAINTAIN STANDARDS

38. Services should have in place suitable process to support and manage those who fail to attain or maintain standards. If personnel demonstrate unsatisfactory performance, there may be occasions when services remove an individual from command duties, until such time as a satisfactory performance can be demonstrated.

QUALITY ASSURANCE

39. As part of the safety management system, aerodrome emergency organisations should have a quality assurance system in place to ensure that the validation process is fair and consistently applied. All incident command system (ICS) trainers, assessors and performance and review assessors should be deemed operationally competent at the appropriate level, and should also be periodically assessed and revalidated.



D. COMMAND SKILLS

1. Command skills are the cognitive and interpersonal qualities critical for assertive, effective and safe incident command. To apply them, incident commanders should be able to understand the situation as it unfolds. They should be able to:
   - Identify and prioritise problems and develop a plan to resolve the incident
   - Communicate this plan to others
   - Co-ordinate and control activity in line with their plan
   - Display the leadership needed to resolve the incident and operate effectively under the pressures of an incident
2. As well as having technical knowledge, an incident commander should possess command skills to underpin their judgements, decisions and behaviours.
3. The safety-critical command skills are:

Leadership	Situational awareness	Decision-making
Teamwork	Personal resilience	Interpersonal communication

4. This section draws on research and incident ground observations that have helped identify the command skills necessary for incident commanders.
5. The importance of commanders having effective command skills should be clearly recognised, and these skills should form the basis for all command development programmes. Without good command skills, the commander will not be able to effectively put in place the technical aspects of incident command.

6. Command skills are complex in nature and can be developed with understanding and practice. It is essential that aerodrome emergency organisations prepare and develop incident commanders to use these skills effectively when commanding an incident. This includes providing appropriate opportunity for practice under realistic pressures.
7. As part of the incident or training debrief process, the incident commander should seek feedback on their performance in resolving the incident. This allows them to identify best practice and where they can make improvements in the future.

E. LEADERSHIP

1. Leadership is an essential element of a commander's role in resolving incidents. The application of good command skills will enhance the way in which they lead and command an incident. These skills are as important as their operational knowledge.
2. At an emergency, personnel in the fire and rescue service, people from other organisations and members of the public will look to the commander to lead and resolve the incident. They expect the commander to be calm, confident, decisive and professional.
3. Effective leadership is more than exercising authority and power. Commanders should be able to apply the most appropriate leadership skills, behaviours, technical knowledge and command skills to resolve an incident. An important element of this includes the need to give others confidence in their leadership. This is related to command presence and commanders should always be mindful of the impression they are creating. The way in which a commander behaves will influence how others respond. Positive relationships will improve the performance of a team, which can contribute to improved safety. Effective commanders have interpersonal qualities that make them more likely to achieve the best from others.
4. Commanders will lead others in dynamic and complex environments and also need to be prepared to adopt a leadership role at multi-agency incidents. They should be able to instil confidence and inspire others to help resolve the incident; recognising individual contributions while building and encouraging trust. People who are led well at an incident are willing to trust and accept the influence of the commander. They will be motivated and committed and more likely to co-operate and comply with an incident commander's instructions and plans.
5. The incident commander is responsible for leading the incident to a successful conclusion, but they cannot be responsible for making all decisions or supervising every detail of an incident. For this reason, incidents are often divided into sectors or functions. Each person who commands a sector or function will also need to show competent leadership skills.

6. There are many different leadership styles, commanders are most likely to maximise performance by recognising that no single leadership style is ideal for all situations. They will need to adapt their style to the situation they are faced with. They should consider the following before adopting the appropriate style:
   - The level of risk
   - How fast the incident is developing
   - The type, size and complexity of the incident
   - The competence of personnel
   - The experience of personnel
   - The physiological and psychological condition of personnel
7. All personnel at the incident should take personal responsibility for the way they act, to ensure the safety of themselves and others, and to achieve the objectives set out by the commander.
8. Personnel should be appropriately supervised, based on the hazards and risks present. The greater the risk to personnel and others, the greater the degree of supervision that is required. This may be by direct or remote observation and monitoring; an example of this is breathing apparatus entry control.
9. The commander should ensure that the personnel they lead are appropriately briefed on the tasks, and any hazards and risks they face. The briefing may also highlight the safest way to complete the task. Commanders need to communicate effectively and confirm that personnel understand the brief, including when and what to communicate to them.
10. Leadership relationships exist across an incident ground. They include those between:
    - An incident commander and the leaders of other agencies
    - An incident commander and their command team
    - Command team members
    - Command team members and personnel under their control
    - Personnel
11. For instance, a sector commander will be led by the incident commander, but at the same time be the leader of personnel in their sector.
12. Aerodrome emergency organisation should provide effective training and development programmes to ensure commanders are able to develop and practise the skill of leadership. Assessment processes and exercises should assess the effectiveness of an individual's ability to lead and provide constructive feedback to promote learning.

LEADERSHIP BEHAVIOURS

13. Aerodrome emergency organisation should ensure their incident command policies recognise leadership behaviours and the responses they elicit. They also need to sufficiently prepare commanders to carry out their role; a commander's success in delivering a successful resolution is heavily influenced by their leadership knowledge, skills and attributes.

BEING SELF-AWARE

14. A commander should be aware of the impact of their actions and behaviours on the personnel they are leading. Being self-aware can help them maximise team performance. They should be able to control and adapt their behaviours, having an awareness of how these might be received.
15. Commanders should also be aware of how behaviours of others can influence their own responses and behaviour, and ensure they control their reactions. It is important to be aware of and manage preconceptions that might influence the way the commander or others respond.

DISPLAYING AND INSTILLING CONFIDENCE

16. A commander should be aware that others at an incident take direction from them. Personnel may respond more positively to a confident commander, which will improve the team's performance. They may also detect negative behaviours such as panic, insecurity or uncertainty. In either case, it may affect how personnel respond to the situation and to a commander’s instructions.
17. Feedback should be provided to the commander. This makes sure everyone has a shared and realistic view of what is likely to happen.
18. Stress can reduce an individual’s capacity to process information. Displaying and instilling confidence may make personnel less anxious. It is important that personnel feel able to ask for help or assistance when they need it.

DEMONSTRATING AND FOSTERING TRUST

19. A commander needs to lead personnel in challenging and potentially dangerous circumstances. Trust between the commander and the personnel they lead is essential.
20. Commanders should consider the impact that the characteristics of the incident and the tasks that need to be carried out have on personnel and members of the public. Trust is also likely to reduce anxiety, which is known to reduce people’s capacity to process information.

FOSTERING TWO-WAY COMMUNICATION

21. The way a commander behaves will affect whether personnel believe there is two-way communication. It affects how likely they are to share critical information. Two-way communication does not always mean an opportunity for lengthy debate. The incident will influence the style of two-way communication. This concept applies at all levels on the incident ground. Effective communication at all levels builds a shared situational awareness. It is this which underpins the identification of objectives and the development of operational plans.

UNDERSTANDING THE USE OF AUTHORITY

22. A commander should be aware of and adopt an appropriate leadership style. This is the style which gets the desired response from others. Some situations will require a more authoritative style of leadership, while others may permit a style with greater interaction.
23. The commander should be aware of how these styles are likely to influence people. They should adopt the appropriate one for the given situation. Equally, others at an incident should understand that a commander may need to vary their style to achieve the best outcome.

SETTING EXPECTATIONS AND STANDARDS

24. Personnel look to the commander to provide vision, a set of clear objectives and set an appropriate tempo to resolve the incident. It is important for the commander to make clear what they expect in terms of standards, role and outcomes.
25. This could include compliance with essential standards, such as operational procedures, levels of personal protective equipment (PPE) or how a task is carried out. The commander sets these standards and expectations, but everyone remains accountable for achieving them.

SAFETY LEADERSHIP

26. An incident commander's commitment to safety is a crucial influence upon incident ground safety. Incident commanders should demonstrate their commitment to safety by:
    - Prioritising safety within their problem solving, decision-making and plans
    - Promoting and valuing safe systems of work and behaviours
    - Ensuring sufficient resources are available to resolve problems and the incident
    - Openly communicating hazard, risk and safety information along with their safety expectations
    - Monitoring safety directly or by nominating an officer to manage safety on the incident ground

VALUES AND SUPPORTS PEOPLE

27. It is important that an incident commander values the contribution others may make in support of their leadership. They should always behave professionally and ensure that others behave likewise, particularly as the environment by its very nature is likely to be stressful. They should motivate and inspire others through empowerment.

COMPETENCE

28. An incident commander should use and share their knowledge and experience as a keystone of their leadership and use it to inform their plans. They should use these factors to provide explanations and justifications where appropriate. They should also use their experience and knowledge to coach inexperienced personnel where applicable.

F. ORGANISATIONAL CULTURE

LEADERSHIP CULTURE

1. The leadership relationship begins before attending an incident. Aerodrome emergency organisation should be aware that the culture of their organisation can influence behaviours on and off the incident ground. This may affect the way in which commanders lead, and the way in which personnel respond. Aerodrome emergency organisation should develop an appropriate organisational culture to ensure it sufficiently considers the operational environment. There should be a focus on learning, and it should support and empower commanders.
2. Commanders and personnel may benefit from having a clear and common understanding of what is expected of them by their aerodrome emergency response organisation in terms of leadership during incidents, and that this is consistently displayed. Clear expectations can reduce uncertainty and anxiety and therefore improve operational effectiveness.
3. The reaction to status and authority may affect how likely personnel are to share information, including that required to develop accurate situational awareness. It is likely to be impacted upon by the organisational culture of the fire and rescue service, as this influences the leadership relationship at incidents.

IMPACT OF ORGANISATIONAL POLICY AND PROCEDURES

4. Operational policies and procedures should provide a clear framework for commanders to operate within. Aerodrome emergency organisation should consider how they enable commanders to deal flexibly with unusual incidents, and the extent to which operational discretion may be applied in such circumstances. Aerodrome emergency organisation should

also consider the degree to which organisational policy and procedures influence the acceptance of risk and decision-making of commanders.

IMPACT OF THE APPROACH TO DEALING WITH PERFORMANCE

5. The expectation of the way in which performance is dealt with by the aerodrome emergency response organisation may influence the way in which leaders behave and others respond. Examples of good command performances arising out of post-incident debriefs and reviews should be recognised and shared by Aerodrome emergency response organisation. Where underperformance occurs, it may be appropriate to deal with it immediately, while other areas requiring improvement may be raised during debriefing or post-incident reviews. The level of perceived stigma associated with recorded underperformance may influence factors such as openness, trust, risk acceptance and response to errors.

G. SITUATIONAL AWARENESS

1. Situational awareness is a person's perception and understanding of the situation they face. It includes their anticipation of what the situation may become, including the impact of their actions. For a commander, it is their perspective of the scene of operations.
2. This situational awareness, or mental picture of the incident, is the foundation for the commander to formulate a plan of action. On the basis of this understanding, the commander will assess risk and make decisions, identify and prioritise objectives and develop an incident plan. The commander will also look ahead and consider how an incident may develop and also predict the consequences of actions.
3. Maintaining good situational awareness of the incident is a critical skill. Commanders need to have the ability to build an accurate mental picture of the situation. They need to be able to do this in challenging, dynamically changing and high-pressure circumstances, sometimes with incomplete or inaccurate information.
4. Aerodrome emergency organisation should provide effective training and development programmes to ensure commanders are able to develop and practice the skill of situational awareness. Assessment processes and exercises should assess the effectiveness of an individual's ability to gain and maintain situational awareness and provide constructive feedback to promote learning.
5. Training should make commanders aware of the factors that can affect situational awareness. It should also train commanders about how to use their understanding of the situation to

anticipate what is likely to happen next, including how the situation might develop and the consequences of their actions.

6. A person's mental picture of an incident is like a jigsaw, made up of many sources of information interpreted as a single view.
7. Some pieces of this jigsaw come from direct exposure, for example, to events that can be seen or directly experienced at the incident. However, a commander may not have all of the information available that they need to form a full and accurate picture.
8. Other pieces of the jigsaw come from memories of similar events, assumptions or communications with others. For example, as personnel work on their tasks, new information about hazards and the risks they present may come to light. As the commander may not be aware of this information, they rely on each person to carry out their own risk assessment to stay safe and relay new information back to them in a timely manner. This information may affect the incident plan and the safety of people operating in that area, so it is important that personnel are aware of their responsibilities.
9. These elements combine with the information that is directly available to create a mental picture. Therefore, it is important for commanders to constantly monitor their situational awareness, and verify the accuracy of any assumptions that might underpin their understanding of the situation.
10. A person's mental picture of an incident is made up of many sources of information. They are interpreted into a coherent picture in a way that makes sense to them in the current circumstances of the incident. It is important to consider the relationship between the information that was reasonably available and how the conditions have affected a commander's ability to process it.
11. The working conditions at an incident may affect their ability to process information. For instance, the amount of information they need to process, how they manage information and distractions, the tasks they are involved with and the amount of stress they are feeling all take up part of a commander's capacity to process information. Evaluations of operational decisions, whether post-incident or in a training environment, should take this relationship into account.
12. Good situational awareness is essential as it underpins operational decision-making. Decision makers, whether they are a commander, operational personnel or fire control personnel, make decisions based on their perception of the situation and their perception of the problem. For decision-making to be effective, it is necessary for the commander to put in place the means to continuously monitor the environment to detect changes, and to ensure their understanding

of the situation remains accurate. An example of this would be an appropriate command structure and communication network.

13. Insufficient situational awareness may lead to commanders overlooking information when they make decisions. It may result in a failure to revise a decision that has already been made in light of new information that does not fit the commanders' perception of the situation. This is known as 'confirmation bias', as attention is biased only to information that confirms the current view of the situation. Other information that is highly relevant to the actual situation might be ignored if it does not fit with this view. This may adversely affect the way in which the risk picture posed by the incident is communicated in safety critical briefings and when command is transferred.
14. Other types of biases also affect memory recall and interactions with others, which in turn may also affect the accuracy of a commander's perception of an incident.
15. Understanding the relationship between the information that was reasonably available to a commander at the time, and the impact of the conditions experienced by them on their ability to process information, is of particular importance when investigating bodies consider operational decisions.

STAGES OF SITUATIONAL AWARENESS

16. There are three stages of situational awareness:

A. INFORMATION GATHERING

17. The commander will gather information from a variety of sources to gain accurate situational awareness. They use it to develop their mental picture, monitor changes and track progress. The information will relate to the incident as a whole, the task itself, available resources, and hazards.
18. Commanders also need to understand why they may fail to gather information correctly. Causes could include:
    - Incomplete or unavailable information
    - Distractions causing information to be missed
    - Missing information as attention is fixed on a single element of the situation, often referred to as 'tunnel vision'
    - Ignoring new information as it does not fit with their current view of the situation, often referred to as 'confirmation bias'
    - Failing to scan or re-scan the incident scene to gather information

- Information being difficult to detect or obtain
- Misperception or misunderstanding of information
- Poor communication with others

B. UNDERSTANDING INFORMATION

19. As a commander gathers information, they will process it and extract the meaning. This helps to form an understanding of the situation. They will integrate this information with knowledge and memories, which may include:
    - Experience of incidents at the same or similar buildings or locations
    - Experience of incidents with the same or similar situations
    - Assumptions
    - Expectations
    - Mental models, which may be:
        - Knowledge structures formed from previous learning – in this context, it is a file of information stored in memory that represents a combination of cues and their meaning; for example, a mental model of how to resolve a type of incident, or how to operate a piece of equipment
        - Combinations of cues or pieces of information that may activate a previously formed mental model; when a particular mental model activates, it maps out what is expected to happen and typical actions or responses
20. Activating a mental model may also lead the commander to direct attention to information relevant to the situation. This has some benefits as it saves time and frees up mental capacity to process information. However, it can also lead to neglecting other pieces of information that might prove to be important and may also lead to confirmation bias.
21. Experience, context and assumptions can supplement or distort a commander's interpretation of the scene. Assumptions should be confirmed as accurate at soon as practicably possible to avoid persistent misperception.

C. ANTICIPATION

22. Incident commanders should use their understanding of the situation to anticipate what is likely to happen next, including how the situation might develop and the consequences of their actions. In order to effectively plan their operational activities, is vital that their interpretation reflects the actual situation, which will allow them to effectively plan their operational activities.

23. Understanding of the history of the incident development, including numbers and locations of persons missing or unaccounted for, will help to anticipate how the incident may develop.

EFFECTIVE SITUATIONAL AWARENESS

24. Effective situational awareness ensures that the interpretation reflects the actual situation. This is critical for making appropriate decisions and predicting the likely effects of activities. Incident commanders should be aware of the factors that can affect situational awareness, and understand how to put in place the means to monitor the operational environment to detect changes and maintain an accurate understanding of the situation.
25. The following may assist effective situational awareness:
    - Clear briefing: Clear, accurate and timely briefings to and from the commander will help to ensure people share up-to-date information.
    - Minimising distractions during critical tasks: This may help to reduce demands on mental processing capacity. Effective organisation at an incident can assist with reducing distractions.
    - Appropriate spans of control: Can reduce the likelihood of becoming overloaded with information by delegating responsibility for certain areas or tasks. Delegation allows the commander to maintain an overall view of the situation. Maintaining good lines of communication is vital. They ensure people exchange accurate, relevant and timely information.
    - Regular review: Commanders should regularly compare their mental picture with cues and information from the current situation, to ensure their situational awareness remains correct so as to maintain accurate situational awareness and detect changes.
26. Factors that might affect situational awareness include:
    - Location of incident command point: The siting of the incident command point, and the potential scale of the incident ground, may prevent visual cues being seen.
    - Limitations of cognitive processing systems: Cognitive processing systems, such as those that underlie perception, attention, decision-making and memory, are not infallible and have their limitations. For example, working memory and our attention have finite capacities, which once full leads to forgetting and missed information.
    - Stress: Anxiety and stress take up part of a person's cognitive processing capacity. They can narrow attention and reduce available capacity for focusing on and understanding information. This may lead to commanders neglecting important information or not

processing it properly, causing an inaccurate mental picture of the situation to be developed.

27. The commander should be aware of the signs and symptoms of excessive stress and take appropriate action to manage the impact on themselves and personnel.
    - Fatigue: Fatigue can reduce cognitive processing capacity, which will decrease a commander's ability for concentrating on and making sense of information. See Personal resilience.
    - Poor information management: An incident commander should effectively manage available information to ensure it is accessible when required, either during or after an incident. They should arrange for information to be visually displayed to suit them, to provide an overview of the current situation. This will assist them to detect and track incident developments, validate and record information.
28. Ineffective information management can lead to an overload of information, which can be overwhelming. It can take up mental processing capacity, leaving less to focus on and understand the wider situation. Alternatively, it may lead to a lack of information that can be very frustrating and lead to poor judgement and decision-making, and an insufficient incident plan.
    - Automatic actions: A cue might automatically cause a certain response. Automatically responding to an element of the situation may not always fit with the required overall incident response. See Intuitive decision-making and Analytical decision-making.
    - Biases: Biases are systematic errors in thinking when processing and interpreting information in order to make judgements and decisions. They help to mitigate the effects of information overload as they are a means to shortcut the amount of cognitive processing required to optimise overall processing capacity. Biases not only effect decision-making but also cognitive processes associated with memory recall and social interactions.
29. Aerodrome emergency organisations should ensure incident commanders are aware of the different types of biases and how they may affect their command. The table below illustrates some of the biases associated with decision-making, memory and social interaction.

Decision-making biases	**Memory biases**	**Social biases**
Confirmation bias: To search for, interpret and focus on information that confirms your perception.	**Bizarreness effect:** Bizarre information is better remembered than common information.	**Authority bias:** To attribute greater accuracy to the opinion of an authority

		figure and be more influenced by that opinion.
Omission bias: To judge harmful actions as worse, than equally harmful omissions (inactions).	**Misinformation effect:** Memory about an event becomes less accurate because of interference by subsequent information.	**Halo effect:** To perceive a person's positive traits to spill over to other areas of their personality.
Anchoring bias: To rely too heavily, or 'anchor', on one piece of information when making decisions.	**Primacy effect:** To better recall information received first.	**Horns effect:** To perceive a person's negative traits to spill over to other areas of their personality.
Attentional bias (tunnel vision): To pay attention to some things while simultaneously ignoring others.	**Recency effect:** To better recall information last received.	**In-group bias:** To give preferential treatment to others perceived to be members of your own group.
Sunk cost bias: To justify increased investment in a decision based on prior investment, despite new evidence suggesting the decision was wrong.	**Availability bias:** To place greater value on information that is recalled quickly.	**Stereotyping:** Expecting a member of a group to have certain characteristics without knowing that individual.

MENTAL MODELS

30. Some of the issues with mental models are:
    - The wrong mental model may be activating
    - The correct mental model is activating but it may be a poorly formed one
    - There might not be a relevant mental model
    - There may be too much reliance on some features of the mental model.

SHARED SITUATIONAL AWARENESS

31. Resolving an incident involves the efforts of many people and multiple teams. This might include a number of aerodrome emergency response organisation personnel as well as

responders from other agencies. For any team to work effectively they need to have a common interpretation of events, or shared situational awareness. This supports co-ordination of tasks and activities on the incident ground, including those of other agencies. Commanders should be aware that a dynamic environment can lead team members to form different impressions of the incident. This can happen without teams being aware of it. It can cause conflict and make it more challenging to make decisions.

32. It is not necessary for all personnel to be aware of all of the information about an incident. Having too much information may result in information overload which could reduce an individual's ability to deliver tasks. Good shared situational awareness will mean that team members have the information necessary for their role, and have a common view of the situation.
33. Teams may be assigned to specific areas or tasks, which means that the direct information they have, such as what they can see and hear, is limited to their area of work.

SHARED UNDERSTANDING

34. Team members will interpret information in a particular way based on their individual understanding. A team with good shared situational awareness will have a similar knowledge of the status of the goals they are working towards. They will also understand the status of the goals of other team members in relation to the operational plan. They should also have a common understanding of how their actions may affect others, and the goals they are trying to achieve.

SHARED EXPECTATIONS

35. The team should have a common understanding of what they expect to happen when they are carrying out activities. They should have a similar understanding of how their own and other people's roles work. For example, they should share the same expectations of their roles in accomplishing the task, the nature of the task, and the equipment they have.
36. This can also improve the team's performance, as they have similar expectations of each other's contribution in relation to the operational plan, and the likely impact of each other's activities. It can improve their ability to adapt to changing demands and to co-ordinate efforts. It will help individuals to anticipate the needs of the task and other team members.
37. Aerodrome emergency organisation can encourage the development of these shared expectations. Training and development is important to cultivate this ability in teams. A

commander can encourage this with clear and concise briefing at incidents, together with sharing relevant information.

38. An important element of shared expectations is the tempo of the aerodrome emergency response organisation activities. The commander should make it clear what pace they are setting for the incident, which will depend on the urgency of actions, and the type size and complexity of the incident. This setting and maintaining of an appropriate tempo throughout the stages of an incident is sometimes referred to as 'battle rhythm'.

H. DECISION MAKING

1. For the aerodrome emergency response organisation, the definition of a decision is 'Anything which could be construed as having chosen a course of action that could affect the outcome of an incident in either a positive or a negative way'.
2. Decision-making is a fundamental command skill which can have far-reaching consequences. Decision-making, like any complex skill, needs practice and understanding.
3. It is the responsibility of Aerodrome emergency organisation to sufficiently train, develop and support commanders in their decision-making processes and capabilities. This should result in having commanders who are able to make decisions at incidents, and effectively operate in a complex decision-making environment. It should be recognised that incidents may occasionally require a decision to be made that is the least-worst option.
4. This environment is uncertain, with competing demands and problems that can affect many aspects of the scene. Commanders should be competent and confident to make effective command decisions under such pressures. Therefore, they need to be given ample opportunity to practise and develop this critical skill.
5. Aerodrome emergency organisation should provide effective training and development programmes to ensure commanders are able to develop and practise their decision-making skills, including when operational discretion should be applied and in 'no win' situations. Assessment processes and exercises should assess the effectiveness of an individual's ability to make decisions using different strategies and provide constructive feedback to promote learning.
6. Commanders need to have the ability to make sound decisions based on the elements that make up an incident, as well as having an accurate overall interpretation of the incident. This leads to effective, assertive and safe incident command. There are a number of processes that commanders may use to reach decisions. They can be broadly grouped into two main categories. These are:

- Intuitive decision-making
- Analytical decision-making

INTUITIVE DECISION MAKING

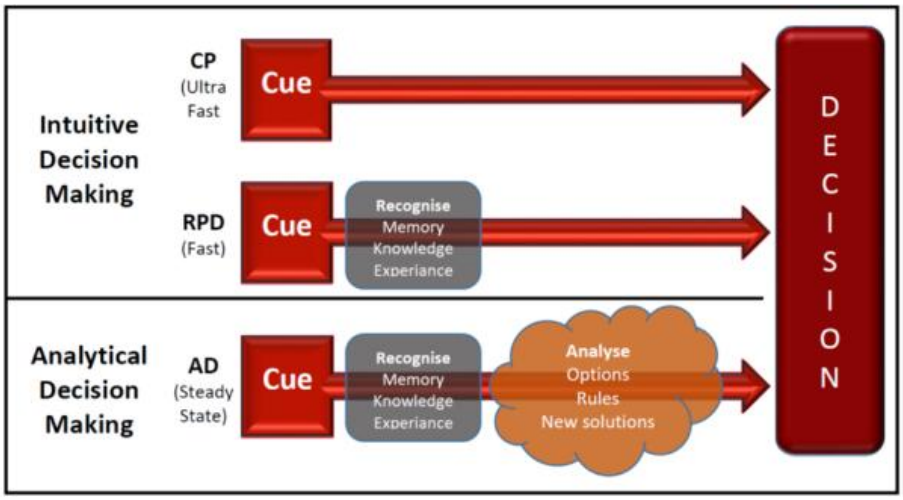
7. These are rapid, reflexive processes that are experienced as relatively automatic. Some decisions can be very reflexive. Such intuitive processes are fast and are invoked without consciously thinking. They may be driven by cues and clues that can automatically and directly trigger a decision or response.
8. Cues that may drive intuitive decision-making include those associated with:
    - Hazards and safety, such as hazardous materials and extent of fire
    - Environmental conditions, such as wind strength and nature of the location
    - Observed emotions in others, such as panic or pain
    - Specific aspects of the incident, such as the number of casualties involved and the nature of their injuries
9. Commanders can react to elements of the situation, such as the cues and clues that act as triggers. This might be via conditioned processes (CP) or a recognition primed decision (RPD) approach.
10. A CP approach is very automatic, so does not involve explicit planning. This means that the rationale is not considered at the time, making it difficult to articulate the reasons that action is taken.
11. An RPD approach is a similarly reflexive process whereby elements of the situation may prompt the commander to recognise, remember and select the responses they made to similar situations in the past. Because this process is also fast it feels like an automatic response. There is little conscious deliberation.
12. An RPD approach may be useful for decision makers operating in a relatively familiar and routine situation. Such processes are less likely to be useful at less common or more unusual incidents where there may be less experience to draw on.
13. Commanders should also be aware that because an RPD approach involves matching cues from the current situation to one that the decision maker recognises, it might encourage them to look for evidence to support their interpretation of the situation.
14. The actual situation may not reflect the interpreted situation. A commander should be aware of these possibilities and should consider using decision controls before they implement a decision. This will help them avoid decision traps.

ANALYTICAL DECISION-MAKING

15. Analytical decision-making (AD) takes more time and mental effort than intuitive processes and can be more susceptible to the effects of excessive pressures that reduce the capacity for mental processing.
16. These more reflective processes involve a greater degree of conscious mental effort, as the situation is analysed. The commander may draw on their knowledge, memories and experience that relates to the situation or problems faced, and then consider what to do. They might:
    - Use a rule-based process, for example, an operational procedure
    - Compare and evaluate possible options
    - Create a completely new solution to an unfamiliar problem, for example applying operational discretion

DECISION-MAKING PROCESSES

17. These processes apply to all decision makers on the incident ground. They have equal importance for a breathing apparatus wearer who chooses what to do next, to a commander developing their plan.
18. It is critical that all personnel are aware of the processes that drive their decision-making. Aerodrome emergency organisation should ensure that decision makers understand the factors that influence which processes they are likely to adopt and the pitfalls associated with each.
19. Although the method of decision-making is not always a conscious choice, it is important for commanders to be aware of the processes that might drive their decision-making. They should be aware of the potential decision traps. Decision controls should be used.



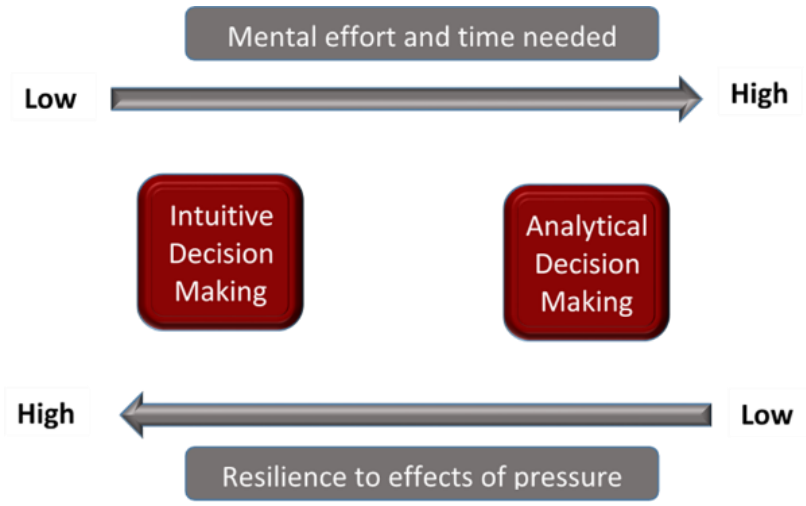
DECISION-MAKING IN THE OPERATIONAL CONTEXT

20. Aerodrome emergency organisations need commanders to operate in complex decision-making environments. These environments may be uncertain, with competing demands and problems that can affect many aspects of the scene. To resolve the incident, incident commanders should:
    - Understand their starting position
    - Know their desired end position
    - Develop a plan that gets from one position to the other
21. To do this well, all decision makers should understand the factors that are likely to influence the way they make decisions. They should be aware of the potential decision traps.
22. The table below shows some factors that might influence decision making in the operational context:

Situational factors	**Emotional factors**	**Cognitive factors**	**Organisational factors**
Time pressure	Anxieties over:	Mental capacity	No clear policy
Moral pressure	Accountability	Competence	Policy too restrictive
Stress or fatigue	Public scrutiny	Confidence	Organisational culture
High stakes	Peer scrutiny	Technical expertise	Safety culture
Uncertainty over:	Legal scrutiny	Risk perception	Organisational risk acceptance or risk aversion
Uncontrollable characteristics of the incident	Experiencing/anticipating negative emotions	Distraction	
Uncontrollable factors of incident command	Trust	Information overload	
Accuracy of information	Complacency	Understanding of role	
Missing information		Uncertainty of options	

Changing environment Ill-structured problems Familiarity with situation or specific premise		Multiple goals Incident goals Organisational goals Other agency goals Competing priorities	

23. Factors in the operational context, such as high-pressure situations, may affect the way people reach a decision. In particular, analytical decision-making (AD) processes that are relatively reflective need more time and mental effort than other processes. It takes time to evaluate and select a course of action. AD processes can be more susceptible to the effects of excessive pressures and they reduce the capacity for mental processing.



DECISION TRAPS

24. A decision trap can be described as a thought process that can lead to a situation going wrong and include biases.
25. There are a number of decision traps that may make decisions in the operational context less effective. Decision makers should be aware of these and should apply decision controls to guard against unintended consequences. Examples of decision traps include:

- Decision does not fit with the objectives, tactical priorities or incident plan: One of the pitfalls of some of the more reflexive, intuitive process is that sometimes the planning processes are bypassed. This means that an action might be intuitively or automatically implemented without considering the actual incident objective, goal or tactical plan. There may be times when the response selected might not fit with achieving the wider goal for an incident.
- Decision made on the basis of part of the situation, such as a cue or a goal, while not taking account of the overall picture: A great deal of decision-making occurs on the incident ground, from operational personnel to those with commanding roles. The operational context is complex and there may be a requirement to make decisions on a wide variety of issues. There are times when decisions are made that relate to very narrow or specific elements of the situation, such as a particular cue or goal.

26. However, there is a danger of unintended consequences if decisions are made on these elements in isolation, without considering the impact on other activities, objectives or the incident as a whole.

- Decision is based on the wrong interpretation: Poor situational awareness can lead to an interpretation of the incident that does not match the reality of the situation. A decision made on the wrong interpretation may lead to unintended consequences.

DECISION CONTROL PROCESS (DCP)

27. Incident commanders and the command team are accountable for the decisions they make. They should be able to provide reasoned justifications for what they did and why. This is supported by the use of the decision control process (DCP). The process also assists incident commanders to mitigate against the likelihood of falling into a decision trap.
28. The DCP is scalable. It can be applied to basic decisions made on the incident ground for a task or problem. It can also scale up for use in planning the resolution of an entire incident. It complements the Mutual-Aid Emergency Services Interoperability Plan (MAESIP) Joint Decision Model for multi-agency decision-making, particularly for assessing risk and developing a working strategy.

DECISION INERTIA

29. Decision inertia is a failure to make a decision. High risk, high pressure and rapid change can create uncertainty about what to do. Decision makers may also be uncertain about possible

alternatives and consequences. This may be challenging if the stakes are high and they have to choose what to do.

30. For example, a commander should make a timely decision to determine if they are operating in either offensive or defensive mode, as there is no default tactical mode. Excessively focusing on accountability and scrutiny can make decision aversion worse. They may develop an excessive focus on potential negative consequences rather than the tactical concerns of the incident.
31. Sometimes this may show as risk-aversion, with a focus on self-protection rather than making an operational decision. They may not make a decision or seek to refer decisions to another decision maker. Aerodrome emergency organisation should be aware that their organisational culture may affect decision inertia.

FAILURE TO ACTIVELY MONITOR AND REVIEW

32. Decision makers may not be aware of the progress of an incident. If they fail to monitor and review the impact of their decisions, it can affect their situational awareness. If they are not aware of progress it is difficult to make good predictions about what is happening. It also makes it harder to understand how the situation might develop.

OPERATIONAL DISCRETION

33. Operational discretion involves the use of professional judgement to make decisions in relation to incidents that are extremely unusual and not reasonably foreseeable, or a combination of circumstances that have not been predicted. Such incidents will be novel and unfamiliar to an incident commander characterised by ambiguity and uncertainty.
34. When confronted by such circumstances, incident commanders will need to produce creative and innovative decisions. These should be analytical decisions that are made consciously and with effort, and where options have been considered and the optimum one selected. Such decisions take time and this may not be available in situations that require the application of operational discretion. They will demand more urgent action as they involve the saving of life, preventing incident escalations, or people from taking action that might cause them harm.
35. Incident commanders should recognise the possibility that when under such pressure they may use intuitive or rule-based decision-making strategies due to the complexities involved and the high levels of cognitive processing required.
36. Incident commanders should understand that when having to decide to apply operational discretion they are likely to be operating in a stressful working environment because of the

hazards and risks involved. Additionally, when exercising their professional judgement it will be to make decisions that are beyond the range of operational procedures, which may be at odds with their organisational practice and culture. This will place them in a unique and uncomfortable position that will also induce stress. Acute stress will impact upon a commander's performance, including their judgement and decision-making. Incident commanders should use their personal resilience skills to manage their stress.

37. Leadership skills are also important when commanding personnel operating outside of operational procedures. It is vital that personnel trust the incident commander and are willing and motivated to achieve their objective, as they will be exposed to higher risks. An incident commander should ensure additional control measures are provided to ensure safety.
38. Incident commanders will need to solve difficult problems and should know and use problem solving techniques. Incident commanders will deal with ill-defined problems. Even though the goal may be clear, for example, save life, the initial situation and methods to solve the problem may be unclear.
39. It is important to represent or frame a problem to help find solutions. Framing a problem allows commanders to bring into mind knowledge and previous experience. This will depend on:
    - Task similarity; the extent to which the tasks to solve a previous problem resemble those that might solve the current one
    - Context similarity; the extent to which the problem-solving environments are the same
    - Time interval; how long since an earlier problem was solved in a similar way
40. This approach becomes problematic where there is little or no directly related knowledge and experience to draw upon. Therefore, reframing the problem may overcome such an impasse by creating access to knowledge and experience from other partially related events.
41. The opportunity to change how a problem is framed may occur:
    - When additional information about the problem becomes available
    - By removing constraints which inhibit what is regarded as permissible, such as the need to follow operational procedures
    - By re-interpreting some aspect of the problem, such as improvising with equipment
42. Commanders should feel encouraged to apply their operational discretion and share their experiences and learning in post incident debriefs and reviews.
43. Aerodrome emergency organisation should provide training that empowers their incident commanders to apply operational discretion and exercise their professional judgment. It should also inform them about the problem solving and command skills they will need to use.

44. Aerodrome emergency organisation should consider training their incident commanders to enhance their personal resilience and decision-making; both skills are necessary for appropriately applying operational discretion.
45. One specific type of training that may assist aerodrome emergency organisation to prepare their incident commanders to develop knowledge of how to overcome specific problems that require the application of operational discretion would be an adaptation of a pre-mortem exercise.
46. Pre-mortem exercises are primarily used to explore what can contribute towards catastrophic incident outcomes. By examining a situation where the command of an incident has been totally unsuccessful with catastrophic outcomes, such as unnecessary loss of life or property, commanders can diagnose what may have caused the outcomes. This is done individually at first, but ultimately the causes are consolidated into a single list that is debated and actions identified that could mitigate the potential outcomes.
47. Besides adapting the process to explore the application of operational discretion, the process can also be adapted to examine a worst case scenario situation, or one involving a very rare type of incident, to identify barriers to dealing with it and how they might be overcome.
48. Overall, pre-mortem exercises help to:
    - Protect incident commanders against the chance of being surprised by unexpected events
    - Highlight faulty assumptions and errors in decision making
    - Identify actions to reduce the severity of the outcomes of an incident
    - Develops awareness of problems associated with aspects of challenging incidents
    - Creates insight, cues and memories associated with the incident type
49. Training should be as realistic as possible and debriefed. Feedback should be provided that captures individual learning and any that has a wider impact should be shared. The application of operational discretion may assist with local, regional or national learning.

JOINT DECISION MAKING

50. There may be numerous situations when a team will need to reach a decision to achieve a common goal. Examples include a command team, an Emergency Operations Centre (EOC), or personnel working together on part of the operational plan. Often, teams will feed information to a commander who will make a decision for the team and control activities. But at times personnel may make decisions remote from their commander. An example is the decisions made by a breathing apparatus (BA) team in relation to their task.

51. Joint decisions are based on more than one perspective. The commander should be aware of this and the following factors which can affect joint decisions:
    - Poor communication: Team members may not communicate the right information to gain a shared understanding of the situation. Even basic terms such as 'save life' and 'prevent harm' may be misinterpreted or have different meanings for individuals from other agencies. Clear briefing and communication between teams will help to avoid conflicts in understanding and what teams expect to happen.
    - Group think: On some occasions the group can suspend rational judgement to maintain group cohesion. People may set aside their personal opinions and adopt the opinion of the group. An example may be a team accepting an inappropriate task without challenge, or being hesitant to contradict their team leader with valid information. People who are opposed to the decision may remain quiet to avoid affecting the dynamic of the group, or their status within it.
    - Competition between commanders: Competition between team members may be initiated, for example, by competition between commanders from different agencies over who has primacy at a multi-agency incident, or between command team members in the same service over who should be incident commander. The outcome of such competition may lead to interpersonal conflict.
    - Interpersonal conflict: Interpersonal conflict between team members may manifest in a lack of co-operation, or a lack of motivation to engage.
    - Status: Commanders should avoid judging how relevant information is by the status of the person who offers it. Expertise or competence may sometimes be relevant when evaluating information, but not always. Commanders should understand how their preconceptions about status can affect their judgement. Useful information can come from any member of the team.
    - Lack of confidence: Team members may lack the confidence to contribute new or relevant information. They may be affected by their own uncertainty or their status in the group.
    - Failure to challenge: Team members may fail to challenge unusual decisions or irrelevant information because they wrongly assume that others share the same understanding of the situation and task.
    - Organisational culture: The culture of the organisation can drive behaviours on and off the incident ground. Typical examples include how people react to status, and how likely they

are to challenge assumptions. Aerodrome emergency response organisation should understand the impact of their culture on team decision-making.

- Poor understanding of the roles, responsibilities and capabilities of other agencies: Commanders may overestimate or underestimate what another agency can do in support of resolving an incident. This may lead some multi-agency team members to feel undervalued or overwhelmed by the demands and expectations placed upon their service. In turn this may affect their motivation, communication and ability to respond in accordance with the timescales of an incident plan.
- Trust: Aerodrome emergency response organisation incident commanders need to be are aware of the roles, responsibilities and capabilities of other agencies. As part of a multi-agency team it is unlikely that a aerodrome emergency response organisation commander will know those from the other agencies. In a multi-agency team environment, the primary means for a aerodrome emergency response organisation commander to establish trust is based on their perceived competence of the other team members' abilities to perform their role.

I. INTERPERSONAL COMMUNICATION

1. The purpose of communication is to provide another person with information. This typically involves three factors:
   - The meaning of the message from the sender
   - The actual message passed
   - The meaning of the message as understood by the recipient
2. The commander should be aware of their own assumptions and those of the person with whom they are communicating. They should test assumptions and make information clear. They should make sure the other person has accurately understood the message.
3. Communication at an incident may be one-way or two-way.
4. There are times when direct one-way communication is appropriate. The sender will deliver a message with no opportunity for feedback. This form of communication is rapid and puts the sender in control of the message. However, the lack of feedback from the recipient means that they cannot confirm their understanding.
5. Two-way communication offers the receiver the opportunity to feed back to the sender; information flows between them. While this often takes longer than one-way communication, it can be more accurate because it provides an opportunity to confirm the intended meaning.

6. It is important to maintain open and effective communications. There may be many lines of communication and they are a major aid to control. Examples include direct or indirect reports from personnel, crews or sectors.
7. Other emergency services, assisting agencies and fire control rooms will also be communicating. When assessing the span of control, the management of communications should also be considered, taking into account the pressure this may put on a commander. It is critical to share communications in a way that will support a common picture of the incident.
8. The commander should be able to cope with the flow of information. It is important to limit direct communication and information flows to manageable levels. Failure to keep communication manageable can have a negative effect at an incident. It could result in poor communication of risk-critical information, or overlooking it.
9. It is best to keep the span of control for tactical roles as narrow as possible. Commanders should limit their span of control to the number of individuals to whom they can give enough attention.
10. Effective communication is fundamental to achieving successful and safe resolution of incidents. It provides the commander with knowledge about the situation and progress of tasks. Obtaining accurate and timely information is crucial to underpin situational awareness and subsequent decision-making. It helps the commander perform the role in a confident and determined manner and thereby assert their leadership and authority.
11. Communication is vital for co-ordinating activities, completing tasks and handover of command. Sharing accurate and timely information is also critical for helping others to have a common understanding of the situation, what is happening and what needs to happen next. Even the most effective plans will only work if the people putting them into practice understand them.
12. Communication helps develop and maintain shared situation awareness across a command team and with responders from other agencies. For example, a common understanding of the situation, what is happening, and what needs to happen next, is particularly important at major incidents involving multiple agencies. Likewise, it is important to obtain an accurate assessment of the needs of all agencies to develop an effective incident plan.
13. As well as exchanging information, good communication helps to establish trust and build relationships. This is important to enable individuals to be effective in carrying out their tasks to resolve the incident. Commanders should be aware that effective communication is essential for good leadership and makes it easier for people to follow instructions, understand briefings and have confidence in what is being stated.

14. The manner in which a commander communicates influences the perception of their competence, confidence and trustworthiness. A commander who communicates confidently and in a calm manner when under pressure will instil trust and confidence in others, enable them to understand the situation they are confronted with, make them more resilient to pressure and less likely to operate outside of the incident plan.
15. Even the most effective plans will only work if the people putting them into practice understand them. Commanders should be aware that messages are not always understood in the way they are intended. Problems with messages arise because the sender often assumes the person receiving their communication has gained the same understanding. Sometimes this is not the case, because the person receiving the message extracts meaning in a way that makes sense to them.
16. Aerodrome emergency response organisation should provide effective training and development programmes to ensure commanders are able to develop and practice their interpersonal communication skills. Assessment processes and exercises should assess the effectiveness of an individual's ability to communicate effectively and provide constructive feedback to promote learning.

QUALITIES OF EFFECTIVE COMMUNICATION

17. Effective communication is when information has been exchanged and is understood in the way it was intended. Quality, relevance and clarity of interpersonal and radio communication is essential, for example when relaying information on the incident ground and to fire control rooms.
18. Qualities of effective communication include:
    - Style: A commander should judge which style to adopt in order to optimise the information exchange necessary for a given situation. For example, in pressurised situations an assertive style will convey urgency.
    - Credibility: Information is received and confirmed as being from a reliable and credible source before being acted on. For example, using social media to emphasise the advice and information that if shared across social media platforms would benefit community response and resilience.
    - Clarity: Avoids ambiguity by using commonly understood terms. This is especially important when working with other agencies or members of the public as some terminology may have different meanings. Following a structure will also help to communicate a clearly.

- Relevance: Information is relevant, appropriate, and concise and keeps to the point. This is essential during high pressure situations. Incorrect information can overload the receiver and the meaning can be lost; information should only be exchanged with relevant individuals. For example, providing relevant and informative communications to the public to ensure their compliance with a decontamination process.
- Timeliness: Communications should be made at an appropriate point in time. To avoid distractions from critical tasks consider how urgent the information is and the current task demands of the receiver.
- Understandable: Understanding is confirmed to prevent misunderstanding and differences in shared situation awareness.
- Questioning of assumptions: Assumptions are questioned as senders and receivers of information may have assumptions about the information. Commanders should question and clear up assumptions to ensure what they say is what the other person hears and understands.
- Assertiveness: There is a clear benefit to being assertive to clarify meaning and test assumptions. Confidence and status can affect the ability to be assertive under pressure. It is important for a commander to be able to distinguish between being passive, assertive and aggressive. If a commander is passive, they may fail to represent their views effectively so that others take note of them. If a commander is aggressive, they may ignore the views of others, be defensive and act in a superior manner. However, an assertive commander will respect the views of others and remain objective. Features of assertiveness are asking questions to acquire information, and advocating a particular point of view.
- Actively listen: The environment at an incident can make it more difficult to communicate. Noise, adverse weather conditions and heightened levels of activity can be distracting and make listening difficult. It is important to concentrate on content rather than delivery, as preconceptions about the status of the person who is communicating may also affect listening. Commanders should not interrupt or complete the sentences of the other person. They should be supportive and patient with them. To listen actively, a commander should adopt positive body language, make eye contact, ask questions and paraphrase.
- Matched words and behaviour: People are constantly communicating, even when not using words. When verbal and non-verbal messages match, it helps people to make sense of the message. For example, a calm approach reinforces a reassuring message.

FORMS OF COMMUNICATION

19. Communication at incidents can occur in different forms:
    - Verbal
    - Non-verbal, such as facial expressions and body language
    - Written, for example Site-Specific Risk Information (SSRI), tactical fire plans or procedures
    - Electronic, such as via mobile data terminals or the internet
20. The commander should consider how people will perceive non-verbal communication. Non-verbal communication is important when briefing personnel or liaising with other agencies. Commanders should consider it carefully when they interact with members of the public in an emergency situation; they may be highly sensitive to the emotional states of others. The commander's non-verbal behaviour should match their verbal message.

VERBAL

21. Most communication at incidents is verbal, either directly or through radio communications. Commanders should be aware that verbal communication is important for building a common understanding for teams to complete tasks.
22. Discretion should be used when verbally conveying sensitive or distressing information, to avoid it being overheard by unintended recipients.

NON-VERBAL

23. People are constantly communicating, even when not using words. Non-verbal communication can be used to complement or reinforce verbal communications and is also a major signal of emotional state. The use of non-verbal information may be intentional or unintentional, and may include:
    - Facial expressions and eye movement
    - Body movement and gestures
    - Voice characteristics and qualities
24. The manner in which a commander communicates verbally and non-verbally with others influences the development of relationships and the creation of a positive team working environment.
25. The commander should consider how their non-verbal communication is likely to be perceived when commanding an incident. It should be consistent with their message, which is important when briefing personnel or liaising with other agencies. Non-verbal communication is particularly important when interacting with members of the public in an emergency situation.

WRITTEN

26. When written information is captured on the incident ground, care should be taken to ensure it is accurate, clear and relevant. This may involve a variety of personnel from a command support team member, to a loggist who will contemporaneously record the decisions and conversations of a commander. Close attention by the commander to the written records generated is essential to avoid misunderstandings.

ELECTRONIC

27. Mobile data terminals, computer-based command support systems, digital cameras, and mobile telephones may provide a commander with visual as well as written information about an incident; sources could include drones (classified as a type of unmanned aircraft system by the Civil Aviation Authority), a helicopter downlink, a risk database or social media websites. Equally, such systems may allow a commander to share information with members of the command team, responders from other agencies, and personnel remote from the incident.
28. When visual information is used, it is important for the receiver to understand the context surrounding it to avoid misunderstanding; for example, the meaning of symbols on a plan, or the nature of materials involved in a fire determining the operational tactics on view.
29. Having visual and other electronic information does not mean that other forms of communication are no longer required. Just because a commander has sent pictures of the incident via an email to a remote colleague does not mean that a shared understanding of the situation has been achieved. Such information should be supported by verbal or written communication to ensure the context and message the commander wishes to convey is understood.
30. Security of the IT networks over which such information may be transmitted and received is vital to protect against sensitive information from reaching unauthorised individuals.

BARRIERS TO COMMUNICATION

31. There are many barriers to communication, which may lead to misunderstandings that impact on the effectiveness and safety of incident operations. The table includes examples of barriers to communication:

Form of communication	**Barriers to communication**
Verbal	Remote from receiver Inappropriate language Language difference

	Inability to hear Noise Interference Adverse weather conditions Distraction due to high-level of activity Poor listening skills Pre-conceptions about the status of the person who is communicating
Non-verbal	Emotions Body language does not reflect the message Unable to see or interpret body language Voice level Status Culture Stereotyping Discrimination
Written	Language difference Poorly written script Spelling errors Punctuation errors Poorly formatted documents Time constraints
Electronic	Hardware failure Software failure Communications network failure Over reliance on electronic communication

J. PERSONAL RESILIENCE

1. An incident can be a challenging environment to work in. The location, tasks and uncertainty of what might happen puts pressure on commanders and personnel. An appropriate level of pressure can have a positive effect by increasing alertness. However, excessive pressure can cause acute stress, which may limit the ability to think, communicate and operate effectively.

2. Stress occurs when an individual experience a difference between the demands placed on them and their ability to cope. Working in demanding or challenging environments may also lead to physical and mental fatigue.
3. Commanders and the teams they lead should be able to function while being aware of stress and fatigue. They need to communicate, make critical decisions and process varying pieces of information. They should be able to understand how stress and fatigue affect these processes.
4. Aerodrome emergency organisation should ensure that personnel working under stressful conditions are aware of the effects and symptoms of stress. Appropriate training and support processes should prepare personnel for operating in stressful environments and for the pressures of incident command
5. Stress can adversely affect a commander's behaviour and distract them from commanding the incident. This in turn may jeopardise the safety of operations.
6. There are two types of stress that an individual may experience:
   - Chronic stress: A response to persistent, poorly managed pressures, usually over a prolonged period of time. Such stress may lead to serious health conditions such as anxiety, insomnia, and high blood pressure.
   - Acute stress: A reaction to sudden, unexpected events such as those that may be experienced when working in a dynamic, high-risk environment when commanding an incident. Such stress can involve significant physiological, psychological and behavioural effects, often referred to as the 'fight, flight or freeze response'.
7. Incident commanders should recognise their own physiological, psychological and behavioural changes in response to stressful situations. This self-awareness will enable them to take action to manage the impact of stress upon their own performance.
8. The significant factors associated with acute stress that may affect an incident commander, may also affect members of their teams. Even one team member who is affected in a negative way can be enough to affect the way a team functions. Commanders should be aware of the symptoms that suggest stress and pressure are damaging how the team works together.
9. The amount of pressure that can lead to stress will differ between individuals. It depends on an individual's expertise and personal resilience; that is the outcome of an evaluation of the pressure they feel and their access to coping strategies to manage it. Personal resilience may be thought of as the capacity of an individual to cope with stress and fatigue without it affecting their performance.
10. Experts have greater personal resilience for many reasons, including:

- Extensive subject matter knowledge
- Ability to perceive meaningful patterns from environmental cues because of the organisation of their knowledge
- Possessing a good working memory when under pressure due to high levels of skill automaticity, freeing up storage and processing capacity
- Possessing a good long-term memory containing their experiences with established links between them, making information retrieval an efficient process
- Possessing strong self-monitoring skills that enable them to detect errors or recognise when they do not understand something

11. Aerodrome emergency organisation should provide effective training and development programmes to ensure commanders are aware of the factors that affect their personal resilience and be able to recognise when they or others are becoming stressed or fatigued. They should develop and practice their stress and fatigue management skills. Assessment processes and exercises should assess the effectiveness of an individual's ability to manage their personal resilience and provide constructive feedback to promote learning.

TYPE OF PRESSURE

12. Some typical demands or impacts that may cause acute stress are detailed in the table below.

Demands	**Impacts**
Working environment	Noise Heat Reduced visibility Weather conditions Emotional reactions from the public Moral pressure Upsetting scenes Conflict Physical or psychological fatigue
Uncertainty	Multiple or conflicting goals: Complex incidents may generate critical situations that require multiple goals, which may result in conflicts between objectives, including those of other agencies; this may lead to indecision and hesitation about prioritisation and the actions to be taken

	Incomplete or inaccurate information: This may result in a low level of situational awareness; the subsequent uncertainty will make it more difficult to anticipate what may happen next, especially in relation to risk-critical actions Unexpected event: An incident that alters in an unexpected way, or where indicators of progress or incident type do not fit with current situational awareness, may breach expectations New, unfamiliar or unusual situation: A situation where the commander has no experience or recognised procedures to draw on to decide what actions are appropriate, such as the need to apply operational discretion Failed plan or control measure: Expectations about the sequence of events are not met, which introduces uncertainty about the situation; this may occur because of system, procedure, or equipment failures, or as a result of human error
Tasks	Time pressure: This is the need to take risk-critical actions within a short timeframe versus the having the resources and ability to carry out those actions; this may occur if immediate life-saving actions need to be taken, or in a rapidly changing situation Hazards and risks Performance anxiety: Fear that is triggered when being required to carry out the role of commander, or the anticipation of undertaking the role Workload management: A high workload that is not appropriately managed can lead to an inability to deliver assertive, effective and safe incident command Spans of control: If spans of control are too broad, it may result in the commander becoming overwhelmed Consequences of failure, including 'no win' situations where harm will be caused whatever action is taken Threat to life

RECOGNISING THE EFFECTS OF STRESS

13. Incident commanders should understand and recognise the effects of acute stress in themselves and others, and understand how stress may affect their ability to command an incident.
14. People differ in the way stress can affect them; in some, the effects may be subtle changes from their normal behaviour. However, there is no definitive list of behavioural indicators and the effects can vary. Typical indicators of stress can be broadly categorised as behavioural, emotional, physical and cognitive:

Stress Indicators	**Impact**	**Signs and symptoms**
Behavioural Indicators	A change in a normal pattern of behaviour can indicate acute stress.	Hyperactivity Repetitive behaviours or sounds Irritability Aggression Becoming withdrawn or detached from situation Apathy
Emotional indicators	Experiencing stress can lead to emotional distress.	Vulnerability or a feeling of loss of control Panic Anxiety Fear of situation Fear of failure
Physical indicators	Situations that feel stressful can result in the body releasing Adrenaline. This can result in some physical changes that can indicate stress.	Increased heart rate Pupil dilation Sweating Dry mouth Butterflies in stomach Trembling
Cognitive (thought process) indicators	In manageable amounts, some stress may enhance cognition through clearer thinking and improved memory. However, in less manageable amounts stress	Disrupted concentration Difficulty prioritising objectives or tasks Narrow focus or tunnel vision Lack of focus on relevant cues Memory impairment

	can have negative effects on thought processes.	Information overload leading to forgetting Task overload due to the limited capacity to undertake tasks resulting in tasks being dropped or not completed Easily distracted Focuses on information that supports mental picture of the situation, whilst ignoring other pieces of information Forgetting to carry out an intended action at the time it was due to be done Impaired decision-making Blank mind Resort to familiar or drilled routines

IMPACT OF STRESS

15. Stress may lead to:

- Impaired situational awareness: Impairments such as a narrow focus and becoming easily distracted may result in difficulties with scanning the scene. People may struggle to assimilate the information presented so they can understand the situation fully.
- Impaired decision-making: Failure to consider all of the relevant issues, due to 'tunnel vision', can lead to poor decisions being made.
- Impaired communication: The negative behavioural and emotional effects of stress, such as anger and irritability, may make communicating clearly with others difficult.
- Impaired teamwork: If team members experience stress it can impair how the team functions. Stress can cause teams to communicate less effectively, which can:
    - Affect team situational awareness
    - Lead to errors

- Result in a reduced level of shared understanding about the situation, objectives and plan
- Result in team members starting to focus on specific tasks, rather than on team objectives

- Impaired performance: Individual and team performance may decline due to stress, with an increased likelihood of errors being made.
- Impaired leadership: Negative emotional responses are likely to be detected by others, and are known to elicit similar emotions. This can result in a breakdown of trust and relationships, and confidence may be lost.

MANAGING STRESS

16. Aerodrome emergency response organisations should prepare their commanders and personnel to function under stressful conditions. They should consider how they develop incident commanders to acquire the highest levels of personal resilience.
17. For example, exposing incident commanders to increasingly realistic training simulations prepares them to cope with the stress associated with responding to unusual circumstances, which may require the use of operational discretion. Consideration should also be given to exposing incident commanders during training to situations that do not develop as expected, or where applying control measures fails to resolve the incident.
18. The aim should be to build confidence and develop expertise in incident commanders, so that dealing with the unexpected becomes expected and elicits a reduced emotional response.
19. The following factors help build individual and team resilience to stress:
    - Awareness of stress indicators: Personnel should be able to identify the symptoms of stress that can be detrimental to their own performance and that of others. Individuals should feel able to say when an overload of stress is impairing their ability to carry out their function without fear of stigma.
    - Shared knowledge, understanding and expectations: For effective co-operation and co-ordination of tasks and activities, shared understanding and expectations are essential and requires effective communication between those involved. For example, if a team member lacks understanding about a situation or role they have been assigned, critical information may not be shared because they do not perceive it as important. This may lead to the incident commander experiencing an unanticipated incident development that is at odds with their expectations. Training that familiarises personnel with a range of functional command roles and tasks likely to be encountered will strengthen understanding of the

likely impact of a team member's actions on the activity of others and the co-ordination of operations.

- Team flexibility and adaptation: Factors such as time pressure and uncertainty can bring about changes to plans and activities to complete the task or achieve the goal. Teams that can adapt activities as the situation demands will be more likely to be effective in the face of situational pressures.
- One-to-one command support: Support in the form of a colleague, including those responsible for monitoring a commander's performance, can assist an incident commander by listening to their concerns and ideas. They can highlight overlooked command activities, or actions that ought to be considered as part of an incident plan. The opportunity for an incident commander to discuss their intentions as well as their vulnerabilities may assist in alleviating some of their stress.
- Good team communication skills: Training that exercises effective communication in a pressurised operational environment can enhance skills and build resilience. Good communication is essential for effective co-operation and co-ordination of activities.
- Comprehensive knowledge base: Developing a deep, broad knowledge base in relation to incident command, command skills and key operational policies can make the unfamiliar more familiar by virtue of having access to a greater mental network of information.
- Confidence: Frequent practise of command skills under pressure may build confidence and resilience. Training should correct errors and build learning in line with operational procedures. It also builds confidence in the team because it helps them to behave in the way others expect.
- Positive outlook: A positive outlook has a moderating effect upon how stressed an individual feel. It assists and incident commander to deal with challenging incidents and recover from setbacks.
- Automation of skills: Frequent training and practise of command skills and other incident command-related skills will automate any actions involved. Automatic responses do not impact upon cognitive capacity, which frees up thinking space to consider and deal with other issues associated with an incident. For example, thinking how to behave as a leader when trying to lead will take thinking capacity away from working out how to safely resolve an incident.
- Perception of the predictability and controllability of an incident: A commander who is knowledgeable and situationally aware will be less likely to perceive they are unable to

predict and control aspects of an incident. Incidents that prevent a commander from seeing what is going on are particularly problematic as they are reliant on the words of others to build up a mental model. Innovative ways to overcome this include the use of drones (classified as a type of unmanned aircraft system by the General Civil Aviation Authority) or other sources of video footage.

- Physical fitness: Incident commanders who are physically fit will be better able to cope with the psychological and physiological responses to stress.

COPING STRATEGIES DURING AN INCIDENT

20. The following are some coping strategies that can be used by commanders and personnel during an incident:
    - Prompt detection: Being able to recognise the indicators of stress in self and in others, will enable corrective action to be taken
    - Creating time to think: Standing back and taking an opportunity to review activities may reduce feelings of being overwhelmed, which may help to process the information and facilitate continued functioning
    - Seeking one-to-one support from others: This may confirm a perception of a situation is accurate and decisions are sound
    - Requesting reliefs: For commanders or personnel undertaking tasks or functions, when it has been identified that stress is harming ability to perform
    - Remaining calm under pressure: This will affect the behaviour and performance of those supporting an incident commander and the confidence they have in a commander's leadership
    - Workload and communication management: Effectively managing spans of control by delegating work and command roles to others, and implementing a communication strategy
    - Information management: Commanders should ensure information is managed effectively by command support personnel and displayed in a manner that suits them so that it is available when required. For example, a commander may wish for a timeline to be drafted indicating key time points, such as informative messages, and request to be prompted when one is due.

COPING WITH FATIGUE

21. Fatigue is a physical or mental state of feeling tired and weak. Physical fatigue results in an inability to continue functioning at normal levels of physical ability. Mental fatigue affects concentration and thought processes. Although mental and physical fatigue are different, they often occur at the same time. Physical work, and extremes such as temperature and weather, can have an impact on personnel. Some of the signs and symptoms include:

Indicators	**Signs and symptoms**
Behavioural indicators	Less expressive communication Difficulty in expressing self Becoming withdrawn Reduced communication Irritability
Emotional indicators	Anxiety Panic Vulnerability due to loss of control
Physical indicators	Impaired motor skills Poor timing Failure of co-ordination
Cognitive (thought process) indicators	Impaired thought processes Difficulty in adapting to changes Lowered creativity Difficulty in making decisions Acceptance of lower standards of behaviour Overtly distracted by discomfort Neglecting tasks

22. Commanders should recognise the effects of fatigue in themselves and personnel, and take action before fatigue begins to reduce performance.

K. TEAMWORK

1. An essential skill for effective incident command is the ability to command and control teams of people. Understanding team dynamics is essential to get the best out of individuals and

teams. Team dynamics involves processes that drive how people affect each other, how this affects the team and its performance.

2. Effective teamwork, intraoperability and interoperability, is the extent to which organisations can work together coherently as a matter of routine; it enables the consistent delivery of aerodrome emergency response organisation operational procedures and MAESIP policies and procedures.
3. Aerodrome emergency organisation should provide effective training and development programmes to ensure commanders are able to develop and practice their teamwork skills. Assessment processes and exercises should assess the effectiveness of an individual's ability to lead a team and be part of a multi-agency team, and provide constructive feedback to promote learning.

TEAM PERFORMANCE

4. There are many factors that influence teamwork and these are represented in the basic team performance model below. It illustrates how team factors such as individual experience and operational procedures influence team processes such as resilience, decision-making and co-ordination, which then affect team performance.
5. An individual’s abilities depend on their knowledge and skills as well as their experience, attitudes and personality. Team structures will be hierarchical and vary in size and composition of different roles. They may also be multi-agency or contain members of the public with expertise that is required, such as the owner of a business involved in a fire. It is important for an incident commander to pay attention to and support individual team members to ensure they are able to carry out their role.
6. The working environment is an influential team factor. Along with the type of incident, its complexity will dictate the composition of a command or multi-agency team.
7. The command skills of leadership, situational awareness, decision-making, interpersonal communication, communication strategy and personal resilience, feature prominently within team processes. Team formation is a key process completed by an incident commander. It involves creating a command team from available resources and then developing and adapting it as the incident develops or as additional resources become available.
8. The performance of a team is reflected in incident outcomes while a commander is in charge. These may be regarded as a measure of a team’s effectiveness and includes stress which has a detrimental effect on teamwork, intraoperability and interoperability. Highly-motivated and

well-trained teams will be more resilient to stress, which can adversely affect individual and team performance; refer to Personal resilience.

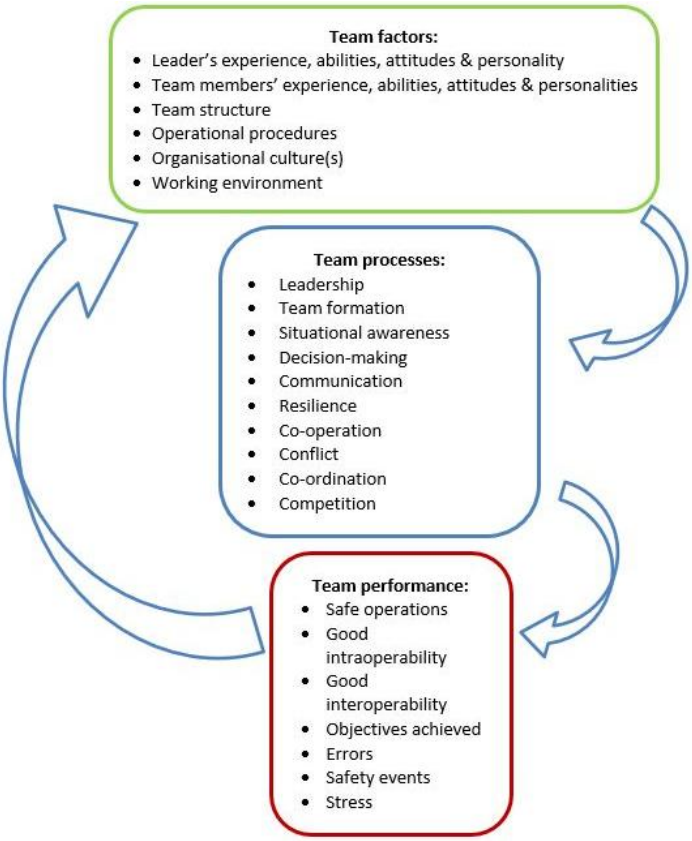
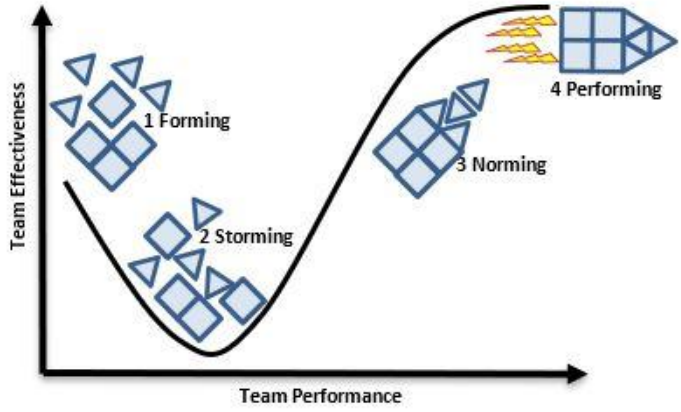


Figure: Basic team performance model

TEAM DEVELOPMENT STAGES

9. There are several stages of team development:



FORMING STAGE

10. An incident commander is expected to create a team that will effectively and safely resolve an incident. Yet, the urgent nature of an incident may limit the ability of an incident commander to match each role with the ideal team member. This may result in a team that consists of personnel who do not know each other or have no experience of, or the right knowledge and skills for their role. The team may not possess shared situational awareness and its members may be unclear about the relationships between the different roles in the team. However, when forming a team an incident commander should consider the following factors:
11. Knowledge matching: Consider individual and team knowledge and match this to the required function. An incident commander may support this knowledge with a clear briefing. They may provide additional support or additional monitoring.
12. Skills matching: Consider the existing skills of the individuals and teams in relation to the tasks needed by the incident plan. It may be possible at some incidents to also consider the need for developing skills or expertise. If the situation allows, commanders may wish to consider managing the exposure of personnel to situations or tasks which will build their skills and experience.
13. Attitude matching: Some aspects of attitude contribute to a team working well together, being cohesive and motivated. Such attitudes might be stable personality traits or they may come and go, affected by mood. The way a person reacts to pressure and stress at an incident can affect both of these. The commander may wish to consider these factors when allocating tasks to individuals or teams. Attitude can affect how likely they are to work well together and achieve the intended result.
14. When incident commanders have more time, or if the situation allows, they should replace team members with those who have the requisite knowledge, skills and attitude.
15. To help overcome some issues with team formation, and the storming stage, an incident commander should know and understand the different responsibilities of the generic roles they may assign to team members, for example sector commander and safety sector commander. They should also know and understand the technical and specialist roles such as tactical advisers and fire investigators. Clarity of roles and responsibilities and their relationships reduces conflict between team members so, clear briefings are essential. Refer to Roles and responsibilities for further information.

STORMING STAGE

16. Potential conflicts may arise during this stage, as the team gets to know each other. Conflict may arise from a lack of trust between team members over each other's abilities or team

members may question the commander's plan. This stage may see a team struggling to co-ordinate its activities and progress with implementing a plan may be slow. Throughout this stage a commander may need to be assertive and persistent when dealing with team members. This will not only secure commitment from them, but it may also be used to get all engaged in discussions and empower them to challenge others or ask for help. Remaining objective, and focusing on the facts, will assist commanders to accept criticism as feedback and intelligent use of humour can ease tension.

NORMING STAGE

17. During the norming stage team members will communicate openly with each other in a friendly and supportive communication style and actively listen to each other (see Interpersonal communication). They will adopt recognised communication protocols and operate in accordance with operational procedures.

PERFORMING STAGE

18. The performing stage is hallmarked by effective co-ordination of team activities that achieve objectives within the incident plan. This is enhanced by team members monitoring and supporting each other's performance and effectively sharing information. In turn this may result in fewer errors and safer operations due to the reduced likelihood of miscommunication, or a lack of communication leading to an unco-ordinated response. It also means the team is capable of taking innovative actions.

TEAM EFFECTIVENESS

19. Mutual trust between team members is essential for effective communication and co-operation, which drive co-ordination, as they both affect shared situational awareness and decision-making.
20. Communication is the mechanism to exchange information between team members and how information is communicated will inform attitudes, understanding and behaviours. Shared situational awareness is essential for teamwork to be effective. For example, it is important for incident commanders to articulate their goals and expectations and to effectively monitor time, to ensure they are achieved by predetermined deadlines.
21. Co-operation is motivated by the attitudes, beliefs and feelings towards teamwork and achieving a common goal. For example, if a team member feels undervalued they are less likely to contribute during team briefings.

22. Co-ordination involves the use of knowledge, skills and behaviours to turn planned activities into actions to achieve a common goal. For example, briefing one sector commander about internal firefighting conditions to ensure they brief and commit sufficient breathing apparatus crews to safely extinguish a fire, while also briefing another sector commander to set up a water tower to prevent firespread in an adjacent sector, making sure it does not attempt to extinguish the fire due to the presence of breathing apparatus crews firefighting inside the building.
23. Effective teamwork revolves around team members monitoring and supporting each other. A team that monitors its performance will detect gaps and inconsistencies and adapt until they can be overcome. It will be more likely to change tactics when current ones become ineffective or are not working. Team members will freely provide and accept feedback and help from other team members.
24. To summarise, effective teamwork between command team members or members of a multi-agency team and an incident commander results in:
    - Mutual trust between team members
    - Positive working relationships between team members
    - Consistent application of aerodrome emergency response organisation operational procedures and MAESIP policies and procedures
    - High quality briefings of team members about a role they are required to perform
    - Open communication and co-operation between team members
    - Effective co-ordination of actions by team members on the incident ground
    - Monitoring of the team's performance by its members
    - Shared situational awareness within a team or between teams
    - Effective decision-making

TEAM DECISION-MAKING

25. Team or joint decision-making involves team members working interdependently to make decisions to achieve a common goal. It is dependent on many factors, including:
    - Individual or organisational agendas
    - Motivation
    - Shared situational awareness
    - Dominant personalities
    - Group think
    - Failures to challenge

- Poor communication
- Status
- Organisational culture

L. ORGANISATION AT AN INCIDENT

1. It is the responsibility of Aerodrome emergency organisation to ensure commanders are sufficiently trained, capable and knowledgeable to effectively and safely organise resources, in order to obtain the best resolution to an incident.
2. It is the responsibility of all personnel, who may attend or be involved with an incident, to ensure they are familiar with the requirements of the incident command system and can operate safely and effectively within it. This applies equally to those who will perform a command role and to those who will be operating under the command of others, including fire control personnel.
3. Incident command and support activities start on receipt of the emergency call to the fire control room, and continue to the conclusion of the incident.
4. Control measures for structuring an incident can be found at:
   - Incident command: Cordon control
   - Incident command: Sectorisation

CORDON CONTROL

5. Aerodrome emergency response organisations have the power to restrict the access of people to premises or a place in an emergency. Commanders should consider the safety of personnel, members of other agencies and the public. Cordons are an effective way of controlling resources and maintaining safety.
6. Where practical, the police will establish and maintain cordons at appropriate distances to allow the emergency services and other responding agencies to save life, protect the public and property, and care for casualties.
7. In some areas the police will have agreements enabling the fire and rescue services to manage gateways into the inner cordon, establish who should be granted access and keep a record of people entering and exiting.
8. Personnel from other agencies may need to work within cordons that are under the safety management of the fire and rescue service. Briefing arrangements for responders from other agencies should be jointly established, preferably in advance of an incident.

9. Pre-planning and exercising with partner agencies should aim to establish the roles and responsibilities for implementing and maintaining cordon control for multi-agency incidents.
10. After the initial cordon has been established to secure the scene the incident is usually divided into two distinct areas:
    - Inner cordon
    - Outer cordon

INNER CORDON

11. The inner cordon denotes the hazard area and controls access to the immediate scene of operations. This provides an increased measure of protection for personnel working in that area. Incident commanders should restrict access to the lowest numbers needed for safe and effective operational activity. At small incidents this could be an existing physical barrier or a safety officer briefed to restrict access.
12. At incidents where a higher degree of control is required, those entering the inner cordon should report to a designated scene access control point and register their arrival. This ensures that they can be safely accounted for should there be any escalation of the incident, and affords an opportunity for briefing about the hazards, control measures, emergency arrangements and other issues. Nobody should be permitted to enter the inner cordon without an appropriate level of personal protective equipment (PPE). It is necessary to ensure that those leaving the inner cordon register their departure
13. Incident commanders should account for people's safety and location. If an incident is using sectors they can delegate this responsibility to the sector commander, who should be aware of the people and personnel who are active in their sector. An inner cordon gateway control system should be established and may include:
    - Means of recording all people entering and exiting the inner cordon area
    - Provision of safety briefing and agreed evacuation signals
    - Checklists for personal protective equipment (PPE)
    - Personnel to escort non-fire and rescue responders
    - Details of working locations
    - Tasks of other agencies
14. The rescue and firefighting service will be responsible for safety management within the inner cordon until responsibility for the scene is transferred to another body. Overall responsibility for the health and safety of personnel working within the inner cordon remains with individual

agencies. Such agencies should ensure that personnel arrive at the scene with appropriate PPE and are sufficiently trained and briefed for the work they are to undertake within the cordon.

Figure: Where practical the inner cordon should be identified with the use of red and white barrier tape

OUTER CORDON

15. An outer cordon may be established around the vicinity of the incident to control access to a wide area. This will allow the emergency services and other agencies to work unhindered and in privacy. Access through the outer cordon for essential non-emergency service personnel should be by way of an access control point.
16. This cordon limits access to an area being used by the emergency services and other relevant agencies. The police will usually control outer cordons, and may also establish traffic cordons to prevent unauthorised vehicular access. The police will identify safe routes in and out of the cordon for emergency vehicles and other agencies. Rendezvous points and marshalling areas will usually be located within the outer cordon.

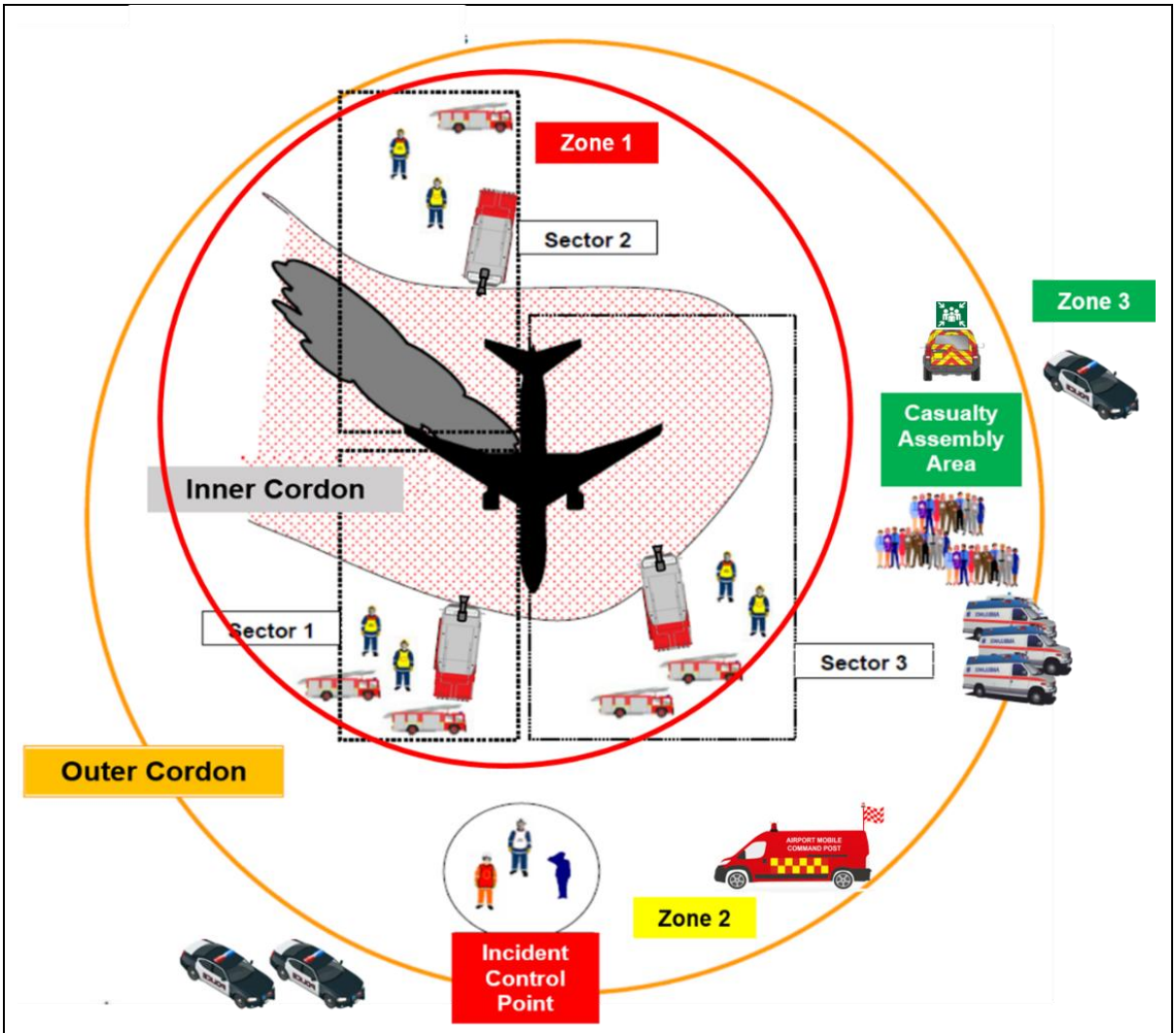


Figure: Example of cordons at an aircraft accident scene.

HOT, WARM AND COLD ZONES

17. At certain incident types, there may be a need to divide cordons into hot, warm and cold zones. This will depend on the level of risk faced by emergency responders and the range of corresponding control measures identified and implemented. The use of these zones should be agreed by all emergency responders. As example, for an aircraft accident scene, MAESIP provides the following definitions:

    - Hot zone – The area where the initial release occurs or disperses to. It will be the area which may pose an immediate threat to the health and safety of all those located within it and is the area of greatest risk.
    - Warm zone – An area uncontaminated by the initial release of a substance, which becomes contaminated by the movement of people or vehicles. The warm zone will be extended to

include the area of decontamination activity. These areas cannot be guaranteed as free from contamination.

- Cold zone – The uncontaminated area between the inner cordon and the outer cordon where it has been assessed that there is no immediate threat to life.

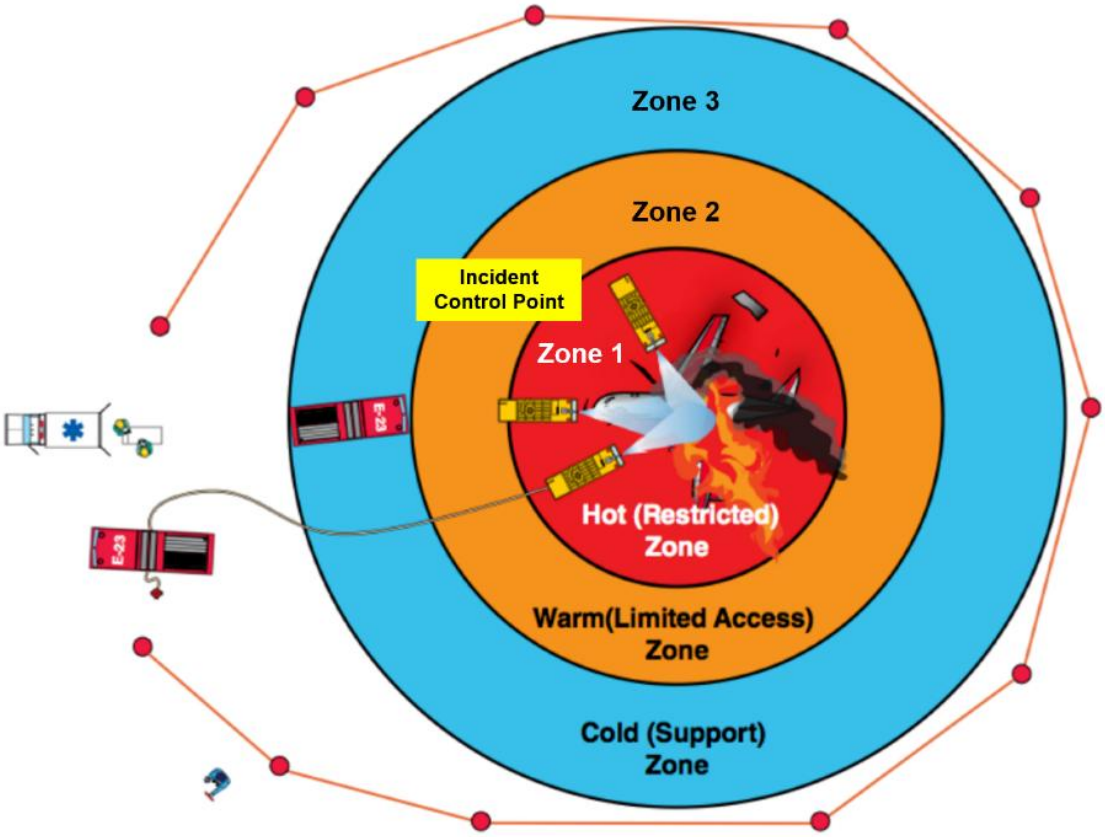


Figure: Example of hot, warm and cold zones at an aircraft incident. Taken from IFSTA ARFFS 6th Edition Manual.

EXCLUSION ZONE

18. Some hazards may present such a significant danger to the safety of personnel, other agencies and the public that no control measures will sufficiently reduce the risk. Incident commanders should consider establishing an exclusion zone within the inner cordon to which precludes access for all personnel and responders from other agencies.

Figure: Where practical exclusion zones should be identified with the use of black and yellow barrier tape

AIR EXCLUSION ZONES

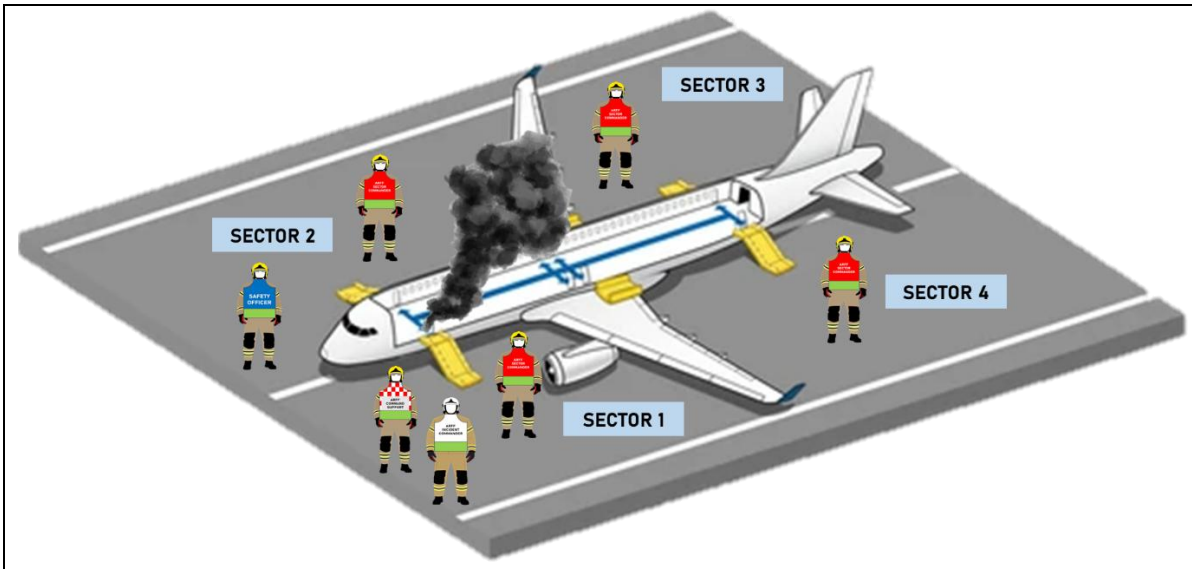
19. It is important that aerodrome emergency response organisation notify air traffic control as soon as possible if there is a possibility that an incident may represent a hazard to aircraft in the area. Air traffic control can then issue warnings and instructions to aircraft in the vicinity of the fire. If required, the police can request that air traffic control create an air exclusion zone around a fire, to prevent unauthorised aircraft or drones (classified as a type of unmanned aircraft system by the General Civil Aviation Authority) from flying over, or near, the incident.

SECTORISATION

20. Understanding the span of control concept is important when managing a large amount of activity and information. Dividing an incident into sectors may support this by providing a clear reporting structure. Sectors should only be used if necessary and commanders should keep the structure as simple as possible. This is in order to reduce the possibility of barriers to the flow of information between personnel and the incident commander.
21. An incident commander may be able to effectively control small incidents without the need to implement additional command arrangements. If they can monitor tasks by moving around the incident ground, it is unlikely that sectors are needed.
22. However, operations often take place in more than one location during an incident, for example, at the front and rear of a building. This may result in the incident commander being unable to effectively manage operations and supervise safety, in which case sectorisation should be considered.
23. Sectors should be introduced when the demands placed on an incident commander are high. In these cases, it is essential to delegate responsibility and authority. This ensures that the level of command and safety monitoring is appropriate for all activities.
24. The incident commander should also consider appointing sector commanders to supervise personnel and command areas of operations if the scale of operations grows.
25. If an incident becomes more complex with a growing number of sectors in use, the incident commander may choose to appoint an operations commander. This is to manage the sectors and reduce the span of control for the incident commander. If the number of sectors grows, they may need to group the sectors under more than one operations commander. The all-hazards command approach is able to scale up to any situation as required.

26. Even when tasks are delegated, the incident commander remains responsible at all times for overall incident management. They should remain focused on command and control, the use of resources, incident planning and the co-ordination of sector operations.
27. To support sectorisation, fire and rescue services need to identify the roles likely to be performed in the command team. These will include the level of skills and appropriate responsibilities for each command role and function.
28. Personnel should be made aware of the various command team roles and functions in the host fire and rescue service and assisting fire and rescue services. It is important to take steps to ensure that the roles and functions are also understood by other agencies. Establishing joint working protocols with neighbouring fire and rescue services, and other agencies, may help to safely implement and effectively control sectorisation of a multi-agency incident.
29. Fire and rescue services should have appropriate arrangements, including resources and equipment, in place to record information at command points and in sectors. This may include command support teams, command boards and control units. Key information about the sectorisation should be recorded, including:
    - The tactical mode
    - Number of personnel working in the sector
    - Identified hazards and risks
30. Information recording may be happening at multiple locations; care needs to be taken to ensure critical information is recorded and retained.
31. The creation of sectors should only occur on the instruction of the incident commander to meet the demands of an incident. Sectors can apply to a defined area of a building, such as the vertical features of tall buildings, or to geographical features. Sectorisation at transport incidents can be more complex to define. Sectors can also be used to control functional areas, such as a safety sector. Unless there are exceptional circumstances, the use of sectors should follow the standard models.
32. Using this approach, the front of a simple aircraft is Sector 1. Progressing in a clockwise direction, Sector 3 is normally at the rear. Sector 1 could also be the main scene of operations if this is not the front. Where this is the case, all personnel should be made aware
33. This will ensure consistency at major or cross-border incidents where crews attend from two or more services. A plan showing demarcation of sectors at the command point can be useful for briefing purposes.

FOUR SECTORS

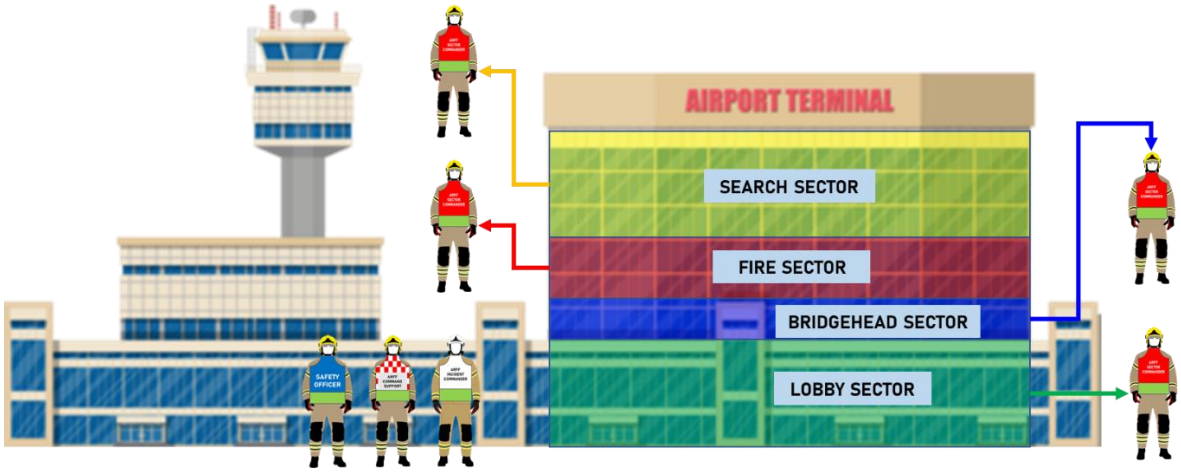


34. There may be some aircrafts, buildings or environments that do not suit the standard model. In these cases, it is important to designate the sectors carefully. There needs to be a good understanding of the physical boundary and operating parameters, and this should be communicated to avoid confusion.

VERTICAL SECTORS

35. The standard model of Sector 1 being the main scene of operations would be difficult to use in some situations for example, in a multi-storey building or structure where operations are over several levels. The vertical sector model is used to maintain effective spans of control when sector commanders are remote from their scene of operations.

36. Sectorisation should take account of the restrictions of operating in an environment where the fire floor is a barrier to accessing the areas above. The entire area above the bridgehead should be considered a hazard area in a tall building.



37. It may only be necessary to operate a single operational sector internally, with firefighting and support sectors operating outside. More than one internal sector may be required at an incident where a large number of personnel are firefighting, searching, or ventilating; this is to ensure that the commander's span of control is not exceeded. The zones of activity within the structure, for example, internal firefighting operations, should be identified using the following examples.

FIRE SECTOR

38. This is an operational sector and would be the main area of firefighting and rescue operations. It consists of the floors from the bridgehead to the fire, the floors directly involved in fire, plus one level above. The fire sector commander will, on most occasions, need to be located at the bridgehead directing operations.

BRIDGEHEAD

39. This is normally two floors below the fire floor, provided they are clear of smoke. It is a location rather than a sector on its own. If the distance from the ground floor lobby to the bridgehead is more than two or three floors, and spans of control require it, the use of a lobby sector should be considered.

SEARCH SECTOR

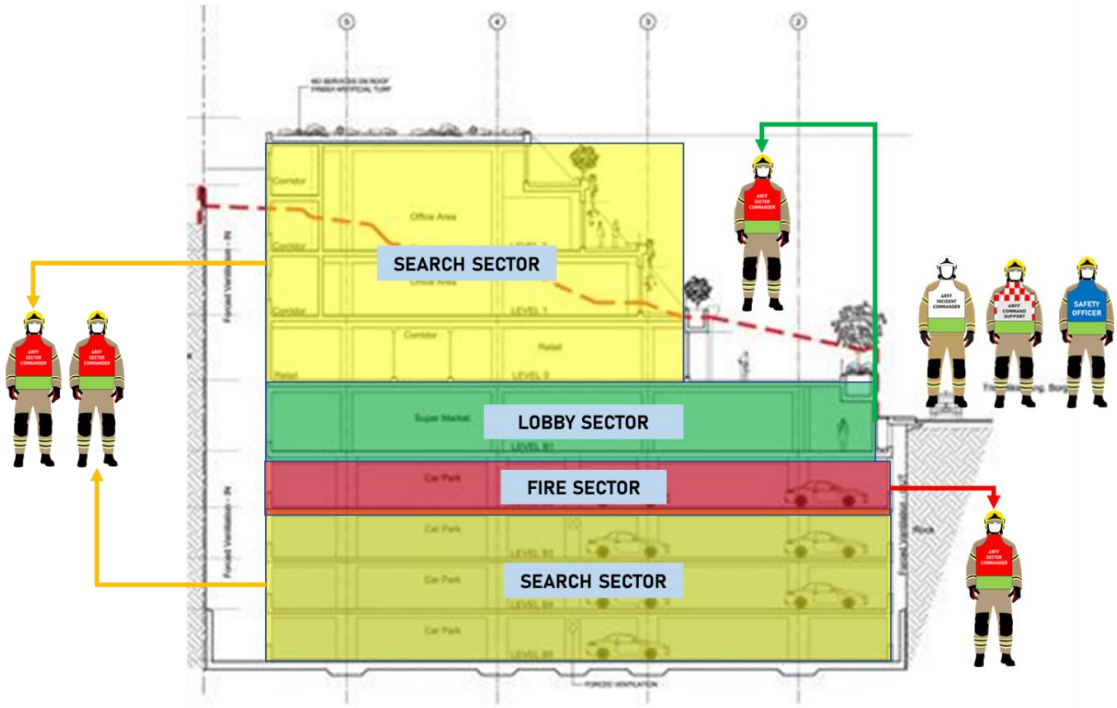
40. This is an operational sector and is located above the fire sector where search and rescue, ventilation and other operations are taking place. Where possible, the search sector commander should be located at the bridgehead with the fire sector commander. If this is not possible, they should be located one floor below the bridgehead, or where not practical, the nearest suitable alternative location.

LOBBY SECTOR

41. This is a support sector and would cover the area of operations from the ground floor lobby to the bridgehead. The lobby sector commander will act as the co-ordinator of all the logistics needed by the fire sector commanders and search sector commanders. The lobby sector commander would also co-ordinate all operations beneath the bridgehead, including salvage and ventilation. The lobby sector commander is normaly located at the building access point.
42. This system of sectorisation provides for flexibility. There may be times when other approaches are needed. For example, it may be necessary to have more than one sector per floor in a complex building, or a tall building may require two fire sectors, each with its own bridgehead.

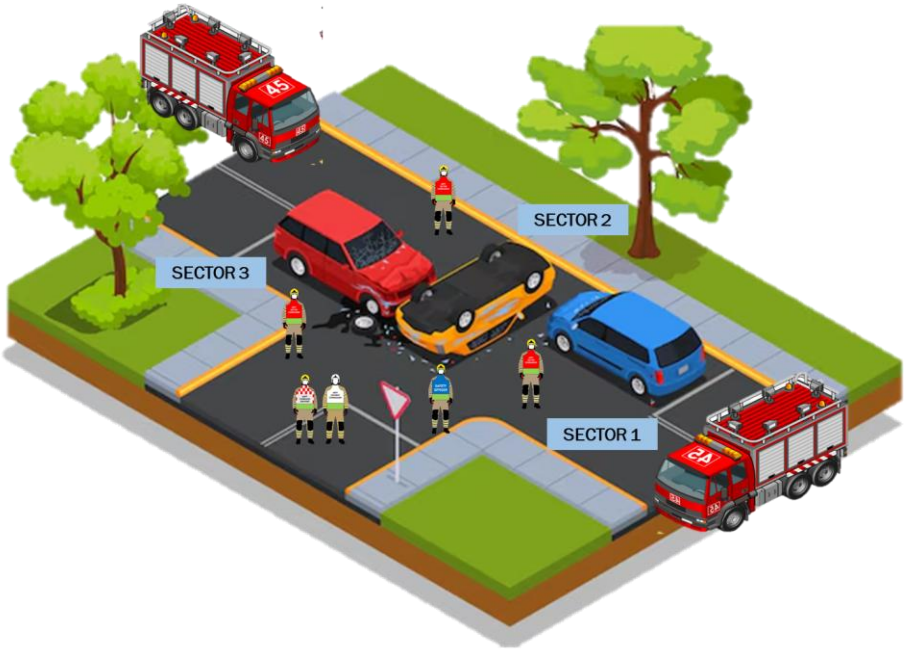
These may be operating in different stairwells with an operations commander co-ordinating from the lobby area.

43. These principles can be applied to other situations where vertical, internal sectors are necessary, for example at basement fires. In this case the search sector may extend above and below the fire, and the lobby sector may be located outside the building.



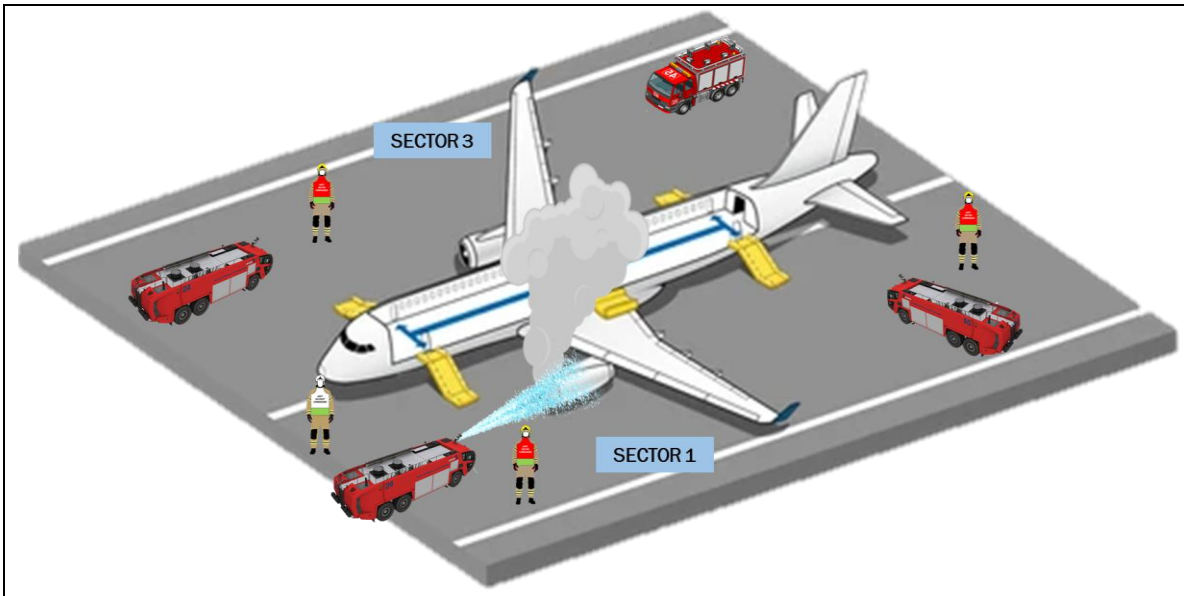
44. Below are some examples of sectorisation that can be applied in different emergency scenarios:

SECTORISATION FOR ROAD TRAFFIC COLLISION

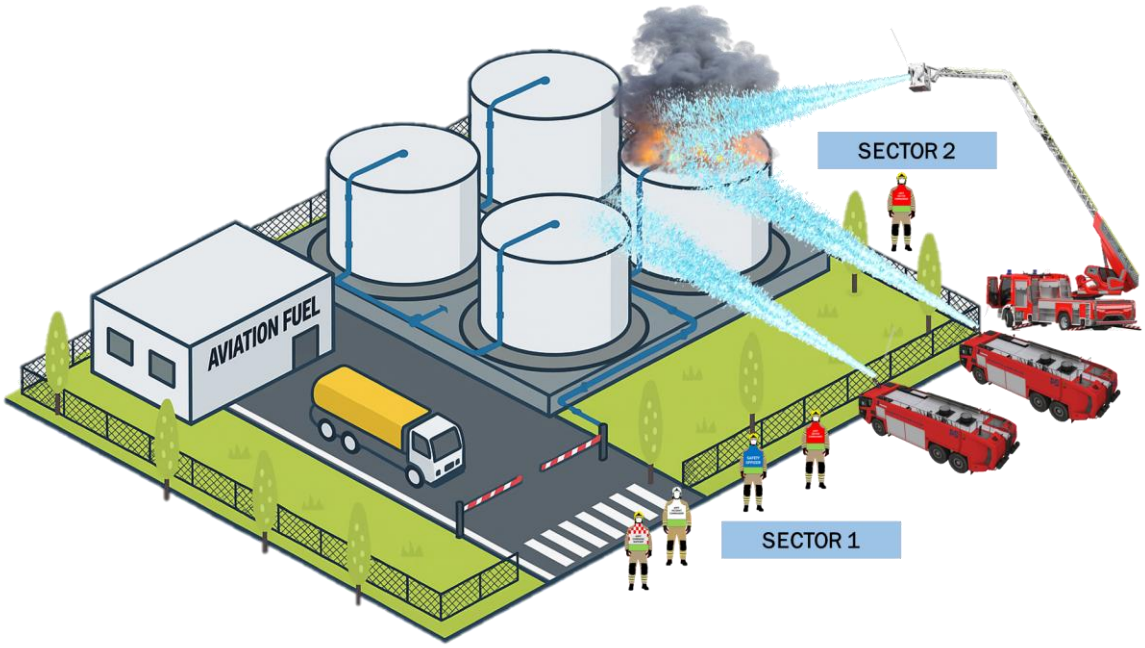


SECTORISATION FOR A CABIN FIRE IN AN AIRCRAFT

SECTORISATION FOR AN ENGINE FIRE IN AN AIRCRAFT

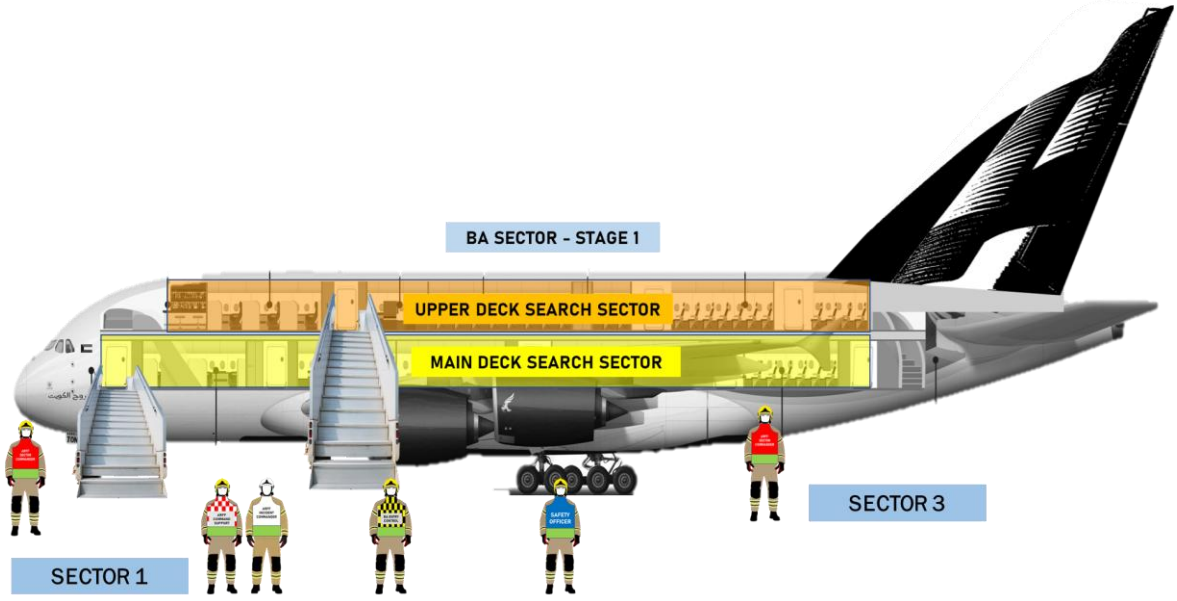


SECTORISATION FOR AVIATION FUEL TANK FIRE AT AN AIRPORT



SECTORISATION FOR A HAZMAT LEAK INSIDE A CARGO AIRCRAFT

SECTORISATION FOR INTERNAL SEARCH AND RESCUE IN AN AIRCRAFT



ROLES AND RESPONSIBILITIES

45. Operations on the incident ground should be well-organised and controlled. The incident command system provides the commander with a clear framework to help structure, organise and manage an emergency. It can be adapted to all sizes and types of incident and helps commanders to deploy and use resources in an efficient and safe way.
46. The incident command system is a scalable and flexible all-hazards approach to operational management and organisation. The system's design helps a commander manage and achieve their plan. It encourages a controlled and systematic approach to resolving incidents.

47. It is not the incident command system which achieves this outcome. It is how the commander uses it in support of their decision-making, together with their application of sound aerodrome emergency response organisation techniques. The incident command system will only be successful when applied with good command skills.
48. The incident command system allows the commander to use health and safety arrangements, including operational procedures, and tailor them to an incident and its objectives. This helps to achieve a balance between risk and benefit. See the firefighter safety maxim.
49. Commanders should be aware of becoming overburdened and having too broad a span of control. This can lead to ineffective leadership, poor decision-making and poor communications. Commanders should consider the issues of team dynamics to get the best from their team. See Operational team effectiveness.
50. Commanders should apply the incident command system at every incident, and it should be familiar to all personnel. At larger incidents, many aerodrome emergency response organisation personnel will be operating under this nationally recognised system of work. Using common language and components prepares Aerodrome emergency organisation for local, cross-border and national incidents.
51. The incident commander at an incident is the nominated competent and responsible person. On attendance of a more senior officer at an incident, they should assess the existing operational plan and priorities. They will need to review the current risk assessment and the incident plan. This assessment forms part of the command process and will help them to decide whether to take over command or to take on another role, for example:
    - Operational assurance
    - Active incident monitoring
    - Providing tactical advice
    - Mentoring
52. The most senior officer present holds organisational accountability, even when they have not taken the role of incident commander. This cannot be passed to another person.
53. Some factors which influence aerodrome emergency response organisation policy on transferring command include:
    - Service resource levels
    - Geography of the service
    - Organisational structure

54. When command is handed over, there should be a structured transfer with a formal acknowledgement. This should be communicated to all personnel including fire control rooms. This is equally as important when an incident scales down, when a more junior commander may take over the remaining tasks. For the incident command system to work well, commanders and other key roles should be clearly identifiable.
55. It is important that command personnel:
    - Are sufficiently trained
    - Are familiar with policies and procedures
    - Have the necessary competencies for their role
    - Demonstrate effective command skills
    - Are confident in their ability
    - Know who they are responsible for
    - Know who they need to report to
    - Know what their operational brief is

THE ROLE OF THE INCIDENT COMMANDER

56. The incident commander has overall responsibility on the incident ground. In order to resolve an incident assertively, effectively and safely they should:
    - Command and control the incident
    - Identify hazards and manage risk
    - Assess resource requirements
    - Determine an incident plan
    - Co-ordinate and deploy available resources
    - Evaluate progress against the plan
57. There are common elements to all incidents. Where they differ, incident commanders will need to adapt their actions using their experience and knowledge. They will need to consider the hazards they face and the resources available to deal with them.
58. It is vital for the incident commander to have accurate situational awareness. This will allow them to make early decisions, develop an incident plan and commit resources. On arrival at an incident the incident commander will carry out an immediate evaluation, including a Dynamic risk assessment.

59. As soon as time permits commanders should conduct a detailed assessment of the situation. They should use the decision control process (DCP) to help set objectives and organise their actions.
60. Throughout the incident, the commander should ensure a suitable and sufficient risk assessment is in place and is regularly updated. They should ensure control measures are in place and any significant findings recorded. Incident command becomes more complex with greater scale and duration. An individual cannot be expected to manage and control all aspects of command on their own at a larger incident. It is important for the incident commander to create an appropriate command structure. This may include:
    - Setting appropriate reporting lines
    - Delegating levels and tiers of authority and responsibility
    - Agreeing spans of control for each commander
    - Establishing what role the outgoing incident commander will take to maximise their situational awareness
61. Effective communication is important at all incidents. Accurate information has to pass between the incident commander and all persons on the incident ground. A thorough briefing of crews should take place before deployment. Crews need to know which tactics the commander wants to use, as well as sharing safety critical information. Without such briefings there is the potential for crews self-deploying or operating outside the incident plan.
62. Incident commanders should be aware of activity and developments on the incident ground and have a responsibility to ensure messages and information pass to the fire control. This ensures a record is maintained that captures an accurate picture of an incident.
63. Care should be taken not to create a ‘command gap’ because the incident commander is unavailable. This could be because they are undertaking a survey of the incident ground, or because they are in a briefing. The incident commander can mitigate this, for example, by being available by radio.
64. The incident commander should establish effective arrangements for communication are in place to ensure a good flow of information is maintained.
65. An incident commander should make sure that they can:
    - Gather and share information
    - Issue instructions to personnel
    - Receive situation reports from all areas, including sector commanders
    - Assess and provide for the needs of other agencies

66. Incident commanders may hold briefings en route to an incident. On arrival they should carry out a risk assessment and add this to the briefing.
67. The extent of the briefing will depend on the type, size and complexity of the incident. For example, the pre-briefing for small fires may be straightforward. Where personnel have little experience of the type of incident, or there is high risk, a more comprehensive brief may be appropriate.
68. It is also important to debrief personnel that have withdrawn from a working area during an incident. Debriefs are a good source of safety information and this should not be overlooked.
69. The incident commander should ensure there are clear communications with sector commanders. This is critical to maintaining situational awareness.
70. The incident commander needs to gather information, issue instructions and receive situation reports. They also need to assess the needs of other agencies and plan to meet them. They should establish suitable arrangements for communications.
71. These tasks will usually be the role of command support, under the guidance of the incident commander, in order to:
    - Establish communication links with the fire control room
    - Ensure radio channels and call signs are correctly assigned
    - Establish communications with other agencies
    - Establish communications with sector commanders and receive regular situation reports
    - Ensure sector commanders can communicate between themselves
    - Make use of site-specific communication systems; some complex buildings and structures, including those extending underground, have communication systems installed for use by emergency services

LEVELS OF COMMAND

72. There are four agreed levels of command qualification for aerodrome emergency response organisation operations:
    - Level 1 – Initial
    - Level 2 – Intermediate
    - Level 3 – Advanced
    - Level 4 – Strategic

ASSUMING COMMAND

73. Ongoing commanders should review the tactical priorities and command structure in place, are appropriate for the requirements of the incident.
74. When command of an incident changes it should be disciplined and formal. In every case a clear and precise exchange of information should be undertaken to confirm the status of the incident or sector, before assuming command or delegating responsibility. It is the responsibility of the person handing over command to ensure that all relevant information is provided. The best method of transferring command is through face-to-face briefings between the outgoing commander and the incoming commander. The following should be considered when taking over command:
    - The rationale for taking over
    - Whether the incoming commander has sufficient situational awareness or requires additional information
    - Whether to confirm or amend the plan according to the agreed operational priorities and objectives, risk assessment and tactical mode
    - Ensuring safe systems of work are in place and maintained
    - Checking resources are sufficient and deployed to match the tactical priorities
    - Reviewing communications, to include other emergency responders
    - Whether the command structure is appropriate
75. Personnel at the incident, the designated control point and the fire control room should be informed of the change of incident commander. Clear demarcation of the transfer of command is provided by the incoming commander using the agreed fire and rescue service's terminology.
76. The degree of control an incident commander needs to maintain may depend on the size and demands of an incident. In addition to the normal command team role, at larger incidents they may assign specific areas to appointed officers. These may include:
    - Marshalling
    - Breathing apparatus sector
    - Hazardous materials or environmental protection
    - Water management
    - Foam management
    - Management of reliefs including crew rehabilitation and welfare
    - Communications
    - Media liaison

RESPONSIBILITIES OF THE INCIDENT COMMANDER AT LEVEL 1 - INITIAL

77. Command and control of operations at a task-focused supervisory level at an incident.
78. When the incident commander arrives at an incident scene, their aim is to save life, protect property and the environment. In doing so, they will have a range of information to consider. This will become even more complex and difficult if the incident escalates. The incident command structure should be introduced at the earliest opportunity. This includes command support and any additional functions to support operations at the scene.
79. The incident commander should establish a Forward Command Post (FCP) at the incident scene and may need to access technical advice to help them make decisions and set tactical priorities.
80. Commanders should consider interoperability if a joint and co-ordinated approach is required. They should have the capability to declare a major incident and communicate a M/ETHANE message, to provide information to their own and other agencies if required.

RESPONSIBILITIES OF THE INCIDENT COMMANDER AT LEVEL 2 – INTERMEDIATE

81. Command and control of operations at a tactical middle manager level.
82. On the arrival of a more senior officer, they should decide if the existing incident commander should remain in charge. This decision should include assessing whether the existing incident commander is sufficiently capable to remain in that role, based on the type, size and complexity of the incident.
83. Following the initial actions of Level 1 commanders, Level 2 tactical commanders should maintain the primary aims to protect life, property and the environment. Aerodrome emergency response organisation tactical commanders are usually located at the scene and should establish the tactical priorities. Tactical commanders should review whether the command structure in place is appropriate for the requirements of the incident.
84. Where required, tactical commanders should establish an Emergency Operations Centre (EOC) to ensure there is co-ordination between agencies. For further information refer to Levels of command and control at multi-agency incidents.
85. The use of tactical advisers should be considered to provide specialist advice and support.

RESPONSIBILITIES OF THE INCIDENT COMMANDER AT LEVEL 3 – ADVANCED

86. Tactical command at the scene of a large and serious incident. There is a requirement for tactical co-ordination and of having reached the stage of using a developed command support and a full incident command system structure.

87. On the arrival of a more senior officer, they should decide if the existing incident commander should remain in charge. This decision should include assessing whether the existing incident commander is sufficiently capable to remain in that role, based on the type, size and complexity of the incident.
88. Large and serious incidents have a potential impact on the community and the resource availability for a aerodrome emergency response organisation and its partners.
89. As the tactical commander will usually be in place before the strategic commander, they should determine and communicate priorities, ensuring these are reviewed once strategic command has set a strategy.
90. When the emergency operations centre (EOC) has been established, the tactical commander will interpret strategic direction, and where appropriate tactical parameters, by developing and co-ordinating the tactical plan. For further information refer to Levels of command and control at multi-agency incidents.

RESPONSIBILITIES OF THE INCIDENT COMMANDER AT LEVEL 4 – STRATEGIC

91. The strategic commander often leads a service in multi-service operations such as major incidents. In most circumstances, they operate remotely from the scene and do not directly oversee activity at the incident ground, taking a longer-term view of the incident response and recovery.
92. Strategic command is associated with commanding remotely or within a Crisis Management Centre (CMC). A Level 4 incident commander is responsible for the wider strategic considerations, which include:
    - Protecting life, property and the environment
    - Establishing policy and, if necessary, providing guidance and parameters for tactical commanders
    - Continuity of operations provision:
        - If appropriate, securing strategic resources in order to resolve the incident and prioritising the allocation of resources
        - Identifying and establishing appropriate resources, communicating availability and limitations appropriately
        - Prioritising requirements of multiple incidents and allocation of resources, maintaining operational resources across their service
    - Reviewing and ensuring the resilience and effectiveness of the command team
    - Chairing a CMC meeting

- Developing and agreeing a set of strategic objectives with partner agencies
- Providing response to government
- Local and national resilience
- Agreeing a media strategy
- Business continuity
- Public health
- Planning beyond the response phase for recovery and a return to normality
- Considering issues that have affected intraoperability or interoperability
- Supporting debriefs and shared learning through Joint Organisational Learning (JOL)

TECHNICAL OR SPECIALIST SUPPORT

93. The incident commander may need to access technical advice to help them make decisions and set tactical priorities. Any person providing technical or specialist support attends an incident to provide assistance; the incident commander remains in charge, with the overall responsibility for decision-making and the incident plan.
94. If personnel are working on technical or widespread operations, specialist support sectors may assist them. Examples of technical or widespread operations include the National Resilience capabilities of high-volume pumping (HVP), mass decontamination (MD) or urban search and rescue (USAR).

TACTICAL ADVISERS

95. Tactical advisers (TacAds) can be used at any size of incident; at more complex incidents, several advisers may be used by emergency services.
96. If advisers are deployed by more than one emergency service it may assist with effective communication between responders. There should be a common understanding of risks, hazards and tactics to inform the overall plan for resolving the incident.
97. For more information about the deployment of TacAds and their fields of specialism, refer to the Incident command guidance: Specialist advice.

THE COMMAND TEAM

98. The command team comprises the incident commander and any other personnel that are operating in a commanding role, for example, command support, operations commanders and sector commanders.
99. Aerodrome emergency organisation will have different approaches towards deciding which roles and functions form part of the command team. However, the main aim is to enable clear

communications and decision-making between the incident commander and those performing operational tasks.

100. It is important to keep the span of control for tactical roles as narrow as possible. Personnel should not have so many aspects to consider that they cannot give them enough attention. The incident command system provides a structure which maintains manageable spans of control.

101. The system provides for additional roles within the incident command structure. This reduces the burden on the incident commander. The command team concept can also be applied to operations command, sector command, and functional command support activities.

102. Incident commanders need to maintain open and effective communications. Examples include direct or indirect reports from individuals, crews or sectors. Other parties will also be communicating; other emergency services, responding agencies and fire control rooms. When assessing the span of control, the incident commander should consider how to manage communications and the pressure this may create.

103. It is important to limit direct communication and information flows to manageable levels. Spans of control should ordinarily be limited to five lines of direct communications; this may be excessive if these channels are intense and active.

104. At all incidents a command support function should operate. This should be scalable depending on the type, size and complexity of the incident to assist an incident commander to manage reporting lines. It can ensure that critical information and advice reaches the right people on the incident ground, in a timely manner.

105. The specific arrangements vary with the circumstances of the situation and the stage of the incident. The command team approach offers an incident commander the means of managing complex situations. It creates a team of commanders working together who can function better than an individual.

106. An incident commander may be able to manage and oversee small incidents on their own. Once there are a number of personnel present, the incident commander should consider appointing sector commanders to supervise them.

107. If an incident becomes more complex, with a number of sectors in use, the incident commander may choose to appoint an operations commander. This role will manage the sectors and reduce the span of control for the incident commander. If the number of sectors continues to grow, they may need to group the sectors under more than one operations commander. The system is able to scale up to any situation as needed.

108. Despite delegating responsibilities, the incident commander is responsible at all times for the overall incident management. They should focus on the command and control, the use of resources, incident planning and the co-ordination of the sector operations.

COMMAND SUPPORT SYSTEMS

109. Command support and its related support sectors are critical to resolving incidents. An incident commander cannot manage a complex and rapidly developing incident alone. Effective and structured support systems that can vary with the size and demands of an incident need to be implemented.

110. Aerodrome emergency organisation will have different approaches to the roles and functions that make up the command support team. The aim at every incident is to ensure clear communications and decision-making between the incident commander and personnel. Some of the command support functions may be at locations remote from the incident. This is particularly the case at major or multi-agency incidents, or where multiple incidents are occurring, for example, during wide-scale flooding. See Joint decision-making.

111. The incident command system and command support arrangements described in this foundation material provide a framework to assist the incident commander. This in turn helps the incident commander to organise and deploy available resources in an assertive, effective and safe way. To achieve this, it is important that everyone understands the different roles and responsibilities in the command support function. This helps maintain common expectations which feed into shared situational awareness.

112. It is important that personnel who work as part of command support are competent to do so. Some tactical adviser roles have accredited courses and qualifications, such as national inter-agency liaison officer (NILO) and hazardous materials adviser (HMA). For other roles there may not be recognised qualifications, such as command unit operator or marshalling officer.

113. Aerodrome emergency organisation should consider the degree of training required for each role. They should consider how they will train personnel to acquire, develop and maintain appropriate skills and competencies. Skill development should be based on the risk profile for an area. The training requirements for different officers will vary depending on their role.

114. Aerodrome emergency organisation will also need to consider the scale of an incident they expect personnel to deal with. Command support at a small incident will have different requirements to a similar role at a more complex incident.

115. Personnel with roles in specialist vehicles and major incident rooms should have the appropriate competencies, for example to use specialist equipment. Services will need to make sure they have systems to record training, assessment and exercises for these personnel.
116. Command support should be used at all incidents to help the incident commander manage an incident. It should be put into place as soon as is practically possible. The importance of establishing command support in the early stages of an incident cannot be over emphasised. A suitably experienced member of personnel should be nominated to operate command support.
117. An effective command support system and equipment are required to support incident commanders. Each aerodrome emergency response organisation will need to decide what to provide and how to achieve this.
118. Guidance for establishing the command support function is provided in Incident command: Command support.
119. Incident commanders should collect clear, concise and accurate information as fast as possible to help them make decisions. They should make sure they provide appropriate information to other decision makers. This is an important factor affecting the outcome of an incident. Command support will use the information to support planning and brief relevant parties.
120. Suitable management information systems should be provided to help the command support officer and their personnel carry out their role. Providing risk-critical information and site-specific plans at an incident is essential to planning and ensuring safe operations. A lack of risk information, or not passing on information, can have a significant impact on command decision-making. Several incident investigations have identified this as a contributing factor.

SCALABLE COMMAND ARRANGEMENTS

121. Managing and supervising personnel on the incident ground is an essential part of the safe system of work used by the fire and rescue service.
122. The incident command system is a framework that assists with the management of resources at an incident. The incident commander may delegate responsibility for operational tasks and functions, but they remain accountable for health and safety at an incident. The most senior officer present always holds organisational accountability, which cannot be passed to another person.

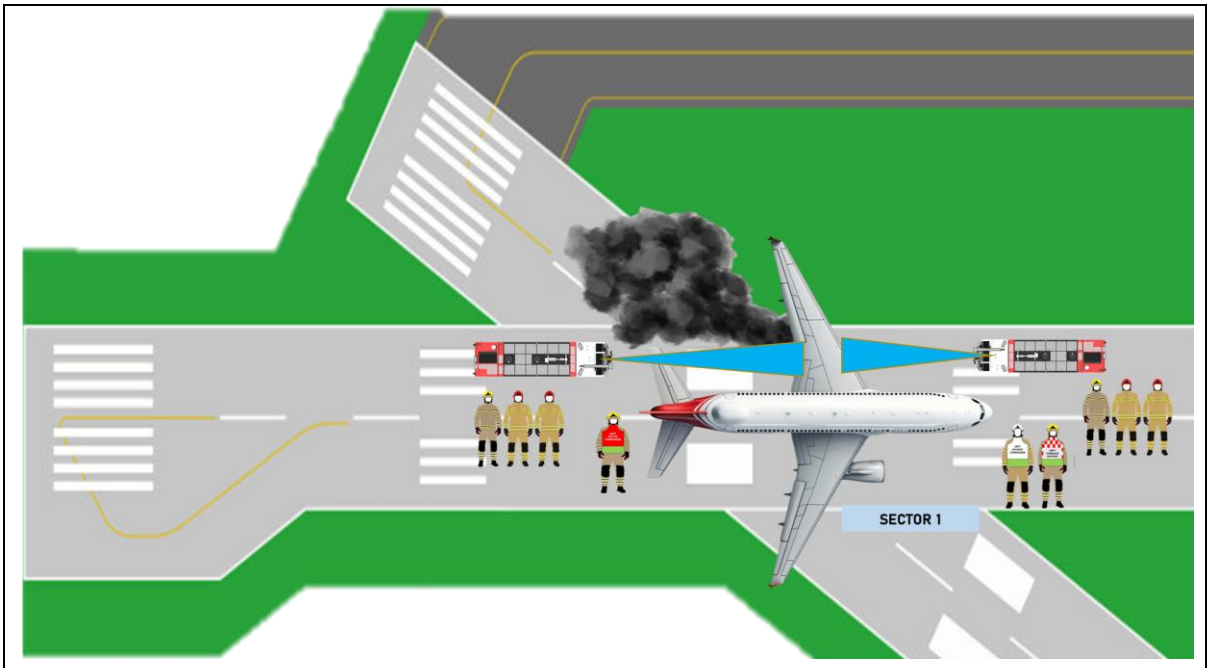
123. The incident command system reduces spans of control to a manageable level and improves control and communications. Taking these steps may protect the incident commander from becoming overloaded with information. It also supports effective situational awareness and decision-making. This way the incident commander can maintain control under conditions of stress and rapid change.

124. For the incident to be resolved safely, effectively and efficiently, the principles of the incident command system are:

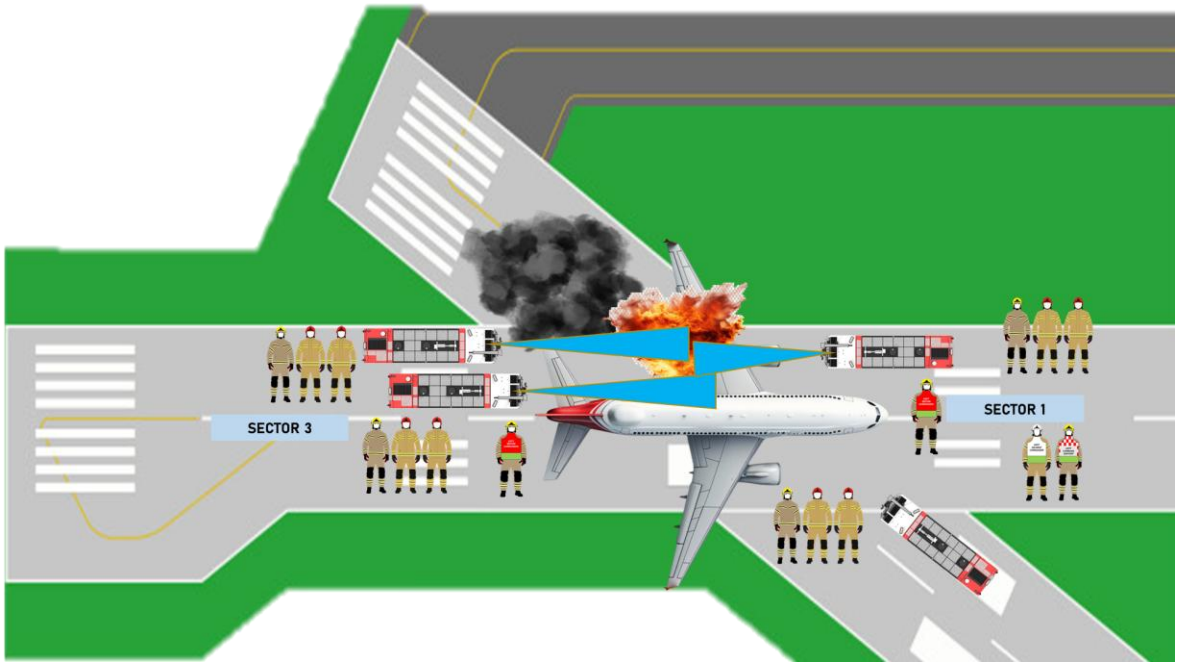
Clear, defined and visible lines of command	Manageable spans of control of commanders	A communications infrastructure
Clearly defined and understood roles and responsibilities	Appropriate responsibility and authority	Sectorisation of the incident

125. Understanding the 'span of control' concept is important when managing a large amount of activity and information. Dividing an incident into sectors provides a clear line of reporting. The table below shows an incident can be scaled up or down using operation commanders and sector commanders to ensure the span of control does not become too great for any member of the command team. The following pictures show how the command structure and sectorisation methodology can be used to keep individual spans of control to an acceptable level.

TWO PUMP INCIDENTS

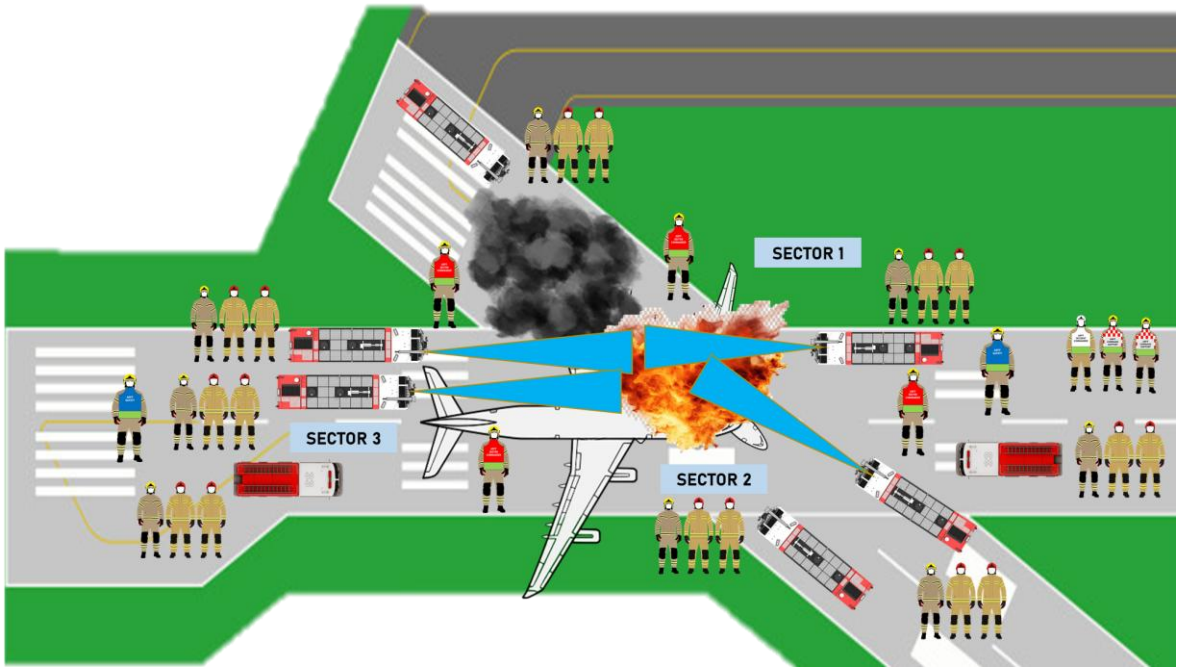


FOUR PUMP INCIDENTS

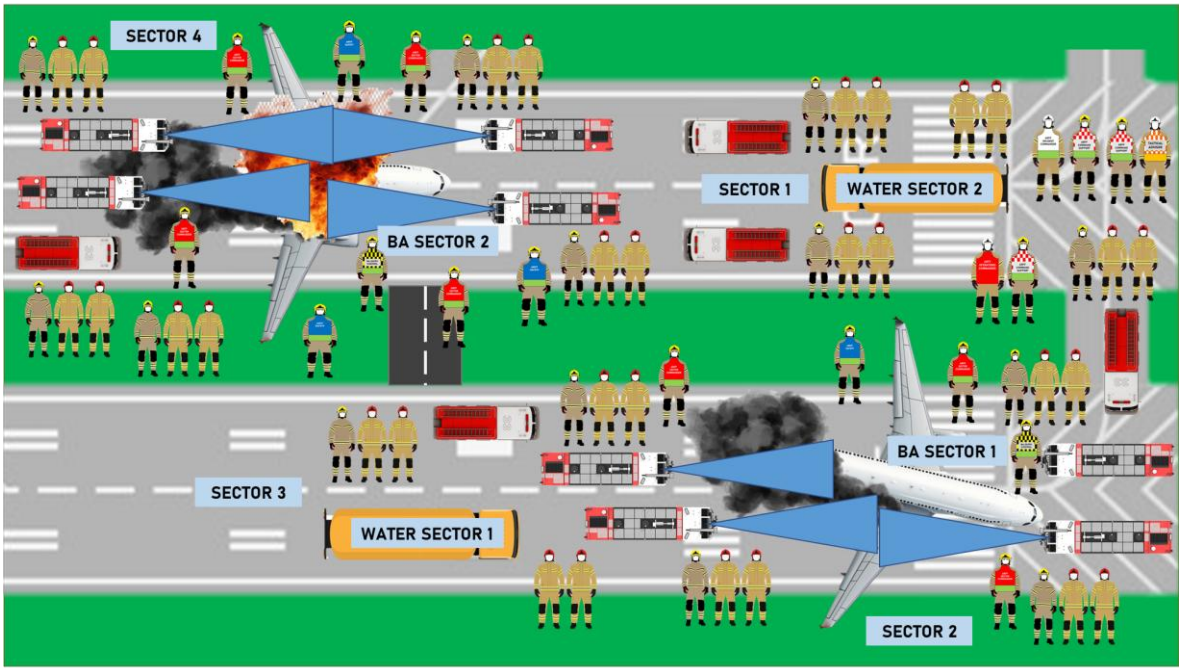


FIVE PUMP INCIDENTS

EIGHT PUMP INCIDENTS



15 PUMP INCIDENTS



126. The incident commander should anticipate the likely scale and complexity of an escalating incident and develop the necessary command structure at the earliest opportunity.

SECTOR COMMANDERS

127. A sector commander may be appointed to be in charge of a defined physical, geographical or functional area of operations. The role of the sector commander is to command resources within their sector.

128. The sector commander will report to the incident commander, operations commander or command support. They will take responsibility for the resources and the achievement of objectives within their sector. The sector commander will mainly focus on implementing the incident plan, effective command and control, resource deployment, and operational activity. They have control on how they are going to meet their objectives agreed with the incident commander. They need to set priorities and objectives for their sector, working within the incident commander's overall objectives and incident plan. Importantly, they will focus on the health and safety of their personnel.

129. Despite having control of resources within the sector, any change in tactical mode should have the explicit acceptance of the incident commander or operations commander. This applies except if they need to withdraw people from a hazardous area. In such a case they should tell the incident commander as soon as is practical and update the tactical mode.

130. However, if a rapid change in circumstances occurs, the sector commander should revise the risk assessment. There may be occasions when they need to act first in the interests of safety and then inform the incident commander of their decision.
131. Sector commanders provide direct and visible leadership. They should be in direct communication with personnel in their sector, and remain available to the crews they are responsible for and ensure shared situational awareness. The progress of operations in each sector should be communicated to the incident commander or operations commander. The officer assigned to command a sector should adopt the incident ground radio call sign for that sector, for example 'sector one commander'.
132. There are times when an incident commander may require a sector commander to leave their post. This might be for a briefing or another purpose. They should be replaced by someone with appropriate competence and authority to maintain continuous supervision. Personnel operating in the sector need to know about this change. This prevents the creation of a command gap. When there is a change in sector commander, personnel in the sector, together with the command team and the fire control room, should be notified of these changes.
133. It is good practice for sector commanders to have their own command support resource to help them manage their sector. This will depend on the size and nature of an incident, but is particularly the case for large incidents.
134. Sector commanders should have appropriate means of recording information, including:
    - Key risks and hazards
    - The tactical mode
    - Numbers of personnel operating within the sector
    - A means of accounting for personnel

OPERATIONS COMMANDER

135. The operations commander supervises and co-ordinates operations. This is to allow the incident commander to maintain a workable span of control. The operations commander is a member of the command team, operates on behalf of the incident commander, and can approve changes to tactical mode.
136. The operations commander should avoid becoming involved in activities other than operations, for example, command support, functional sectors or dealing with the media. This allows the operations commander to co-ordinate sector commanders to ensure that:
    - Operational activity is co-ordinated

- Support is offered
- Resourcing issues are addressed
- Risk assessments are performed at the right times to support the priorities and objectives
- Assessments are appropriately recorded and of the expected quality

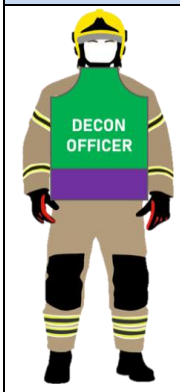
137. If an incident needs more than one operations commander to maintain the span of control, it is essential that their call signs can be distinguished. Sectors also need to understand exactly which operations command they fall within. If the facility exists, different incident ground radio channels can be allocated to each operations commander.

IDENTIFICATION OF COMMAND ROLES

138. The command team includes officers who have a variety of roles. It is important to make sure they can be easily identified using a commonly understood method. This is particularly important at cross-border or multi-agency incidents. The following are the suggested tabard configurations:

Figure: Incident command tabards

Incident commander	**Operations commander**	**Sector Commander**
Full white or white yoke and yellow body tabard	All red tabard	Red yoke and yellow body tabard
Command Support	**BA entry control operative**	**Safety officer**

Chequered red and white yoke with yellow body tabard	Full or half chequered black and yellow tabard	Blue yoke and yellow body tabard
Mass decontamination officer	**Tactical adviser**	
		
Green yoke and purple body tabard	Chequered red and white yoke with red body tabard	

M. INTRAOPERABILITY AND INTEROPERABILITY

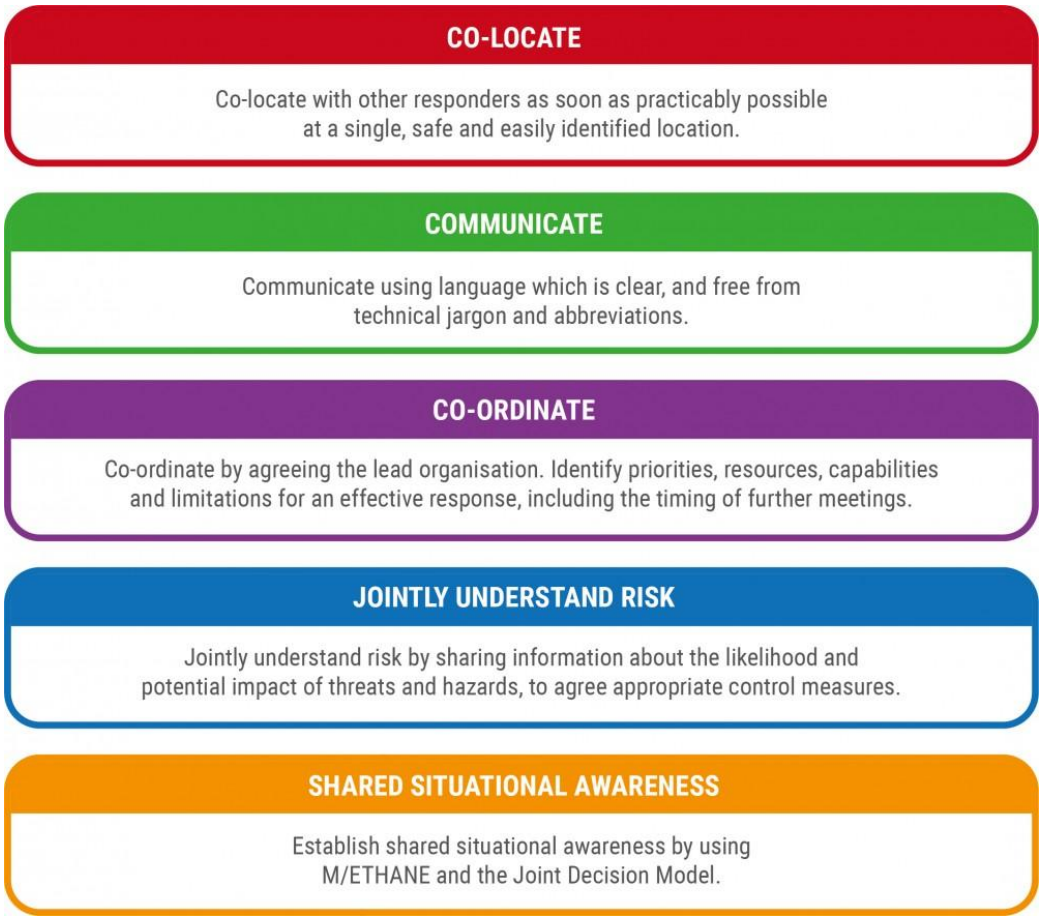
INTRAOPERABILITY

1. Intraoperability means the ability of an aerodrome emergency response organisation to work with other emergency services.
2. It is important that Aerodrome emergency organisation can provide an integrated response to local, cross-border and national incidents. This approach supports the principles of national resilience. It also promotes a better response at local and cross-border levels. In such situations, services need a mutual understanding of their resources and capabilities.
3. Aerodrome emergency organisations have had supporting arrangements for assistance between services for many years, some of which are based on legislative requirements.
4. For intraoperability, Aerodrome emergency organisation should have regular contact to ensure that appropriate cross-border plans are in place. They should test these plans under realistic

conditions. Joint training is also valuable and will help to find differences in terminology, policies or procedures to avoid confusion arising at incidents.

INTEROPERABILITY

5. Interoperability is defined as the extent to which organisations can work together coherently as a matter of routine.
6. Multi-agency interoperability is essential for incidents of all sizes. The Mutual-Aid Emergency Services Interoperability Plan aims to promote greater consistency across emergency services. This includes the use of key terms and common terminology. There is no legislation that states the primacy of one agency over another. The joint doctrine gives further guidance on co-ordination between emergency services.
7. The key principles of effective joint working are:



8. Shared situational awareness is important. At major or complex incidents, a more formal approach to planning and outcomes should be taken. All responding services should agree these using an approach aligned with the MAESIP Joint Doctrine Interoperability Framework, the MAESIP Joint Decision Model.

9. Commanders should be well versed with the MAESIP doctrine. It is particularly important that they are familiar with the Joint Decision Model.

LEVELS OF COMMAND AND CONTROL AT MULTI-AGENCY INCIDENTS

10. At a multi-agency incident, agencies may use three levels of command and control:

11. These levels relate to roles not rank; the titles do not represent seniority, but instead provide the function of that person or group.

12. It is important that officers understand the levels of command and control, and can be flexible in using them. The following table shows how the four aerodrome emergency response organisation levels of command map to the three multi-agency levels of command and control.

		Multi-agency level of command and control		
		Operational (at scene)	**Tactical (remote)**	**Strategic (remote)**
Aerodrome emergency response organisation level of command	**Level 1 – Initial**	✓		
	Level 2 – Intermediate	✓	✓ (reflecting organisational policy and MAESIP)	
	Level 3 – Advanced		✓	
	Level 4 - Strategic			✓

OPERATIONAL

13. The operational commander will control and deploy the resources of their respective service within a functional or geographical area and implement direction provided by the tactical

commander. As the incident progresses and more resources attend the scene, the level of supervision will increase in proportion.

TACTICAL

14. The tactical commander will be located where they can maintain effective tactical command of the operation. Invariably the aerodrome emergency response organisation incident commander will be in attendance at the scene. If a Tactical Co-ordinating Group (TCG) is established, either the incident commander or a nominated liaison officer should attend meetings. The TCG may be located remote from the incident.

STRATEGIC

15. The strategic commander in overall charge of each service is responsible for formulating the strategy for the incident. Each strategic commander has overall command of the resources of their own organisation, but will delegate implementation decisions to their respective tactical level commanders.
16. The aerodrome emergency response organisation ordinarily structures incidents without using strategic command. However, if agencies form a SCG or RRP, the aerodrome emergency response organisation should structure the levels below as Tactical and Operational.
17. Depending on the circumstances, different emergency services may choose to command from different locations. The aerodrome emergency response organisation incident commander may choose to command from an established command location at or near to the scene of operations.
18. If aerodrome emergency response organisation representative is required to attend a meeting at an off-site command location, this should be either the incident commander or a nominated member of the incident command team. The designation and responsibilities of command reside with the on-scene incident commander.
19. The person attending an off-site meeting needs to be empowered to make decisions on behalf of their service. If the command authority remains on-scene, communication between the two service representatives needs to be robust.
20. Incident commanders should be aware that when working with military personnel they use the terms operational and tactical in the reverse of the aerodrome emergency response organisation incident command system.

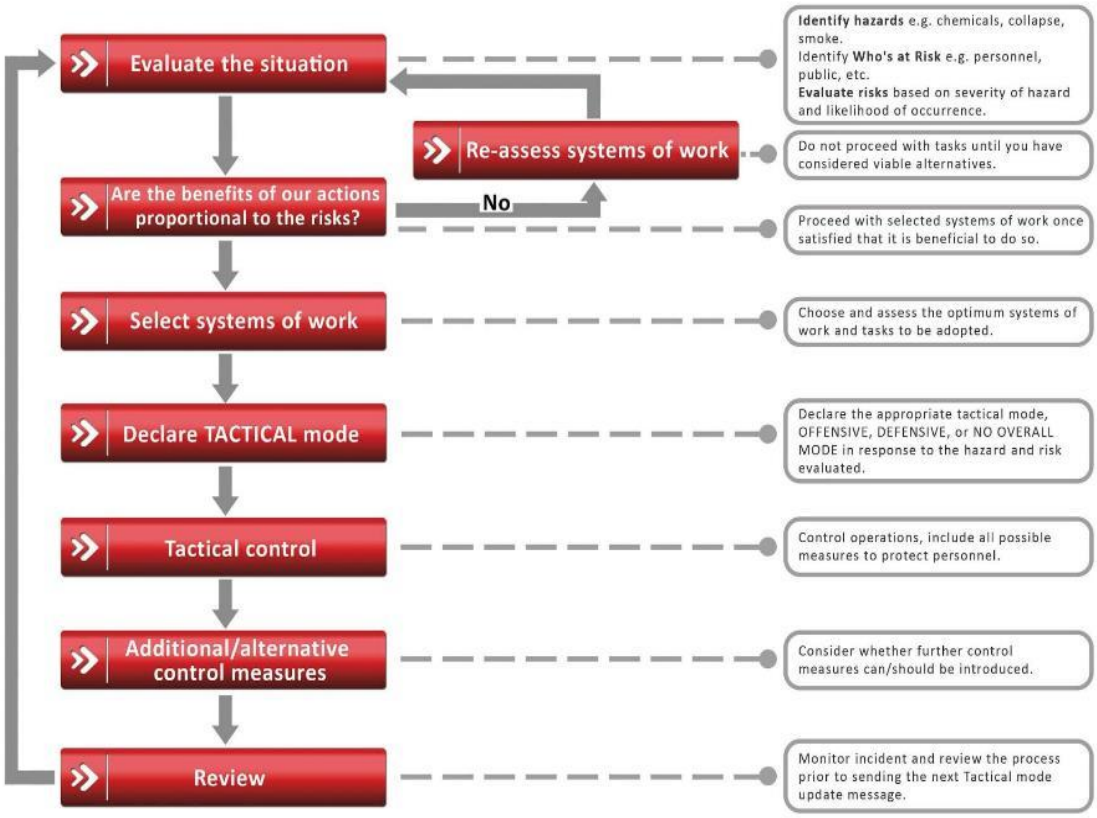
N. RISK ASSESSMENT

1. The aerodrome emergency response organisation operates within a framework that uses trained personnel, safe systems of work and specialist equipment. The incident commander should reduce risks as far as reasonably practicable.

INDIVIDUAL RISK ASSESSMENT

2. Individual risk assessment helps personnel remain safe when working unsupervised. There will be circumstances where personnel may encounter unexpected or unforeseen situations. Individual risk assessment is the process a firefighter carries out to identify hazards and determine the level of risk they will accept. The outcomes of an individual risk assessment inform and influence their decisions.

DYNAMIC RISK ASSESSMENT



3. Dynamic risk assessment (DRA) describes the assessment of risk in a rapidly changing environment at an incident where decisions are sometimes made in fast-moving situations, with incomplete or inaccurate information. It is a process not a control measure. The outcome of the DRA will contribute to the incident plan. It helps to inform whether personnel should be operating in the hazard area, which in turn determines the tactical mode.

4. DRA is the continuing assessment of risk in a rapidly changing environment at an incident. It is a process of quickly determining the nature of the risk and what the response should be. It confirms the response is appropriate by taking into account the benefit and risk. This assessment should determine the reasonably practicable measures which should be taken to manage the risk.
5. The person undertaking the DRA should also apply the statutory requirements for risk assessment, which will assist the incident commander in making informed decisions.

1. EVALUATE THE SITUATION, INCLUDING DECIDING WHO MIGHT BE HARMED AND HOW

To identify hazards and suitable control measures the incident commander will first need to consider:

- Operational risk information available from site visits, fire safety plans, standard operational procedures and crews on scene
- Information available from the owner or responsible person at the scene
- The nature of the tasks to be carried out
- The significant hazards presented by the incident
- Who might be harmed and how, based on the risks presented to:
    - The public, including casualties
    - Personnel
    - Other emergency responders
    - The environment
- The resources that are available, for example, competent personnel, appliances and equipment, specialist advice.

2. BENEFITS OF ACTIONS PROPORTIONATE TO RISK

Once they identify what they are going to do, they need to make a judgement about the benefits and risks. Are the benefits of the outcomes proportional to the risks for those involved?

- If YES, proceed
- If NO, then consider how else the incident may be dealt with

3. SELECTING SYSTEMS OF WORK

Commanders will need to consider the possible systems of work and choose the most appropriate for the situation. Are the proposed control measures reasonably practicable and achievable?

4. DECLARING THE TACTICAL MODE

The outcome of this assessment will contribute to the incident plan. This will include a decision about whether personnel should work in the hazard area, which will require the appropriate tactical mode to be announced. The declaration of a tactical mode is a simple method of recording the outcome of the incident commander's risk assessment.

5. TACTICAL CONTROL

When proceeding with a task a commander will need to make sure that:

- Individuals and teams understand their objectives
- They have allocated clear responsibilities
- People understand the safety measures and procedures

6. ADDITIONAL ALTERNATIVE CONTROL MEASURES

Commanders will still need to eliminate, reduce or contain any remaining risks to an acceptable level by introducing additional or alternative control measures, such as:

- Appropriate procedures and methods of work
- Additional personal protective equipment (PPE), for example, safety glasses or safety harnesses
- The deployment of Breathing apparatus
- Specialist personnel or equipment, for example, urban search and rescue USAR, aerial appliances or water rescue

As the incident develops, changing circumstances may require the original course of action to be revised, for example:

- Firefighting tactics may change from defensive to offensive, or vice versa
- New hazards and their associated risks may arise for example, the effects of fire on building stability
- Existing hazards may present different risks
- Personnel may experience fatigue

7. REVIEW

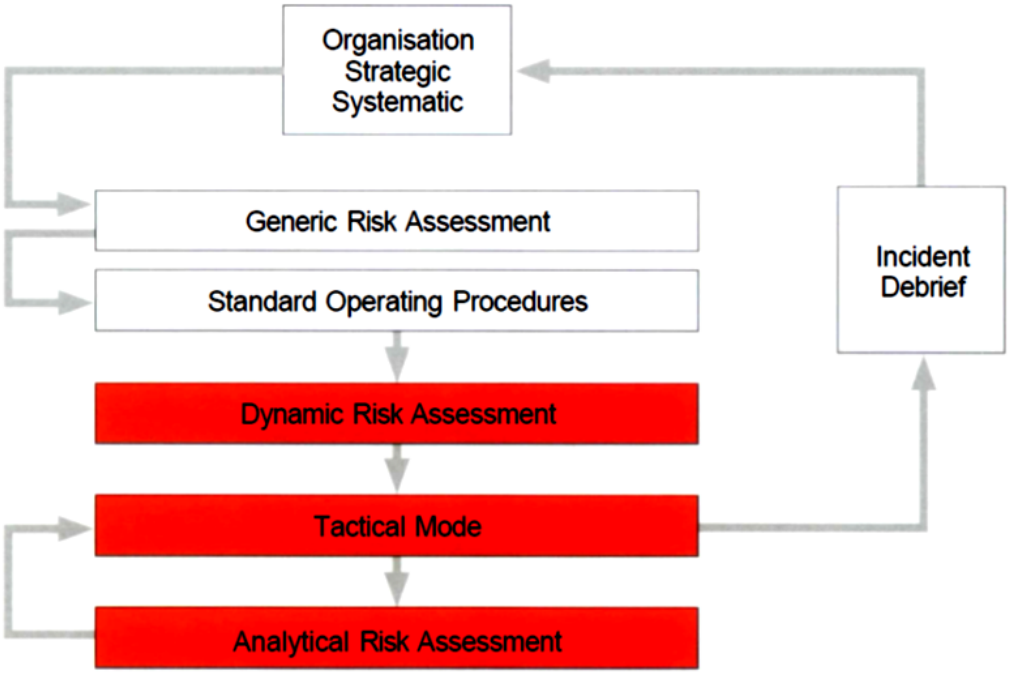
Incident and sector commanders need to manage safety by monitoring the situation. This monitoring should include a regular review of how effective the existing control measures are.

As the environment changes, the incident commander should review the risk assessment. Even when a safe system of work is in place the incident commander should take into account changing priorities as this may alter the risk or the perception of risk. Refer to Decision control process.

A change of plan will need to be put in place with minimal delay. Incident commanders should declare the revised tactical mode, make sure they communicate the change and continue with the DRA process.

ANALYTICAL RISK ASSESSMENT

6. As the incident progresses, or becomes more complex, it requires a more detailed and formal record of the significant findings of the risk assessment. This is referred to as analytical risk assessment (ARA).



7. Having carried out the DRA and established a tactical mode, an incident commander should be aware of the immediate hazards, who is at risk and the control measures necessary to protect them. This assessment should determine the reasonably practicable measures that personnel should take to control the risk.
8. This initial assessment now forms the basis of a more detailed incident risk assessment known as an ARA. This should be completed and recorded on all occasions when the recorded DRA is not sufficient.
9. An incident commander should ensure an ARA is carried out as soon as time or resources permit. Responsibility for carrying out the risk assessment within a sector may be delegated to sector commanders. However, the incident commander still retains responsibility for approving the tactical mode.

10. The person who completes the ARA should be competent. They need to bring their findings to the attention of the incident or sector commander. These should include details of any hazards, risks and control measures.
11. In addition, the key findings of the ARA should be shared with all responders that are at the incident ground and the fire control room. This information may form part of the multi-agency decision-making process at the incident.
12. Incident or sector commanders should review the ARA whenever the risk to personnel changes and at suitable intervals. It is for each service to decide what a suitable interval is; however the incident commander can vary the interval after consulting any sectors or safety sector. One example of this kind of static incident is a controlled burn at a barn fire.
13. Reviewing the risk assessment may confirm the existing control measures and tactical mode are correct. It may also show the incident needs extra control measures or a change in tactical mode. Incident commanders should make sure changes are announced and new actions happen without delay. The new situation is also the basis for any future risk assessment.
14. Where there is a formal debrief, the use of the ARA forms can help show the risks known at the time. The suitability of the risk assessment should also be reviewed at this time.

Example - Incident Ground Analytical Risk Assessment (ARA)

Incident Number……Date & Time……Sheet of

Incident Type (GRA*)……Address / Location……Sector…..

Hazards	Who is at risk?	Existing Control measures	S 1-5	L 1-5	S x L	Risk Rating	Are existing control measures adequate?	If NO - Implement additional control measures needed to reduce risk
Ensure ARA is updated at regular intervals								Continue on separate sheet if required
INCIDENT COMMANDER		**FORM COMPLETED BY**			**PREVIOUS TACTICAL MODE**			
					CURRENT TACTICAL MODE			

15. Aerodrome emergency organisation should keep ARAs for audit and periodic review. They should also be considered for training and guidance development.

ENVIRONMENTAL RISK ASSESSMENT

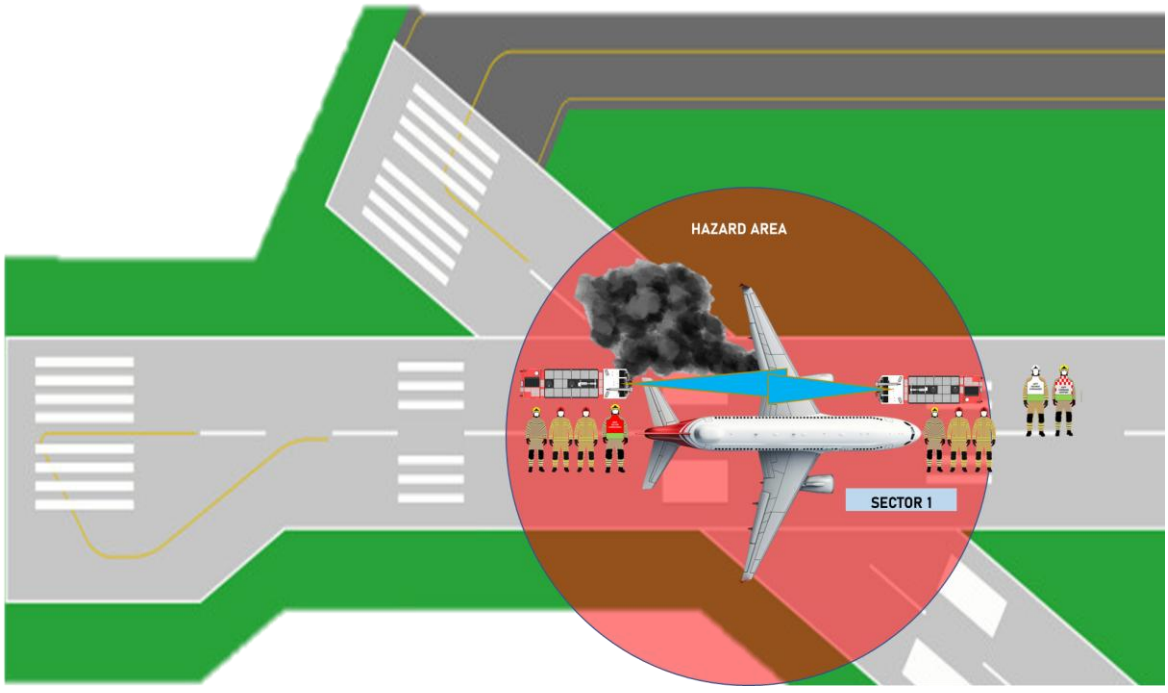
16. Incident commanders should conduct an assessment of the environmental risk at incidents they attend. This will help them to identify the potential risks posed by aerodrome emergency response organisation actions on the environment and the control measures that can be applied to reduce or, where possible, prevent environmental damage.
17. Incident commanders should conduct an assessment of the environmental risk at incidents they attend. This will help them to identify the potential risks posed by fire service actions on the environment and the control measures, which can be applied to reduce or, where possible, prevent environmental damage.
18. An environmental risk assessment should identify:
    - Nearby population
    - Livestock
    - Location of local watercourses
    - Location of sensitive habitats and their proximity to the incident
    - Incident location in relation to sensitive groundwater.
    - Local drainage
    - Polluting materials
    - Type of media being used
    - Quantity of firewater run-off being produced
    - Volume/properties of any spilt materials
19. For smaller incidents the environmental risk assessment may be included as part of the dynamic risk assessment. For larger, more protracted incidents or where a known risk to the environment has been identified, a formal environmental analytical risk assessment should be completed and recorded.
20. Any risk to the environment either known or suspected should be communicated to those attending the incident and where appropriate, the relevant agencies.

O. TACTICAL MODE

OFFENSIVE MODE

1. This is where aerodrome emergency response organisation personnel are working in the hazard area and exposed to greater risk, because the incident commander has decided it is appropriate following their risk assessment. This may apply to an individual sector or to the whole incident when every sector is in offensive mode.

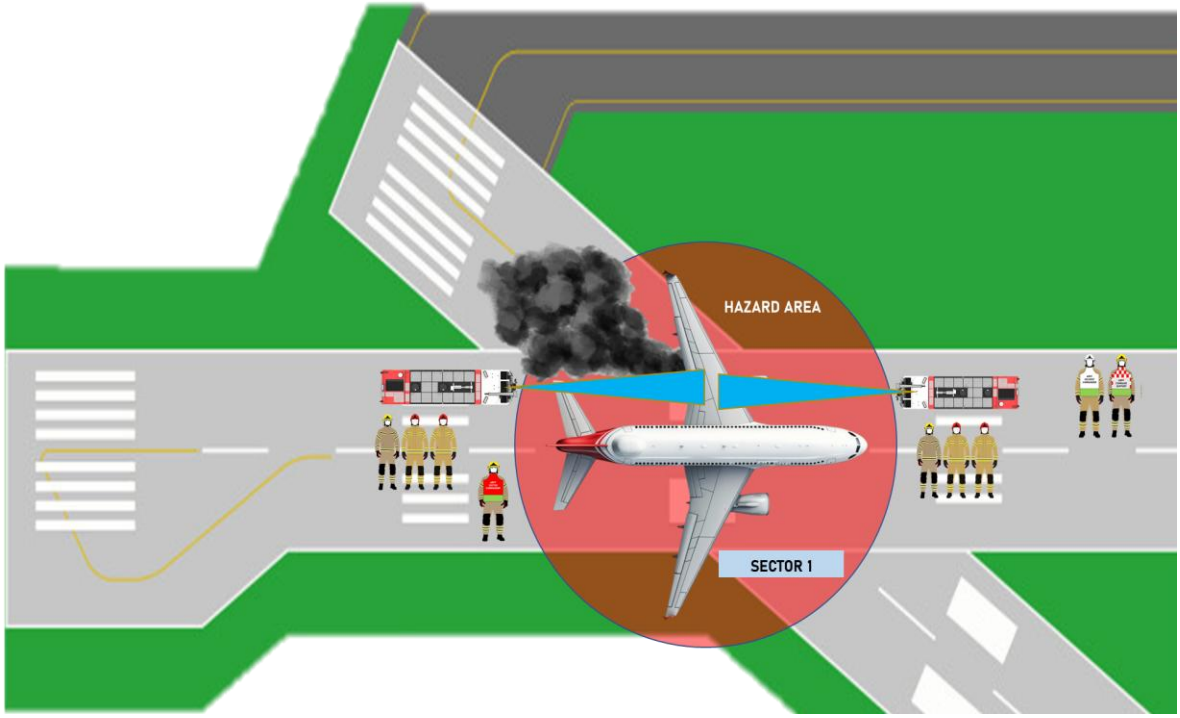
2. Offensive mode is likely to be the common mode of operation. Examples of offensive mode include:
   - An aircraft or property fire where personnel enter the aircraft or building for rescue and firefighting
   - Personnel dealing with an incident outside an aircraft or building but still operating in the hazard area
   - Personnel dealing with a road traffic collision and working on the airside roadway
   - Personnel entering an industrial site for firefighting or to isolate machinery
   - Withdrawing personnel from a hazardous area because the risk has increased
3. In the last example, although personnel are being withdrawn they are still in the hazard area and the tactical mode is still offensive. It would not change to defensive mode until all personnel have left the hazard area and been accounted for. Use the message 'tactical withdrawal of responders in progress' or 'emergency evacuation of responders in progress' to timestamp the decision of the incident commander's dynamic risk assessment, including the need to change to defensive mode.



DEFENSIVE MODE

4. This is where commanders deal with an incident from a defensive position. In defensive mode, the identified risks are unacceptable and outweigh the potential benefits. No matter how many extra control measures could be put in place at that particular time, the risks remain too great to commit personnel into the hazard area.

5. Defensive mode does not indicate that operational activity is not taking place. However, it does indicate that personnel are not working in the hazard area.
6. Examples of defensive mode include:
   - Firefighting outside a hazard area
   - Standing by awaiting expert advice, before committing crews
   - Standing by in a safe area while other services deal with an incident, for example, a terrorist related incident

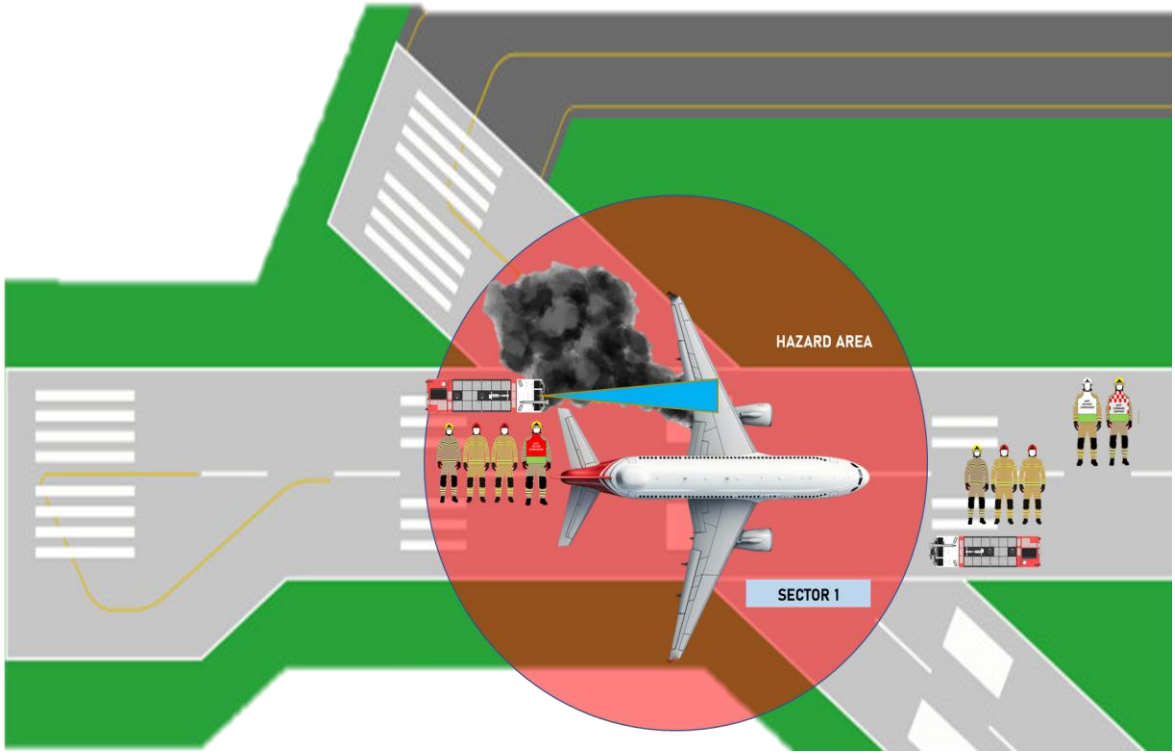


TACTICAL MODES WHEN SECTORS ARE IN USE

7. Examples of announcement of No Overall Tactical Modes
8. Communication with the fire control room may also be the method of recording significant findings from a risk assessment. If this is the case it should include sufficient information about why the mode is appropriate. For example:
   - 'Crews in offensive mode: persons reported or saveable life'
   - 'Crews in offensive mode: saveable property'
   - 'Crews in offensive mode: environmental protection'
   - 'Crews in defensive mode: awaiting isolation of power cables'
9. All incidents need a tactical mode and it should be kept current. The frequency of announcements is for each aerodrome emergency response organisation to determine.
10. Communication examples when changing from offensive to defensive tactical mode

11. Communication should be timely, without detracting from risk critical operations, and include sufficient information demonstrating the need to change from offensive to defensive tactical mode, for example:
    - 'Offensive mode: all persons accounted for, tactical withdrawal of responders in progress'… followed by;
    - 'Defensive mode: all crews withdrawn'

      Or:
    - 'Offensive mode – emergency evacuation of responders, signs of structural collapse' … followed by;
    - 'Offensive mode – emergency evacuation of responders in progress, crews committed to assist in evacuation'…followed by;
    - 'Defensive mode – all personnel accounted for, roll call complete'



SECTION C – MUTUAL-AID EMERGENCY SERVICES INTEROPERABILITY PLAN (MAESIP)
A. INTRODUCTION

1. Major incidents are commonly defined as events that require an extraordinary allocation of resources, either due to their location, severity, type, and/or number of victims. The management of these incidents, varied by nature as they are, usually involves responders coming together from

2. multiple rescue services. Agencies might even have to come from different jurisdictions or geographies.
3. Inter-service cooperation, in this context, is necessary but rarely simple. That's because responding agencies will bring their own competencies, experiences, systems, and terminology.
4. Merging everything together, particularly during a severe incident, is difficult, one of the challenges to optimal resource allocation and effective incident management.
5. Starting with the Incident Command System (ICS) in the late 1970s, however, major incident command, control, and coordination frameworks have emerged to tackle the variegated challenges associated with multiagency cooperation, e.g., limited spans of control, the need for clearer lines of command, as well as inability to communicate effectively across organisations.
6. What's been developed and refined serves the purpose, therefore, of directing different actions in an affected region. Resultant frameworks seek to organise command and scene assessment, such that an individual structure becomes the mode of handling an incident, and local directors within that region conform to the structure in place.
7. One such framework is the JESIP Joint Doctrine, an interoperability framework, which standardises multiagency working. JESIP models and principles themselves, the most salient of which this guide will lay out, have become the standard for interoperability in the U.K. The Mutual-Aid Emergency Services Interoperability Plan (MAESIP) adopts the JESIP principles to ensure incident management during emergencies at an aerodrome are safely and effectively coordinated.

B. MAESIP PRINCIPLES

1. MAESIP focus is on improving multi-agency response to major incidents. The framework is scalable, with models of joint working that can be applied to any type of multi-agency incident.
2. The most important principle outlines how multiple agencies can work jointly, in all phases of an incident, irrespective of scale and whether the incident was spontaneous or pre-planned.

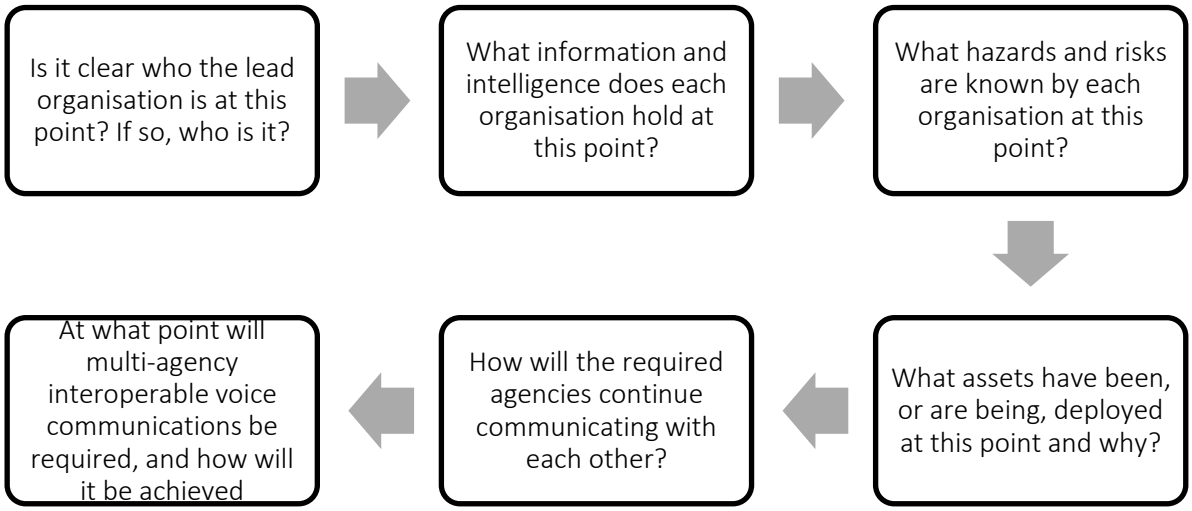
Principle	Description	Notes
Co-locate	Co-locate with other emergency responders as soon as practicably possible at a single, safe, and easily identified location.	• Benefits of co-location include improved communication and understanding that support joint working. • Co-location supports responders to jointly agree upon objectives and develop a coordinated plan to effectively resolve an incident.

Communicate	Communicate using clear language, free from technical jargon and abbreviations.	• Meaningful and effective communication between emergency responders and other organisations underpins effective joint working. • The "talk not tell" process involves control room personnel passing information and asking other organisations what their response to the incident will be. This is achieved by: ○ Sharing information from all available sources along with immediate resource availability and decisions ○ Nominating a point of contact in each control room and establishing a method of communication between all of them ○ Co-ordinating the setting up of multi-agency interoperable voice communications for responders and operational working if necessary.
Coordinate	Coordinate by agreeing on the lead organisation. Identify priorities, resources, capabilities, and limitations for an effective response, including the timing of further meetings	• Coordination involves control rooms and responders of all levels discussing the available resources and activities of each responder organisation, agreeing to priorities, and making joint decisions throughout the incident. • Coordination underpins joint working by avoiding potential conflicts, preventing duplication of effort, and minimising risk. • For effective co-ordination, however, one organisation generally needs to take a lead role. To decide who the lead should be, factors such as the phase of the incident, the need for specialist capabilities and investigation, during both the response and recovery phases should be considered.
Jointly understand risk	Jointly understand risk by sharing information about the likelihood and potential impact of threats and hazards, so as to agree upon appropriate control measures.	• By jointly understanding risks and their associated mitigating actions, organisations can promote the safety of responders and reduce the impact that risks may have on members of the public, infrastructure, and the environment. • But as different responder organisations may see, understand, and treat risks differently, each organisation should carry out their own risk assessments, then share the results, so that they can plan

		control measures and contingencies together more effectively. • Individual dynamic risk assessment findings may be used to develop the analytical risk assessment for the incident.
Shared situational awareness	Establish shared situational awareness by using M/ETHANE and the Joint Decision Model.	• Shared situational awareness is a common understanding of the circumstances, immediate consequences, and implications of the emergency, along with an appreciation of the available capabilities and the priorities of the responder organisations. • Achieving shared situational awareness is essential for effective interoperability. And establishing shared situational awareness is important for developing a Common Operating Picture (COP) at all levels of command, between incident commanders, and between control rooms. • Communications between control rooms greatly assists the creation of shared situational awareness in the initial stages and throughout the incident.

C. SHARED SITUATIONAL AWARENESS

1. Communicating to commanders before they arrive on scene as well as throughout the incident also helps. The organising process, however, should include identifying risks and hazards. The following considerations have been singled out:



2. And that's where standardised methodologies for sharing information with the aim of contributing to shared situational awareness come in. The most import of these in the emergency management context is M/ETHANE.

D. M/ETHANE MESSAGE

1. M/ETHANE is an established reporting framework, which serves as a popular method for passing incident information between emergency services and control rooms in a consistent manner.

M/ETHANE Framework

M	**Major incident declared.** Has a major incident (aircraft accident) been declared? Advise major incident "standby" or "declared." For incidents falling below the major incident threshold M/ETHANE becomes an ETHANE message.
E	**Exact location of the incident.** What is the exact location and geographical area of the incident? Examples: Runway / taxiway location, grid reference, road names, landmarks, etc.
T	**Type of incident.** What kind of incident is it? With brief details, could include aircraft crash/incident, building fires, chemical spill, road traffic collision, etc.
H	**Type of Hazards.** What hazards or potential hazards can be identified? Present and potential.
A	**Location of Access/egress.** What are the best routes for access and egress? Routes to the incident and potential rendezvous points.
N	**Number of casualties.** How many casualties are there, and what condition are they in? An estimate in the first instance, then upgraded with their severity/type.
E	**Emergency services required.** Which, and how many, emergency responder assets and personnel are required or are already on-scene? Present and those required, including specialist input.

M/ETHANE message form template

M/ETHANE MESSAGE FORM TEMPLATE			
Time		**Date**	
Organisation			
Name of Caller		**Tel No**	
M	Major incident	Has a Major Incident been declared? **YES/NO** *(If no, then complete ETHANE message)*	
E	Exact Location	What is the exact location or geographical area of incident	
T	Type of Incident	What kind of incident is it?	
H	Hazards	What hazards or potential hazards can be identified?	
A	Access	What are the best routes for access and egress?	
N	Number of casualties	How many casualties are there and what condition are they in?	
E	Emergency Services	Which and how many emergency responder assets/personnel are required or are already on-scene?	

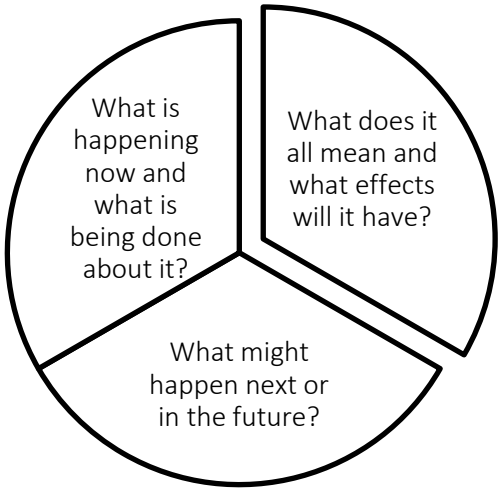
E. STAGES OF RESPONSE TO A MULTI-AGENCY INCIDENT

1. The importance of the M/ETHANE mnemonic and reporting model is that it brings structure and clarity to the initial stages of managing a major incident.

2. During these early stages, it will take time for operational structures, resources and protocols to be established. Some, if not much, of the required information may not be available.
3. All of this puts undue pressure on the first responders and early control rooms.
4. Add to that, incident commanders may lack the necessary resources to deal with the incident. And so, a common approach, such as M/ETHANE, will be required.
5. According to the Joint Decision Model, there should be periodic consideration of the major incident designation by responders. This helps to establish whether a developing situation has indeed become a major incident.
6. Each responder organisation will then send a M/ETHANE message to its control room. Those organisations should then share it with relevant responder organisations as soon as possible.
7. It's imperative, though, that when the first resources arrive on the scene, they consider their own safety. This will involve sending a M/ETHANE message so that situational awareness can be established quickly.
8. The information received through multiple M/ETHANE messages will gradually accumulate to support shared situational awareness in those responding to the incident and between control rooms.

F. DEVELOPING A COMMON OPERATING PICTURE

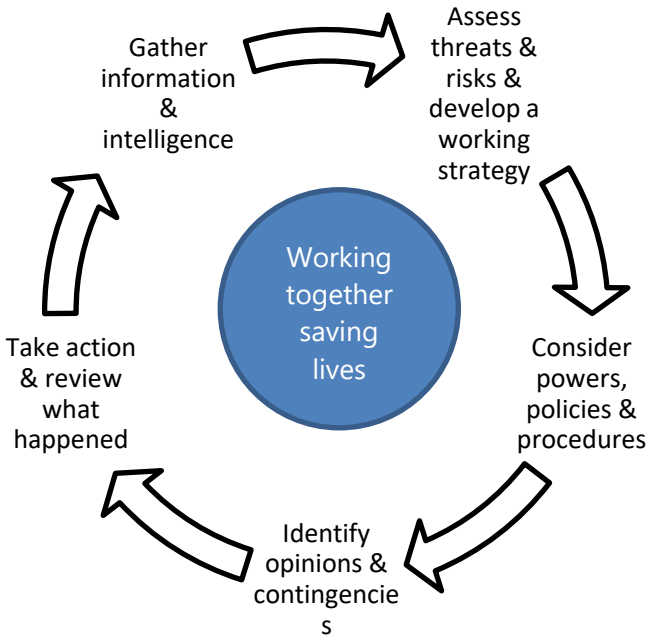
1. It is incumbent on responders to develop a common operating picture (COP). A COP is defined as a common overview of an incident, which is created by assessing and fusing information from multiple sources. The overview developed then gets shared between appropriate command, control, and co-ordinating groups to support joint decision making.
2. Although a common point of reference, the COP should evolve with the incident, to sufficiently summarise the below:
3. There is no set format for the COP. The COP should, however, reflect local requirements and practices. And whatever form the COP takes, it should be user-friendly, easy to navigate, and geared to the requirements of busy decision makers under pressure.



G. JOINT DECISION MODEL

1. This is where the Joint Decision Model (JDM) comes in. The JDM, depicted below, is designed to help responding agencies make effective decisions during dynamic circumstances.
   - When using the JDM, the priority is to **gather and assess information and intelligence**. Responders should work together to build shared situational awareness, recognising that this requires continuous effort as the situation, and responders' understanding, will change over time.
   - **Understanding the risks** is vital to establishing shared situational awareness, as it enables responders to answer the three fundamental questions: what, so what, and what might? But once the process of building shared situational awareness has begun, the desired outcomes should be agreed to as the central part of a joint working strategy.
   - If a Crisis Management Group is convened to this effect, that CMG will **agree and share the joint strategy** for the multi-agency response. The strategic command teams from each organisation should then review and amend their single-agency strategy to be consistent with the joint strategy and support them in achieving the jointly defined outcomes, or overarching aim.
   - Deciding how all agencies will work towards the desired outcome **reflects the available capabilities, powers, policies, and procedures** (means) and the arising options, constraints, and contingencies (ways).
   - **Identifying options and contingencies** comes next. Some options, however, will not be viable, either difficult to implement, technically or logistically infeasible, or illegal and/or

ethically indefensible. Such options, though, should still be logged with rationale as to why they were not achievable.



2. At this point, the JDM advises responders to take action after they've mulled over the appropriate considerations. Responders should also list the various stages taken to reach that decision.
3. This is just a cursory picture of the JDM. Further considerations include:

Stages of Joint-Decision Making (JDM)

Stage	Consideration
Working together saving lives reducing harm	This is the most important consideration throughout the decision-making process. All joint decisions should be made with reference to the overarching or primary aim of any response to an emergency – to save lives and reduce harm.
Gather information and intelligence	At any incident, no single responder organisation can appreciate all the relevant dimensions of an emergency straight away. A deeper and wider understanding will only come from meaningful communication between responder organisations, with the product of those communication, i.e., intelligence, subjected to the following tests: ○ Evaluation, to determine its significance ○ Risk assessment, to determine the need for it to be acted on • Analysis, to identify critical links and associations that assist understanding of the incident
Assess threat and risk and develop a working strategy	This analytical stage involves responders jointly assessing the situation, including any specific threats, hazards, and the risk of harm. It's rare, however, for a complete or perfect picture to exist for a rapid onset incident. A working strategy, as such, should therefore be based on the

	information available and reviewed on a continual basis. When developing that working strategy, responders should apply decision controls, share single service risk assessments, and record and agree the joint assessment of risk. Further steps to take include: • **Identify hazards.** This begins with the initial call to a control room and continues as first responders arrive on scene. Information gathered by individual agencies should be disseminated to all first responders, control rooms and partner agencies effectively. • **Dynamic risk assessment.** Individual agencies carry out dynamic risk assessments, reflecting the tasks and objectives to be achieved, the hazards identified and the likelihood of harm from those hazards. The results should then be shared with all agencies involved. • **Identify tasks.** Each individual organisation should identify and consider their specific tasks, according to their role and responsibilities. These tasks should then be assessed in the context of the incident. • **Apply risk control measures.** Each organisation should consider and apply appropriate control measures to ensure any risk is as low as reasonably practicable. The hierarchy of control should be considered when agreeing a coordinated control measure approach: elimination, substitution, engineering controls, administrative controls, and personal protective clothing and equipment. • **Have an integrated, multi-agency operational response plan.** The outcomes of the hazard assessments and risk assessments should be considered when developing this plan, within the context of the agreed priorities for the incident. If the activity of one organisation creates hazards for a partner organisation, a solution should be implemented to reduce the risk to as low as reasonably practicable. • **Record decisions.** The outcomes of the joint assessment of risk should be recorded, together with the jointly agreed priorities and the agreed multi-agency response plan, when resources permit. This may not be possible in the early stages of the incident, but post-incident scrutiny focuses on the earliest decision-making.
Consider powers, policies, and procedures	A common understanding of relevant powers, policies, and procedures is essential to ensure that the activities of responder organisations complement each other. And so, this stage relates to any relevant laws, procedures, or polices that may have an impact on the response plan and the capabilities available to be deployed.
Identify options and contingencies	Finally, contingency arrangements should be put in place to address reasonably foreseeable events that may occur from actions taken or not taken. But these potential options or courses of action should be evaluated, considering the following: ○ **Suitability.** Does it fit with the strategic direction? ○ **Feasibility.** Can it be done with the available resources? ○ **Acceptability.** Is it legal, morally defensible, and justifiable? Whatever the option chosen, though, responders should be clear on what they need to carry out. Procedures for communicating any

	decision to defer, abort, or initiate a specific tactic should also be clearly agreed.

H. DECISION MAKING SUPPORT

1. Thoroughly assessing the information received helps to ensure quality and suitability for the task at hand. This is critical to ensuring that joint decision making is based on the best possible information, which can only happen by identifying where critical uncertainties lie.
2. Once decisions have been made and actions agreed to, information should be relayed in a structured way. That way it can be easily understood by those who will carry out actions or support activities. This process is commonly known as briefing.
3. As incidents develop past their initial stages, or if they are protracted and require a handover of responsibility, a more detailed briefing tool should be used.
4. The mnemonic IIMARCH, short for Information, Intent, Method, Administration, Risk Assessment,
5. Communications, and Humanitarian Issues, is commonly used in these circumstances, so that information can be briefed in appropriate detail.
6. When using IIMARCH to prepare a briefing it is helpful to consider the following:
   - Brevity is important – if it is not relevant, leave it out
   - Communicate using unambiguous language free from jargon and in terms people will understand
   - Check that others understand and explain if necessary
   - Consider whether an agreed information assessment tool or framework has been used
7. The IIMARCH template below may help commanders in preparing a brief. When using IIMARCH, it is helpful to consider the following:

IIMARCH template for incident briefing

Element	Key questions and considerations	Action
I	**Information** **What, where, when, how, how many, so what, what might?** Timeline and history (if applicable), key facts reported using M/ETHANE	

I	**Intent** **Why are we here, what are we trying to achieve?** Strategic aim and objectives, joint working strategy	
M	**Method** **How are we going to do it?** Command, control and co-ordination arrangements, tactical and operational policy and plans, contingency plans	
A	**Administration** **What is required for effective, efficient and safe implementation?** **I**dentification of commanders, tasking, timing, decision logs, equipment, dress code, PPE, welfare, food, logistics	
R	**Risk assessment** **What are the relevant risks, and what measures are required to mitigate them?** Risk assessments (dynamic and analytical) should be shared to establish a joint understanding of risk. Risks should be reduced to the lowest reasonably practicable level by taking preventative measures, in order of priority. Consider the hierarchy of controls. Consider Decision Controls	

C	**Communications** **How are we going to initiate and maintain communications with all partners and interested parties?** Radio call signs, other means of communication, understanding of inter-agency communications, information assessment, media handling and joint media strategy	
H	**Humanitarian issues** **What humanitarian assistance and human rights issues arise or may arise from this event and the response to it?** Requirement for humanitarian assistance, information sharing and disclosure, potential impacts on individuals' human rights	

8. Finally, the matter in which information is shared is also important to support joint decision-making. It is recommended using a common information sharing platform, preferably digital, to share and manage information collaboratively.
9. Responder organisations may use various supporting processes and sources to provide information, including any planned intentions; this supports joint decision-making.
10. All decisions, the rationale behind them and subsequent actions, should be recorded in a joint decision log. Recording of decisions is critical and where possible should be undertaken by a trained loggist or scribe. A sample joint decision log template is provided below:

Joint decision log template

Classification when complete				
Name of the Person completing this log	**Print Name**	**Signature**	**Time**	**Date**

Date and Time commenced				
Incident numbers				
Location of Incident				
Incident/event				

Note: Please enter the names, roles and organisation of all those commanders who have entries made in this log. (More rows can be added to the table below). They should sign their own signature, adding the date and time.

Print name	Role	Organisation	Signature	Initial	Time	Date

Decision Log Number	Decision - Date and Time of Decision
1. Identify situation & gather information What is your understanding of what has happened? What do we know so far? What might happen?	

2. Assess threats & risks Do I need to take action immediately? Do I need to seek more information? Where can I get it from? What could go wrong?	
3. Policies & Procedure Which ones have I taken into account	
4. Options & Considerations What options are open to me? Consider immediacy of any risk/threat, limits of information etc.?	
5. Decision & Rationale Decision controls- why are we doing this? What do we think will happen? Do we have a common understanding and position on; • Situation • Available information • Terminology • Working practices • Conclusions Is the benefit proportional to the risk?	
6. Review of Decision - Time and result	
Names of People Making Decision	

Name of Person Recording Decision	

11. Using a digital platform helps with automating aspects of sourcing, combining, analysing, and displaying data.
12. Certain advanced emergency management platforms carry both information sharing and full-lifecycle emergency management capabilities. Using these platforms have the added benefit of providing incident management dashboards, as well as the capability to create both M/ETHANE reports and IIMARCH briefings.
13. A truly digital EOC suited for aerodrome emergency response organisations, these platforms have been designed for industry best practice, such as ICS and JESIP. This means, in close, that the platforms boast powerful workflows which go the critical last mile to automate key response steps, making it easier for practitioners of JESIP models and principles to collaborate, communicate, and coordinate to improve their response to major incidents.

AMC4 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY COMMAND FACILITIES

(a) Emergency command facilities should be provided at the aerodrome including:

(1) a fixed emergency operation centre as part of the aerodrome facilities that is readily available for use during an emergency and is responsible for the tactical command and coordination of the response to an emergency;

(2) a mobile command post that is capable of being moved rapidly to the scene of an emergency and is responsible for the operational command, control and coordination of all responding agencies at the scene of the emergency;

(3) provision of sufficient communication equipment and resources for use at these facilities; and

(4) provision of sufficient competent persons assigned to assume control of the emergency operation centre and the mobile command post.

GM1 AMC4 ACM.OPS.CERT.D.005(a) Emergency planning

ESTABLISHING AND MANAGING EMERGENCY OPERATIONS CENTRE

1. INTRODUCTION

(a) This document provides guidance on the establishing and managing an Aerodrome Emergency Operations Centre (EOC) during emergencies at the aerodrome. It is based on International Civil Aviation Organization (ICAO) standards and recommended practices. The EOC plays a critical role in coordinating multi-agency responses, ensuring the continuity of airport operations, and effectively managing crisis situations. This guidance is intended for use by senior airport management, emergency response coordinators, and regulatory authorities.

2. GENERAL

(a) A fixed emergency operations centre should be available to deal with emergency situations at each aerodrome. Certain emergency situations will require a mobile command centre at the scene, normally under the direction of the aerodrome incident commander.

3. DESIGN AND FEATURES OF AN EMERGENCY OPERATIONS CENTRE

(a) The main features of an emergency operation centre are:

(1) its fixed location;

(2) it acts as tactical command, co-ordination and communication centre for supporting the aerodrome incident commander in the mobile command centre for aircraft accidents/incidents, unlawful seizure of aircraft and bomb threats; and

(3) it is operationally available 24 hours a day.

(b) The design of the emergency operations centre should be fit for purpose and where necessary, sufficient supporting facilities are provided to support its various functions.

(c) The location of the emergency operations centre should provide a clear view of the movement area and isolated aircraft parking position, wherever possible.

(d) The mobile command centre will usually be sufficient to co-ordinate all operational command and communication functions. The emergency operations centre is a designated area on the aerodrome which is usually used in supporting and co-ordinating operations in accidents/incidents, unlawful seizure of aircraft, and bomb threat incidents.

(e) The emergency operation centre should have the necessary equipment and personnel to communicate with the appropriate agencies involved in the emergency, including the mobile command centre, when this is deployed. The communication and electronic devices should be checked daily and regularly tested.

Note. — General guidelines on development and management of an emergency operations centre (EOC) can be refer to ASTM E2668 and E2915.

4. STRUCTURE AND ROLES WITHIN THE EOC

The Airport EOC should follow a hierarchical command structure with clearly defined roles to ensure seamless coordination during an emergency. Key personnel and their respective responsibilities are as follows:

(a) EOC Director / Manager (Silver Commander)

(1) Responsibility: Overall command of the EOC, ensuring the effective implementation of the AEP. Acts as the central decision-maker and is responsible for coordination between the Bronze Commander (BC) and the Gold Commander (GC).

(2) Duties:

(i) Serve as the focal point for communication with external agencies and government bodies.

(ii) Direct resource allocation, personnel assignments, and logistical support.

(iii) Ensure timely situational reports (SITREPs) to senior airport management and stakeholders.

(iv) Ensure compliance with regulatory requirements and maintain command during the entirety of the emergency.

(b) Operations Officer / EOC Support

(1) Responsibility: Manages tactical operations within the EOC and ensures information flow between on-scene responders and EOC Director/Manager.

(2) Duties

(i) Coordinate real-time operations with the IC.

(ii) Oversee deployment of resources, including emergency services, medical teams, and security.

(iii) Ensure adherence to predefined response protocols and timelines.

(c) Logistics Officer

(1) Responsibility: Management of all logistical aspects, including resource mobilisation, transportation, and supply chain coordination.

(2) Duties:

(i) Track and deploy required resources such as equipment, personnel, and vehicles.

(ii) Maintain a record of resource availability and needs.

(iii) Coordinate staging areas for incoming support teams and resources.

(d) Planning Officer

(1) Responsibility: Anticipate operational needs and develop strategies for prolonged incidents.

(2) Duties:

(i) Collect and analyse data to assist in forecasting potential escalation of the incident.

(ii) Prepare and revise action plans in alignment with the IC's operational directives.

(iii) Maintain documentation of key decisions and provide updates to the EOC Director/Manager.

(e) Communications Officer

(1) Responsibility: Ensure the functionality of all communication systems and manage the dissemination of information between the EOC, on-site teams, and external agencies.

(2) Duties:

(i) Monitor radio communications and ensure the proper use of standardised ICAO phraseology.

(ii) Ensure communication channels (radio, satellite, digital) are secure and fully functional.

(iii) Coordinate with air traffic control (ATC) and other agencies to facilitate clear information flow.

(f) Public Information Officer (PIO) / Media Officer

(1) Responsibility: Manage public communications, including media relations and social media updates.

(2) Duties:

(i) Develop and disseminate accurate information regarding the emergency.

(ii) Liaise with airport management to ensure unified messaging across agencies.

(iii) Act as the main point of contact for media briefings and public inquiries.

(g) Safety Officer

(1) Responsibility: Oversee safety procedures and ensure the protection of all personnel involved in the response.

(2) Duties:

(i) Monitor on-site and EOC safety protocols.

(ii) Coordinate with the IC and relevant safety bodies to mitigate risks.

(iii) Investigate and address any safety violations or incidents.

5. COMPETENCIES OF KEY PERSONNEL

Personnel assigned to the EOC must possess the necessary expertise to handle complex and dynamic emergency situations. Each role requires the following competencies:

(a) **EOC Director / Manager:** Strategic leadership, decision-making under pressure, advanced coordination skills, comprehensive understanding of airport operations, regulatory compliance, and crisis management.

(b) **Operations Officer:** In-depth knowledge of emergency response protocols, quick tactical decision-making, operational oversight, and field coordination.

(c) **Logistics Officer:** Expertise in resource management, inventory control, transport logistics, and supply chain resilience.

(d) **Planning Officer:** Strong analytical and forecasting abilities, familiarity with emergency planning tools, and experience in developing action plans.

(e) **Communications Officer:** Proficiency in radio communication systems, ICAO standard phraseology, and secure communication practices.

(f) **PIO:** Media relations expertise, clear communication skills, and the ability to handle sensitive information under public scrutiny.

(g) **Safety Officer:** Risk assessment, incident investigation, and application of safety management systems in high-pressure environments.

6. WRITING AND RECORDING CRITICAL INFORMATION

Effective record-keeping and information management are essential for situational awareness and decision-making during emergencies. Key practices include:

(a) **Incident Logs:** Maintain continuous logs detailing actions, communications, and decisions taken during the emergency. Logs should be updated in real-time and reviewed periodically by senior EOC personnel. (See Table 1 for example of EOC incident log entries)

(1) Information to be recorded in the EOC Incident Log includes:

(i) **Date and Time:** Precise timestamps for all actions, decisions, communications, and events.

(ii) **Incident Description:** Brief summary of the emergency situation (e.g., type of aircraft, flight number, nature of the incident, location).

(iii) **Activation Time:** Time the EOC was officially activated for the incident.

(iv) **Notification Details:** Record of who initially reported the incident and through which communication channel (e.g., ATC, on-site personnel, external agencies).

(v) **Key Personnel Activation:** Names, roles, and activation times of key personnel (e.g., EOC Manager, Operations Officer, Communications Officer).

(vi) **Initial Assessments:** Any early evaluations or assessments provided by responders (e.g., damage, injury severity, risk level).

(vii) **SITREPs (Situation Reports):** Regular updates on the incident's progress and evolving conditions, including input from field units and on-scene Incident Commander (IC).

(viii) **Resource Requests and Deployment:** Details of resources requested (e.g., firefighting units, medical teams, equipment) and time of dispatch.

(ix) **External Agency Coordination:** Record of all interactions with external agencies (e.g., police, fire services, medical services), including requests for support and confirmation of their arrival on scene.

(x) **Critical Decisions:** Document all major decisions made by the EOC Manager and senior personnel, including the rationale behind them.

(xi) **Instructions Issued:** All instructions passed to on-scene responders (Bronze Command) or external agencies, along with confirmation of receipt.

(xii) **Public Information Releases:** Record of press releases, media statements, and public information issued by the Public Information Officer (PIO).

(xiii) **Health and Safety Updates:** Safety issues encountered, and measures taken to protect response personnel and the public.

(xiv) **Communication Logs:** Record of all significant communications between the EOC, Gold Command, Bronze Command, and other relevant parties (e.g., ATC, airline representatives).

(xv) **Significant Events**: Chronological recording of important developments, including containment of the emergency, casualties, infrastructure damage, etc.

(xvi) **Incident Escalation or De-escalation:** Log any changes in the incident status (e.g., from minor to major emergency or vice versa) and the reasons for escalation or de-escalation.

(xvii) **Termination of Emergency:** Time and rationale for the decision to terminate emergency operations.

(2) To ensure accuracy, clarity, and consistency, information in the EOC incident log should follow these principles:

(i) Use Clear and Concise Language: Write in a precise, objective manner, avoiding vague terms. Include essential details while avoiding unnecessary information. Use plain language to ensure all readers understand the log entries.

(ii) Maintain Chronological Order: Record all entries in real-time as events unfold. Ensure each entry is timestamped accurately.

(iii) Identify Personnel by Title/Role: Always use the specific title or role of the personnel involved (e.g., "EOC Manager," "Bronze Command") to avoid confusion.

(iv) Log Key Decisions and Actions: For every significant decision, include a clear description of what was decided, why, and by whom. Record the actions taken, who executed them, and when.

(v) Ensure Accountability: Sign each log entry with the name or initials of the person recording the information. Note who issued specific instructions and the recipient.

(vi) Record External Communications: Document all communications with external agencies (e.g., police, fire, airlines) and include the name or agency and the content of the communication.

Table 1: Example of EOC Incident Log Entries

Time (LT)	Incident Entry	Initials
10:00	Incident Notification: ATC reports aircraft [Flight Number] has declared an emergency due to suspected engine fire during approach. EOC activated	JM
10:05	EOC Manager Decision: EOC Manager directs fire services and medical teams to standby at Runway 04. Incident classified as Level 2 Emergency.	JM
10:10	Communications: Silver Command contacts Gold Command to confirm incident and request additional medical support from the city's emergency medical services.	CL
10:12	Instructions to Bronze Command: Silver Command instructs Bronze Command to deploy fire suppression units to the standby location. Confirmed by Bronze Command.	CL
10:15	SITREP: Aircraft has landed safely but reports smoke in cabin. Passengers being evacuated. No injuries reported. EOC awaiting further updates from responders.	JM
10:25	Resource Deployment: Medical teams dispatched to assist passengers. Fire services inspecting aircraft for fire risk.	CL

10:30	Public Information: PIO issued a statement to the media: "An aircraft experienced a minor emergency during landing. Passengers are safe, and the situation is under control."	KS
10:45	De-escalation: EOC Manager confirms with Gold Command that the incident has been downgraded. EOC will remain active until aircraft is cleared for inspection.	JM
11:00	Termination: Emergency operations officially terminated. All resources returned to normal operations. Post-incident debrief scheduled for 15:00	JM

(3) Recording Information: Each entry must include:

(i) **Time:** Precise time when the action occurred or decision was made.

(ii) **Description of the Event:** A brief yet thorough explanation of what happened, what decisions were made, and what actions were taken.

(iii) **Signoff/Initials:** The person making the entry should sign or initial it, ensuring accountability and traceability.

(4) This approach ensures an organised, real-time record of all critical information, aiding in response coordination and post-incident review.

(b) **SITREPs:** Regularly updated situation reports must be distributed to all relevant agencies and airport management. These reports should summarise operational status, resource needs, and critical developments.

(c) **Action Plans:** Document the emergency action plans, including roles and responsibilities, resource allocations, and timelines. Ensure all updates are promptly communicated to relevant stakeholders.

(d) **Resource Tracking:** Maintain an inventory of deployed resources, including personnel, equipment, and supplies. Accurate tracking ensures efficient use and replenishment during prolonged incidents.

7. USE OF STANDARD RADIO PHRASEOLOGY

The use of standardised communication is critical to avoid confusion during an emergency. The following standard phraseology terms stated in the aerodrome emergency plan, must be used by all EOC and response personnel (see Table 2):

(a) Standby: Await further instructions.

(b) Roger: Message received and understood.

(c) Affirmative/Negative: Yes/No responses to avoid ambiguity.

(d) Mayday: Indicates a life-threatening emergency.

(e) Pan-Pan: Urgent situation that is not immediately life-threatening.

(f) Clear: Communication channel is free for further transmissions.

Table 2: Example of Standard EOC Phraseology for Aircraft Emergency Scenarios

Scenario	Silver Command to Gold Command	Silver Command to Bronze Command
Aircraft Crash	"Gold Command, this is Silver Command. We are declaring a full-scale emergency due to an aircraft crash. Requesting additional resources and ongoing SITREPs."	"Bronze Command, this is Silver Command. Proceed with initial response. Establish perimeter and await instructions. Ensure safety protocols are enforced."
Aircraft Fire (on ground)	"Gold Command, this is Silver Command. An aircraft on the ground has caught fire. Requesting immediate support from fire and medical services. Situation is being assessed."	"Bronze Command, this is Silver Command. Dispatch fire services to the scene immediately. Ensure evacuation procedures are underway and establish a safe zone around the fire."
Aircraft Fuel Leak	"Gold Command, this is Silver Command. We have a reported aircraft fuel leak on the apron. Initiating fuel containment procedures and requesting additional fire suppression units."	"Bronze Command, this is Silver Command. Initiate containment of the fuel leak. Ensure no ignition sources are present. Dispatch firefighting foam units and maintain a safe distance."
Bomb Threat (on aircraft)	"Gold Command, this is Silver Command. A bomb threat has been received for aircraft [Flight Number]. Requesting bomb disposal team and immediate threat assessment."	"Bronze Command, this is Silver Command. Evacuate the immediate area and isolate the aircraft. Follow protocol for a suspected bomb threat. Await instructions from bomb disposal team."
Runway Incursion	"Gold Command, this is Silver Command. A runway incursion has occurred involving [Aircraft Type]. Ground movements are suspended.	"Bronze Command, this is Silver Command. Secure the area of the incursion and ensure no further aircraft movements in the vicinity. Coordinate

	Requesting additional support for incident management."	with ground handling and emergency response teams."
Medical Emergency on Aircraft	"Gold Command, this is Silver Command. A medical emergency has been declared on [Flight Number]. Requesting immediate medical support and passenger assistance."	"Bronze Command, this is Silver Command. Dispatch medical teams to the aircraft. Ensure swift evacuation of the passenger if needed and maintain communication with flight crew."
Engine Failure (on takeoff/landing)	"Gold Command, this is Silver Command. Engine failure reported on [Aircraft Type] during [takeoff/landing]. Emergency response teams are being deployed. SITREP will follow."	"Bronze Command, this is Silver Command. Confirm the aircraft's position and status. Coordinate with fire services and ATC for potential runway closure. Ensure preparedness for evacuation."
Landing Gear Failure	"Gold Command, this is Silver Command. We have a landing gear malfunction reported on [Flight Number]. Fire and emergency services are on standby. SITREP to follow."	"Bronze Command, this is Silver Command. Prepare fire and rescue teams for potential hard landing. Ensure emergency response units are positioned along the runway."

8. ACTIVATION AND TERMINATION OF THE EOC

(a) Activation

(1) Activation of the EOC is triggered by defined events, including but not limited to:

(i) Notification of a major aircraft incident.

(ii) Declaration of an emergency by ATC or the BC/GC.

(iii) Significant threats to airport operations or public safety.

(2) The Silver or Gold Commander must initiate the activation process, which includes notifying key personnel, setting up communication channels, and deploying initial response teams.

(b) Termination

(1) Termination of the emergency response is determined by the Gold or Silver Command in consultation with the IC.

(2) A formal announcement of termination should be made, followed by a structured de-escalation process that returns airport operations to normal while ensuring any ongoing impacts are managed.

(3) Post-incident debriefs and evaluations are essential to document lessons learned, assess response efficacy, and revise the AEP as necessary.

9. ADDITIONAL CONSIDERATIONS

(a) Coordination with External Agencies

(1) Establish Memoranda of Understanding (MOUs) with external response agencies (fire, police, medical) to ensure cohesive collaboration during emergencies.

(2) Regular joint exercises should be conducted to ensure familiarity with inter-agency coordination protocols.

(b) Information Flow and Technology Integration

(1) Leverage technology such as Geographic Information Systems (GIS), CCTV, and digital communication platforms for real-time situational awareness.

(2) Ensure redundancy in critical communication systems to prevent failures during the response.

(c) Staff Rotation and Welfare

(1) Prolonged incidents may require staff rotations to avoid fatigue. Plan for adequate shift changes and provide mental health support for EOC personnel.

(d) Security Protocols

(1) Implement strict access control to the EOC during emergencies to ensure the protection of sensitive information and avoid unauthorised personnel disruptions.

10. CONCLUSION

(a) Establishing and managing an EOC during aircraft emergencies requires comprehensive planning, robust training, and well-defined roles to ensure a coordinated and effective response. By adhering to the guidance outlined in this document, airports can significantly improve their preparedness and operational resilience during emergencies. This guidance should be regularly reviewed and updated in alignment with evolving international best practices and airport-specific needs.

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ESTABLISHING AND MANAGING MOBILE COMMAND POST

1. INTRODUCTION

(a) Aircraft emergencies present significant challenges that require coordinated responses from multiple agencies. In such incidents, the Mobile Command Post (MCP), commonly referred to as the Bronze Command, plays a critical role in ensuring the effective on-scene management of resources and operational activities. This document provides comprehensive guidance on the management of MCP operations during aircraft emergencies, based on International Civil Aviation Organization (ICAO) standards and recommended practices, to ensure a unified and effective response.

(b) This document aims to provide aerodrome operators, emergency responders, and crisis management teams with a structured approach for establishing and managing a Mobile Command Post (Bronze Command) during an aircraft emergency. It focuses on key aspects such as command structure, communication protocols, resource management, and interagency coordination.

(c) The guidance applies to all categories of aerodromes managing aircraft emergencies, with specific emphasis on operations at international airports. The document aligns with ICAO Annex 14, Volume I, and ICAO Document 9137 Part 7.

2. DESIGN AND FEATURES OF A MOBILE COMMAND POST

(a) The mobile command post is a facility located at the scene of an incident, normally at the outer cordon, where operational commanders from mutual aid agencies assemble to receive and disseminate information and make decisions pertinent to the rescue and firefighting operations. The main features of the MCP are:

(1) it is a mobile facility capable of being rapidly deployed;

(2) it serves as operational command, co-ordination and communication centre for aircraft accidents/incidents;

(3) it is operational during aircraft accidents/incidents; and

(4) it is correctly located with respect to wind and terrain conditions.

(b) In the event of any accident/incident, a designated, recognizable and readily visible mobile command centre is a high priority item. It should be established as quickly as possible, preferably at the same time as the initiation of fire control and rescue activities. A continuity of command should be maintained so that each agency reporting to the mobile command centre can be sufficiently briefed on the situation before assuming control of its individual responsibilities.

(c) The design and size of the mobile command centre should be fit for purpose and should contain the necessary communication equipment and personnel to communicate with all agencies

involved in the emergency, including the emergency operations centre. The communication and electronic devices should be checked each month and regularly tested.

(d) In order to eliminate confusion and missed transmissions, since several different agencies are working together in the command post utilizing several radio frequencies and telephones, it is essential that the volume of noise be reduced by utilizing headsets or sound absorbent partitions for each participant.

(e) Maps, charts, and other relevant equipment and information should be immediately available at the mobile command centre.

(f) The mobile command post should be easily recognizable by provision of an elevated distinguishing marker, such as a chequered flag, coloured traffic cone, balloon or rotating light. See Figure-9 for example of a mobile command post.

(g) Depending on the scale and magnitude of an incident, it may be necessary to establish a forward/sub-command post at the inner cordon to allow direct and immediate oversight of rescue and firefighting operations. When this is required, one location should be designated as a “master” command post with sufficient communications to the forward/sub-command post.

Figure-9: Example of a mobile command post

3. AIRPORT INCIDENT COMMAND BOARD

(a) The Airport Incident Command Board (AICB) serves as a crucial tool for managing and coordinating responses to aircraft accident/incident that may occur at an airport or within its immediate vicinity (see Figure-10 as an example of an AICB). The aim and objectives of an Airport Incident Command Board typically include:

(1) To provide a structured framework for effectively managing and coordinating responses to incidents within the airport premises.

(2) To ensure the safety and security of responders, passengers, employees, and airport facilities.

(3) To minimize disruptions to airport operations and restore normalcy as quickly as possible.

(b) AICB main objectives are:

(1) Establish Command Structure: Define clear roles and responsibilities for personnel involved in incident response, including representatives from various airport departments, emergency services, and relevant stakeholders.

(2) Enhance Communication: Facilitate efficient communication channels among all stakeholders involved in the incident response, ensuring timely dissemination of information and coordination of activities.

(3) Coordinate Resources: Identify and allocate necessary resources, such as personnel, equipment, and materials, to effectively manage the incident and support response efforts.

(4) Ensure Safety and Security: Prioritize the safety and security of individuals and property affected by the incident, implementing appropriate measures to mitigate risks and hazards.

(5) Manage Information: Collect, analyse, and disseminate relevant information regarding the incident, including its nature, scope, and potential impact, to inform decision-making and response strategies.

(6) Implement Incident Action Plans (IAPs): Develop and execute comprehensive IAPs outlining specific objectives, tactics, and timelines for managing the incident and achieving established goals.

(7) Monitor and Evaluate Progress: Continuously monitor the progress of response efforts, assess the effectiveness of implemented strategies, and make necessary adjustments to optimize resource utilization and address emerging challenges.

(8) Coordinate with External Agencies: Collaborate with external agencies, such as local emergency services, government agencies, airlines, and other airports, as needed, to enhance response capabilities and facilitate mutual aid agreements.

(9) Facilitate Recovery and Restoration: Develop strategies and initiatives to facilitate the recovery and restoration of airport operations and infrastructure following the resolution of the incident, including post-incident debriefings and lessons learned exercises.

(c) By adhering to these objectives, the Airport Incident Command Board aims to effectively manage incidents, mitigate potential risks, and safeguard the continuity of airport operations while ensuring the safety and well-being of all stakeholders involved.

AIRPORT INCIDENT COMMAND BOARD

Airport Incident Commander Name:	Location	Type of Aircraft	Passenger Aircraft	
			Freight Aircraft	

Passenger Numbers		Incident Action Plan	
Total POB		RVP Identified / Operational	
Crew On Board		FOC Established Up Wind	
Passengers on Board		Fire Extinguished / Controlled	
Walking Survivors		Additional Waters Supplies	
Persons Trapped		Triage Zone Established	
Passengers Transported		Transportation for Passengers	
To The Terminal		Ambulance Loading Zone	
To hospital by Ambulance		Terminal Facilities Available	
Airlifted to Hospital		Helicopter Landing Area	
		Inner Cordon Established	
Missing Passengers		Police Liaison Established	
Code Delta (Dead)		Civil Defence Liaison Established	
Notes:-		Medical Liaison Established	
		Communications with EOC	

Hazardous Materials Information

UN/NA Number:
Name:
Class/Subsidiary:

Aircraft Plan

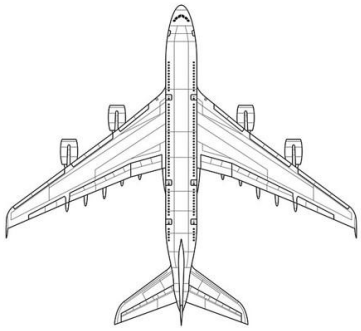


Figure-10: Example of an airport incident command board

4. ROLES AND RESPONSIBILITIES OF THE MOBILE COMMAND POST (BRONZE COMMAND)

(a) Role of the MCP: The Mobile Command Post serves as the on-scene operational hub for managing an aircraft emergency. It is responsible for:

(1) Coordinating operational-level responses by on-scene emergency services lead by the Airport Incident Commander

(2) Managing on-scene resources, including fire and emergency services, medical teams, law enforcement, and security.

(3) Providing situational updates to the higher command levels (Silver and Gold Commands).

(4) Ensuring effective communication among all involved agencies.

(b) Responsibilities of Bronze Command: Bronze Command is responsible for executing the incident management plan at the operational level, ensuring that the strategies developed by Silver Command are carried out effectively. Specific responsibilities include:

(1) Deployment of resources as per the incident action plan.

(2) Monitoring and ensuring the safety of operational personnel.

(3) Liaising with the Airport Incident Commander to report on progress, challenges, and resource needs.

(4) Managing interagency coordination and ensuring that each service understands their role and responsibilities.

5. ESTABLISHMENT AND OPERATION OF THE MOBILE COMMAND POST

(a) Site Selection and Setup: The location of the Mobile Command Post must be strategically selected to provide a clear line of sight of the incident site and accessibility to essential resources. Key factors in selecting an MCP location include:

(1) Proximity to the emergency scene without compromising responder safety.

(2) Adequate space for personnel, communication equipment, and operational tools.

(3) Availability of access routes for emergency vehicles and logistics support.

(b) The MCP should be equipped with the necessary communication systems, including radio, satellite, and secure internet connections, as well as visual aids such as maps, operational plans, and tracking boards.

(c) Operational Structure: The Mobile Command Post should follow a structured command system in line with the Aerodrome Incident Command System (ICS). Key roles include:

(1) **Airport Incident Commander / Bronze Commander**: Overall in charge of the operational response.

(2) **Logistics Officer:** Responsible for ensuring the availability and distribution of resources, including personnel and equipment.

(3) **Operations Officer / Bronze Support:** Coordinates the tactical response of fire services, medical teams, and law enforcement.

(4) **Liaison Officer:** Facilitates communication and coordination with other agencies and stakeholders.

(5) **Safety Officer:** Monitors and ensures the safety of all personnel on-site.

(6) **Communication Officer:** Ensure the functionality of all communication systems and manage the dissemination of information between the MCP, EOC, on-site teams, and external agencies.

(d) Resource Management: Effective resource management is critical for the success of MCP operations. Bronze Command must:

(1) Conduct a thorough assessment of resource availability and deploy them as per the incident action plan.

(2) Ensure that resources are used efficiently and prevent overcommitment, which could lead to operational fatigue.

(3) Keep a detailed log of resource allocation and usage for accountability and future reference.

(e) Communication Protocols: Clear, concise, and continuous communication is essential for effective management of aircraft emergencies. The MCP must establish and maintain communication with:

(1) Silver Command (Tactical): To receive tactical instructions and provide tactical updates.

(2) Gold Command (Strategic): For policy-level decisions, if required.

(3) On-site Units: Fire services, medical teams, law enforcement, and other responders to ensure the alignment of operational activities.

(f) The communication systems must be reliable and should include redundancies such as backup radios, satellite phones, and manual dispatch systems.

(g) See Table 3 for example of standard MCP phraseology for aircraft emergency scenarios and Table 4 for example of MCP incident log entries.

Table 3: Example of standard MCP phraseology for aircraft emergency scenarios

Scenario	Communication Type	Phraseology
Aircraft on Ground with Fire	**Initial Notification**	Bronze Command: "Fire Team One, this is Bronze Command. We have confirmed fire on the starboard wing of [Aircraft Type/Flight Number]. Proceed to designated location Bravo Two for fire suppression. Over."
		Fire Team One: "Bronze Command, this is Fire Team One. Wilco. Proceeding to location Bravo Two for fire suppression. Over."
	Situation Update	Bronze Command: "Silver Command, this is Bronze Command. We have fire under control on starboard wing. No additional fire spread detected. Request status of evacuation. Over."
		Silver Command: "Bronze Command, Silver Command. Evacuation in progress. All passengers are being directed to muster point Alpha. Over."

	Resource Request	Bronze Command: "Logistics, this is Bronze Command. Requesting additional foam units at Bravo Two. Over."
		Logistics: "Bronze Command, Logistics. Wilco.. Dispatching additional foam units to Bravo Two. Over."
Aircraft Crash on Runway	**Initial Notification**	Bronze Command: "Medical One, this is Bronze Command. Aircraft crash reported on Runway 05. Activate triage operations at the crash site. Over."
		Medical One: "Bronze Command, this is Medical One. Wilco. Proceeding to Runway 05 for triage operations. Over."
	Situation Update	Bronze Command: "Silver Command, this is Bronze Command. Aircraft severely damaged, multiple casualties. Medical teams are on site. Request evacuation update. Over."
		Silver Command: "Bronze Command, Silver Command. Evacuations ongoing. Casualty numbers are being confirmed. Over."
	Resource Request	Bronze Command: "Logistics, this is Bronze Command. Requesting additional ambulances at Runway 05. Over."
		Logistics: "Bronze Command, Logistics. Wilco. Dispatching additional ambulances to Runway 05. Over."
Aircraft Off-Runway with Casualties	**Initial Notification**	Bronze Command: "Rescue Team, this is Bronze Command. Aircraft has veered off the runway, multiple casualties reported. Begin search and rescue operations at location Foxtrot 3. Over."
		Rescue Team: "Bronze Command, this is Rescue Team. Wilco. Beginning search and rescue operations at Foxtrot 3. Over."

	Situation Update	Bronze Command: "Silver Command, this is Bronze Command. Multiple casualties located, medical teams en route. Request additional rescue support. Over."
		Silver Command: "Bronze Command, Silver Command. Additional rescue teams dispatched. Provide further casualty details when available. Over."
	Resource Request	Bronze Command: "Logistics, this is Bronze Command. Requesting additional stretchers and medical supplies at Foxtrot 3. Over."
		Logistics: "Bronze Command, Logistics. Wilco. Dispatching stretchers and medical supplies to Foxtrot 3. Over."

Table 4: Example of MCP incident log entries

Time (LT)	Log Entry	Officer In-Charge
08:15	Incident Declared: Aircraft [Flight Number] reported fire on the starboard wing after landing on Runway 05. Bronze Command activated and on site at Bravo Two.	Bronze Commander
08:17	Initial Notification: Fire 1 deployed to Bravo Two for fire suppression on the starboard wing of [Aircraft Type/Flight Number].	Bronze Commander
08:20	Resource Request: Logistics requested to dispatch additional foam units to support fire suppression operations at Bravo Two.	Logistics Officer
08:25	Situation Update: Fire under control. No further spread detected. Requesting update from Silver Command on evacuation status.	Bronze Commander
08:28	Medical Response: Medical 1 deployed to Bravo Two for casualty triage and assessment.	Medical Officer

08:30	Communication: Silver Command confirmed passenger evacuation in progress. All passengers being directed to muster point Alpha.	Bronze Commander
08:35	Hazard Update: Hazardous material assessment requested at aircraft cargo hold by Hazmat Unit.	Safety Officer
08:40	Resource Request: Additional protective gear dispatched to Hazmat Unit at location Echo for assessment of cargo hold.	Logistics Officer
08:45	Casualty Update: Two passengers reported with minor injuries. Medical teams attending to injured. Casualty evacuation ongoing to muster point Alpha.	Medical Officer
08:50	Progress Report: Fire suppression completed. All firefighting units standing by for further instructions. Incident under control.	Fire 1
09:00	Debrief Preparation: Arrangements made for multi-agency debrief after incident termination. All units to provide logs and feedback.	Bronze Commander
09:10	Incident Stand Down: All emergency response teams ordered to stand down. Bronze Command to oversee personnel demobilisation and resource recovery.	Bronze Commander
09:15	Log Close: Incident log concluded. Full report to be submitted to Silver Command within 24 hours.	Bronze Commander

6. INTERAGENCY COORDINATION

(a) Multi-Agency Coordination: Aircraft emergencies often involve multiple agencies working together. Effective interagency coordination ensures that:

(1) Each agency's role is clearly defined in the incident action plan.

(2) Agencies maintain their own command structures but operate under the unified command framework established by the MCP.

(3) Regular interagency briefings are held to update all responders on the current status of operations, emerging risks, and changes in strategy.

(b) Joint Incident Action Plan: The MCP is responsible for implementing the Joint Incident Action Plan, which outlines the tactical objectives, operational strategies, and resource deployment

for the aircraft emergency. The plan should be developed with input from all responding agencies and must include:

(1) Objectives: Clear and measurable goals for each phase of the emergency response.

(2) Tactical Assignments: Specific tasks assigned to each unit, such as fire suppression, casualty evacuation, or perimeter security.

(3) Contingency Plans: Secondary actions to be taken in case of unexpected developments, such as adverse weather or secondary incidents.

7. SAFETY AND WELFARE OF PERSONNEL

(a) Personnel Safety: Bronze Command has a primary responsibility to ensure the safety and welfare of all operational personnel. This involves:

(1) Conducting regular dynamic risk assessments and hazard identification at the incident site.

(2) Implementing safety measures such as personal protective equipment (PPE), decontamination protocols, and safe zones.

(3) Monitoring fatigue levels and mental health of responders, ensuring adequate rest periods and psychological support where necessary.

(b) Incident Termination and Demobilisation: The MCP will oversee the safe demobilisation of all personnel and resources at the conclusion of the emergency. This includes:

(1) Accounting for all personnel and equipment.

(2) Conducting a post-incident briefing to evaluate the response and identify areas for improvement.

(3) Ensuring the site is handed over to the appropriate authority for investigation or recovery efforts.

8. POST-INCIDENT REVIEW AND REPORTING

(a) Debriefing: Once the emergency has been brought under control, a debriefing session should be conducted at the MCP with all involved agencies. This debrief should cover:

(1) A summary of the incident and the response operations.

(2) Identification of any operational challenges encountered.

(3) Recommendations for improving future MCP operations.

(b) Reporting: A formal incident report should be prepared by Bronze Command detailing the MCP's activities, resource usage, and coordination efforts. This report must be submitted to Silver Command and the Emergency Operations Centre (EOC) within a stipulated timeframe.

9. CONCLUSION

(a) Effective management of the Mobile Command Post (Bronze Command) during aircraft emergencies is essential for the success of the overall incident response. This guidance document, based on ICAO standards and best practices, provides a comprehensive framework for the setup, operation, and coordination of MCP activities. By following this structured approach, aerodrome operators and emergency responders can ensure a coordinated, efficient, and safe response to aircraft emergencies.

AMC5 ACM.OPS.CERT.D.005(a) Emergency planning

COMMUNICATION SYSTEM

(a) A communication system should be provided at the aerodrome that:

(1) link the crisis management centre, the emergency operations centre and the mobile command post with each other and with the relevant responding agencies are provided;

(2) ensure adequacy of the communication system in accordance with the emergency plan and consistent with the particular requirements of the aerodrome; and

(3) where an aerodrome operates more than one operational runway, a communication system is capable to support multiple emergencies. Where necessary, a communication needs assessment should be conducted.

GM AMC5 ACM.OPS.CERT.D.005(a) Emergency planning

1. COMMUNICATION SERVICES

(a) Arrangements for two-way communications should be made for all aerodrome agencies involved in an emergency. The plan also should include the maintenance of a sufficient communication network with off-aerodrome agencies responding to an emergency. The plan calls for the mobile command centre and emergency operations centre to have the capability of continuous communication with all participating agencies. Backup modes of communication should be identified during the planning process.

2. COMMUNICATION NETWORK

(a) Communication network for use during an emergency should be accepted by the UAE telecommunication authority to be used at an aerodrome.

(b) A co-ordinated communication network is of vital importance to any major operation involving agencies from more than one jurisdiction.

(c) A co-ordinated communication network should consist of a sufficient number of radio transceivers, telephones and other communication devices to establish and maintain a primary and a secondary means of communication. These networks should link the emergency operations centre and the command post with each other as well as with all participating agencies.

(d) The operational communication network should provide a primary and, where necessary, an alternate means for effective direct communications between the following, as applicable:

(1) The alerting agency (control tower or flight service station, aerodrome manager, fixed-base operator, or airline office) and the rescue and firefighting (RFF) units serving the aerodrome.

(2) Air traffic control tower and/or flight service station, the appropriate ARFFS watchroom and the RFF crews en-route to an aircraft emergency and at the accident/incident site.

(3) Appropriate mutual aid agencies located on or off the aerodrome, including an alert procedure for all auxiliary personnel expected to respond.

(4) The RFF vehicles, including a communication capability between crew members on each RFF vehicle.

3. COMMUNICATION EQUIPMENT

(a) It is important to provide serviceable communication equipment in sufficient quantity to ensure rapid response of personnel and equipment to an emergency. The following communication equipment should be available for immediate use in the event of an emergency.

(b) A sufficient number of portable, two-way radios should be available to provide each participating agency with the ability to communicate with the command post.

(c) Strict communication discipline should be employed to prevent jamming of emergency frequencies. Each agency should operate on its own frequency, and there should be a designated command frequency.

(d) Radios should be available at the command post to provide direct communication with the aircraft or ground controllers should it become necessary. These radios should be equipped with headsets to reduce the confusion and noise from multiple frequencies in use at the time.

(e) Direct communications may also be established with the pilot or the aircraft cockpit by use of cockpit-to ground lines. This requires a proper connector, wire, microphone, and headset. Co-operation and co-ordination between the aerodrome rescue and firefighting service and the

individual aircraft operator(s) are needed to establish this type of communication capability. Normally, this communication capability results from the use of a ground service headset that is plugged into a wheel well interphone jack.

(f) A sufficient number of telephone lines (both listed and unlisted) or cellular phones should be available at the command post to provide direct communication with agencies outside the aerodrome, as well as within the aerodrome. Direct lines save time and reduce the probability of overloading radio communication channels.

(g) Medical facilities and ambulances need communications capability in order to take advantage of advance life support systems within the medical community.

(h) A dedicated vehicle equipped with necessary communication equipment and self-contained electrical power may be a definite asset to a good communication system. A well-equipped communication vehicle is an indispensable part of an efficient, well-managed command post. Planning should always include a qualified vehicle driver/operator.

(i) It is desirable to install recording devices with time insertion units at the operations centre and/or mobile command centre to ensure that all communications are recorded for later analysis. It is also desirable to record all emergency communications, including printed communication.

(j) In the event of a temporary lapse of communications, appropriate contingency measures or runners should be assigned to the command post to augment other modes of communication. Portable megaphones should also be available.

4. APRON AND TERMINAL AREA EMERGENCIES

(a) A communications system should be established by the aerodrome operator s, or the aircraft operators, in order to provide rapid response of the emergency equipment to accidents and incidents occurring in the terminal areas. Apron accidents include aircraft cabin fires, refuelling spills and fires, aircraft and vehicle collisions and medical emergencies.

(b) As many apron personnel as possible, but at least all supervisory personnel, should be equipped with two-way radios in order to establish direct communication with a central notification facility.

(c) All aircraft loading gates or jetways should be equipped with telephones at both boarding and apron levels.

(d) Emergency telephone numbers should be prominently displayed at apron areas.

5. TESTING AND VERIFICATION

(a) The communication system should be tested each day to verify the operability of all radio and telephone networks.

(b) A complete and current list of interagency telephone numbers should be available to all agencies and to personnel responsible for the aerodrome/community emergency plan. These phone numbers should be verified monthly to ensure they are correct. Updated lists should be distributed to all emergency plan participants on a continual basis.

AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY MEDICAL SERVICES, FACILITIES AND EQUIPMENT

(a) Emergency medical services, facilities and equipment at the aerodrome should include:

(1) sufficient procedures for managing evacuated aircraft passengers and crew to safe and secure areas away from the scene of an incident in airside;

(2) rescue and firefighting personnel trained and competent in occupational first aid (OFA) and cardiopulmonary resuscitation (CPR), as determined by an appropriate medical person or organisation;

(3) where there are no medical services available at an aerodrome and/or it is anticipated that a response from the nearest emergency medical services is more than 15 minutes, at least, two full-time members per shift of the rescue and firefighting service or other on-aerodrome personnel are trained and competent as qualified emergency medical treatment level;

(4) sufficient emergency medical supplies are provided or made available within the vicinity of the aerodrome, to render medical assistance commensurate with the level of protection at an aerodrome;

(5) an assessment on the types and quantities of emergency medical supplies, facilities and equipment to be provided at an aerodrome for emergency purposes; and

(6) emergency reception facilities including sufficient trained personnel and equipment are available at an aerodrome including but not limited to:

(i) casualty collection and clearance centre;

(ii) aircraft crew reception centre;

(iii) family and friend reception centre;

(iv) survivor reunion centre;

(v) survivor reception centre;

(vi) survivor repatriation centre; and

(vii) temporary morgue (body holding area).

GM1 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY MEDICAL SERVICES AND EQUIPMENT

(a) Sufficient medical services and supplies should be provided at an aerodrome. Provision of medical services will generally not present great difficulties at a large aerodrome or aerodromes near a large city, as the human resources and material will normally be available. It is necessary to develop the co-ordination with the emergency medical assistance system in the region. The medical co-ordinator appointed to the aerodrome should be responsible for the provision and checking of medical supplies.

(b) Provision of medical services may present some difficulties at small aerodromes not located near populated areas.

(c) These aerodromes, however, should have available emergency medical services to provide sufficient medical care in the event of an aircraft accident, taking into account the largest aircraft using the aerodrome.

(d) A medical inventory of the aerodrome community area should be part of the aerodrome emergency plan. Consideration should be given to:

(1) human resources on and off the aerodrome, i.e. doctors, teams qualified in occupational first aid, stretcher bearers and nurses; and

(2) medical equipment and services on and off the aerodrome, i.e. hospitals and ambulances.

(e) At aerodromes where the above resources are only available from areas beyond the immediate aerodrome community, the aerodrome emergency plan should be integrated with wider emergency plans to obtain the necessary response, possibly using helicopters to transport medical services and equipment to the crash site.

EMERGENCY MEDICAL SERVICES AT AERODROMES

(a) Basis for recommendations.

(1) Emergency medical services at aerodromes are based on the concept that medical personnel and a medical facility commensurate with the size of the aerodrome have been established at an aerodrome and that mutual aid emergency agreements have been developed. Sufficient medical supplies should be maintained at an aerodrome facility to deal with routine medical emergencies which normally occur at an aerodrome (on-the-job injuries, heart attacks, etc.) plus possible aircraft accidents.

(2) Emergency medical training of aerodrome personnel. All personnel assigned to rescue duties and “public-contact” aerodrome employees should be given first aid and CPR (cardiopulmonary resuscitation) training.

(3) Rescue and firefighting personnel should have the ability to stabilize seriously injured casualties. At least two full-time members per shift of the aerodrome rescue and firefighting service or other on-aerodrome personnel should be trained to an emergency medical treatment level as determined by the local medical authority. In addition, it is recommended that as many rescue and firefighting personnel as is practicable receive training to meet minimum standards of medical proficiency and preferably to the level of personnel highly qualified in first aid or the equivalent. Accordingly, they should have sufficient medical equipment at their immediate disposal to initiate stabilization until full medical services are available at the site or until transportation of casualties to sufficient medical facilities is provided.

(b) Occupation first aid and cardiopulmonary resuscitation.

(1) Rescue and firefighting personnel should be trained in occupational first aid (OFA) and cardiopulmonary resuscitation (CPR) as taught by the medical authority, accepted medical person or organisation. Periodic exercises and drills in OFA and CPR techniques are mandatory to maintain proficiency.

(2) The everyday medical problems at an aerodrome can serve to promote and ensure a sufficient level of medical proficiency of aerodrome-based emergency personnel. It should be noted, however, that proficiency in emergency medical techniques can be maintained only through constant practical application. Unless operations include providing advanced life-support systems on a day-to-day basis, proficiency will decline or disappear.

(3) Aerodromes may enlist volunteers from aerodrome employees other than rescue and firefighting personnel to provide an immediate response to assist casualties resulting from emergencies. Volunteers should be trained by accredited agencies in first aid and rescue response duties. In case of an emergency, they should initially be under the supervision of the first commander at the scene, i.e. the chief fire officer, until the arrival of the medical co-ordinator. Each appropriate authority should address the issues of compensation and liability.

(c) Emergency medical supplies and equipment.

(1) The aerodrome operator should arrange to have sufficient medical supplies, available on or in the vicinity of the aerodrome, to treat the passenger and crew capacity of the largest aircraft normally using the aerodrome. Experience has shown, however, that more than one aircraft can be involved in an aircraft accident. Consequently, medical supplies to handle this possibility should be considered. The type and quantity of such supplies

should be determined by the principal medical authority for the aerodrome using the statistical information given in Table 5 below.

Table 5: Estimated maximum number of casualties at an aircraft accident at an aerodrome.

Aircraft occupants	Number of casualties	20 per cent casualties Immediate care Priority I	30 per cent casualties Delayed care Priority II	50 per cent casualties Minor care Priority III
550	413	83	125	205
500	375	75	113	187
450	338	68	101	169
400	300	60	90	150
350	263	53	79	131
300	225	45	68	112
250	188	38	56	94
200	150	30	45	75
150	113	23	34	56
100	75	15	23	37
50	38	8	11	19

Note: These figures are taken from ICAO based on the assumption that the maximum number of surviving casualties at an aircraft accident occurring on or in the vicinity of an aerodrome is estimated to be about 75 per cent of the aircraft occupants.

(2) Statistical data collected from aircraft accidents indicates that about 75 per cent of the aircraft occupants are expected to be surviving casualties. It can be expected that requirements for care of these will be distributed as follows:

(i) 20 per cent — Immediate care (Red — Priority I)

(ii) 30 per cent — Delayed care (Yellow — Priority II)

(iii) 50 per cent — Minor care (Green — Priority III)

A table of the estimated maximum number of casualties resulting from an aircraft accident occurring at an aerodrome is given in Table-1.

(3) The aerodrome should have available stretchers, blankets, backboards and/or immobilizing mattresses, preferably stored on a suitable vehicle (e.g. trailer) which can

be transported to the accident site. Blankets are needed to alleviate casualties' exposure to shock and possible adverse weather conditions. Since trauma victims in an aircraft accident sometimes sustain severe spinal injuries, backboards and cervical collars should be used when removing such casualties from the aircraft in order to minimize the possibility of further spinal injury. The backboards should be of a type designed to fit through access ways and aisles of commercial and business aircraft. They should have restraining straps available so that the patient can be secured to the board. A cleat should be attached to the underside of the backboard to facilitate lifting by carrying personnel.

(4) Sufficient emergency oxygen and respiratory equipment should be available to treat smoke inhalation victims.

(5) Since the majority of non-accident-related medical emergencies at aerodromes involve coronary difficulties, advanced life support systems should be readily available.

(6) Mobile emergency hospitals or inflatable tents or shelters can be used for on-site treatment of immediate care (Priority I — Red) and delayed care (Priority II — Yellow) casualties. These units should be readily available for rapid response. The casualties can be treated at the scene, stabilized and be available for transportation to the appropriate hospital.

(7) A resuscitation type ambulance can be used as an ideal shelter for an immediate care (Priority I — Red) casualty.

(8) Inflatable tents should have sufficient ventilation and lighting when possible. A large tent can normally accommodate about ten (10) serious cases and can be carried on a large all-purpose vehicle along with other necessary medical equipment.

(9) To cope with an emergency involving a large aircraft, it is recommended that the general emergency medical supplies and equipment described in Table-2 be available at an aerodrome or be available from outside sources. Table-2 has been prepared to cope with the largest type of aircraft at present being used for commercial air transport operations, i.e. A380, B747, DC-10, Airbus. If only operations by smaller aircraft are planned for the foreseeable future, the specified medical supplies and equipment should be adjusted to comply with reasonable requirements for the largest aircraft expected to operate at an aerodrome.

(10) The following material describes some of the items included in Table 6:

(i) Immobilizing mattresses (also called vacuum mattresses): This apparatus consists of a plastic bag designed like a mattress and filled with very small balls. An aspirator (mechanical or other) is used to take out the air so that the mattress is crushed by

atmospheric pressure and becomes as rigid as plaster. A human body, partly enveloped before compressing the mattress, is completely wrapped. Head, limbs and backbone thus become immobilized, allowing any type of transportation through the use of lateral rope loops. The apparatus is permeable to x-rays. Although the dimensions are variable, its length varies generally between 1.80 and 1.90 m and its width between 0.80 and 0.90 m.

(ii) Backboards. These are classified as long and short backboards. The approximate dimensions for a long backboard are 1.90 x 0.5 m. Although a backboard of 1.90 m, some backboards of 1.85 m length should be available to manoeuvre through the smallest aircraft emergency exits of 51 cm wide and 91.5 cm high. A 7.5 cm wide velcro retaining strap is normally required for legs. hips, upper torso and head. The appropriate dimensions for a short backboard is. A 7.5 cm wide velcro retaining strap is normally required for lower and upper torso.

Table 6: List of general emergency medical supplies and equipment

Description	**Quantity**
Triage labels	500
Stretchers, adaptable to the most commonly used ambulances	100
Immobilizing mattresses for backbone fractures	10
Splints, either conventional or inflatable, for the various types of fractures	50
First-aid kits, each containing a set of 10 tags, haemostatic pads, tourniquets, respiratory tubes, scissors, dressings, sterile burn packs	50
Resuscitation chests containing material for on-site intubation, infusion and oxygenation for about 20 casualties	20
Electrocardiographic or electro-radioscopic apparatuses	2 or 3
Manual or mechanical respirators	2 or 3
Intravenous infusion packs (normal saline or haemocoel) with giving sets	10
Suction devices	2 or 3
Entonox analgesic cylinders	2
Plastic body bags / temporary storage for the deceased	300-500

(d) Emergency medical communication system.

(1) Communications is a primary requisite of an aerodrome emergency medical plan. The aerodrome medical service communication system should ensure sufficient communication during emergencies to disseminate warning information and obtain

support operations. Without communications the hospital cannot know the number and type of casualties it will be receiving, ambulances cannot be directed to the facilities most capable of rendering the needed care, supplies available from outside sources cannot be called for, and medical personnel cannot be directed to the point where they are needed most.

(2) The participating hospitals should have the capability of communicating with one another by means of a two-way communication network. Ideally, each hospital should have the capability of either calling other individual hospitals or, if the occasion arises, calling all other hospitals simultaneously. This capability is invaluable for hospitals experiencing an emergency such as a requirement for a certain blood type or an item of equipment in short supply. It is also recommended that the medical co-ordinator be able to communicate with participating hospitals directly.

(e) Emergency medical transportation facilities.

(1) The dispatch of casualties to hospitals from the accident site should take into consideration the hospital(s) medical personnel on staff, medical specialties and beds readily available. Ideally, each aerodrome should have available at least one on-call ambulance for routine medical emergencies. Written agreements with off-aerodrome based ambulances should be prepared to provide for emergency transportation services.

(2) Airborne transportation equipment, i.e. helicopters and fixed wing aircraft, should be considered for emergency evacuation or for transport of medical services and equipment from hospitals to the accident site.

(3) Since it may be necessary to transport many casualties to appropriate off-aerodrome medical facilities, ambulances arriving at the scene should report to the rendezvous point or staging area and then to the designated transportation officer. This officer will be responsible for ascertaining the number of casualties who will need transportation, the number and type of ambulance units necessary, and the availability and capacity of each medical facility receiving casualties. In the event of a multi-casualty accident, the transportation officer (or members of the team) will also supervise the actual loading, recording of names and injuries of casualties, and routing of the individual vehicles and casualties to hospitals.

(4) In major emergency situations, other means of transportation may be substituted for ambulances. Vans, buses, automobiles, station wagons or other suitable aerodrome

vehicles may be used. Immediate transportation for moving of the uninjured or apparently uninjured to a designated holding area should be available.

(5) A grid map (with date of latest revision) of the aerodrome and surrounding area should be provided for all rescue vehicles. All medical facilities should be depicted prominently on the grid map

AERODROME MEDICAL CARE FACILITIES (MEDICAL CLINIC AND/OR FIRST-AID ROOM)

(a) General factors influencing need.

(1) There are many general factors which influence the need for an aerodrome first-aid room or an aerodrome medical clinic. Factors to be taken into consideration include:

(i) the number of passengers served annually and the number of employees based on the aerodrome;

(ii) the industrial activity on the aerodrome property and in the surrounding community;

(iii) the distance from sufficient medical facilities; and

(iv) mutual aid medical services agreements.

(2) Generally, it may be recommended that an aerodrome medical clinic be available when the aerodrome employees number 1 000 or more and that a first-aid room be available at every aerodrome. The aerodrome medical care or first-aid room personnel and facilities should be integrated with the aerodrome emergency plan.

(3) The aerodrome medical clinic, in addition to providing emergency medical care to the aerodrome population, may extend emergency care to communities surrounding the aerodrome, if these communities have no emergency facilities of their own.

(4) The aerodrome medical clinic may be included in the community emergency services organization and planning. In the event of a large-scale non-aerodrome local emergency, the aerodrome medical clinic may function as the co-ordination site for direction of incoming medical assistance.

(b) Location of aerodrome medical care facilities.

(1) The facilities should be readily accessible to the aerodrome terminal building, to the general public and to emergency transportation equipment (i.e. ambulances, helicopters, etc.). Site selection should avoid the problem of having to move injured persons through congested areas of the aerodrome terminal building, while providing access to the facility by emergency vehicles by a route that as far as is feasible can bypass normal public access roadways to and from the aerodrome. This suggests that the medical care facility be

located so that access can be gained from the air side of the aerodrome terminal building as this provides control over unauthorized vehicles interfering with emergency equipment.

(c) Aerodrome medical care facility personnel.

(1) The number of trained personnel and degree of expertise needed by each individual will depend on the particular aerodrome's requirements. The staff of the aerodrome medical clinic should form the nucleus for the medical services planning for the aerodrome emergency plan (and be responsible for implementation of the medical portion of the plan). It is recommended that an aerodrome first-aid room be staffed with at least highly qualified first-aid personnel.

(2) In general, it is recommended that during the principal hours of aerodrome activity at least one person trained to deal with the following be on duty:

(i) cardiopulmonary resuscitation (CPR);

(ii) bleeding from a traumatic source;

(iii) Heimlich manoeuvre (choking);

(iv) fractures and splinting;

(v) burns;

(vi) shock;

(vii) emergency childbirth and immediate care of newborn, including prematures;

(viii) common medical conditions which may influence the outcome of injury (allergies, high blood pressure, diabetes, pace-maker, etc.);

(ix) basic measures for treatment and protection subsequent to spills or leaks of radioactive materials, toxic, or poisonous substances;

(x) treatment of emotionally disturbed persons;

(xi) recognition and first aid for poisons, bites, and anaphylactic shock; and

(xii) transportation techniques for injured persons.

(3) This person should have authority to order hospitalization, if necessary and to arrange any needed transportation.

(4) The aerodrome operator should obtain the advice and direction of a consulting emergency medical care physician as to the allotment and design of equipment for the first-aid room commensurate with the anticipated needs of the particular aerodrome.

(5) The aerodrome medical clinic equipment and the medical supplies have to be determined by the physician or the group of physicians in charge of the clinic. It should be remembered that responding to an aircraft emergency may be the main problem.

(6) The aerodrome medical care facility should be sufficiently equipped to handle cardiac arrest and other types of injuries and illnesses associated with industrial medicine. If drugs are maintained, provision should be made to ensure full security.

(7) Sufficient emergency oxygen and respiratory equipment should be available to treat smoke inhalation victims.

(8) Since the majority of non-accident related medical emergencies at aerodromes involve coronary problems, advance life support systems including oxygen, oxygen regulators, and other elements for cardiopulmonary care should be readily available. In addition, first-aid kits (containing drugs, a wide selection of bandages and splints, blood transfusion equipment, and burn and maternity kits), chains, ropes, crow-bars, and metal cutters should be available.

AERODROMES WITHOUT A MEDICAL CARE FACILITY

(a) At aerodromes without a medical care facility (medical clinic or first-aid room), the aerodrome operator should make arrangements to have available sufficient personnel trained in advanced first aid to cover all active hours of aerodrome operation. Equipment for first aid work at these aerodromes should consist, at minimum, of an emergency medical care bag.

(b) This bag should be readily available to be carried on a designated aerodrome emergency vehicle and should contain at least:

(1) one plastic sheet (1.80 m × 1.80 m) with four spikes;

(2) seven haemostats (one package of three, one package of four);

(3) two field dressings (one 45 cm × 56 cm, one 56 cm × 91 cm);

(4) ten abdominal pads (five packages of two);

(5) forty 10 cm × 10 cm gauze pads (four packages of ten);

(6) two tourniquets;

(7) one artificial airway;

(8) three disposable airways (one each No. 2, No. 4, No. 5);

(9) one bulb syringe with two catheters (No. 12, No. 14 FR);

(10) two large bandage scissors;

(11) twenty disposable syringes with No. 25 GA 1.6 cm needle;

(12) twelve ace bandages (two 15 cm, four 7.5 cm, six 5 cm);

(13) twelve alcohol sponge packages;

(14) four rolls of gauze bandage (two 7.5 cm, two 5 cm);

(15) two rolls of adhesive tape;

(16) four vaseline gauze dressings (15 cm × 91 cm);

(17) box of 100 band-aids;

(18) one blood pressure cuff and gauge;

(19) two clipboards (22 cm × 28 cm);

(20) six pencils;

(21) sufficient supply of casualty identification tags (see Appendix 8);

(22) one set of inflatable splints;

(23) one resuscitube;

(24) one short spine board;

(25) one flashlight;

(26) two cervical collars;

(27) one bite-stick wedge;

(28) one disposable obstetric kit; and

(29) one immobilizing mattress.

GM2 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

EMERGENCY FACILITIES

(a) The aerodrome should provide a designated area for passengers in order to assemble and process those who were not injured, or apparently were not injured, during an emergency or times of disruption. Depending on local circumstances, this area should also be able to take care of injured passengers. The area selected should provide for both passenger stabilization and secure protection from the news media.

(b) Taking care of passengers and providing them with all necessities including food and beverages, warm clothing, etc. is of major importance. Holding together all groups involved in the accident and in the recovery phases of an accident makes it easier for all parties to control the flow of information both to passengers and to relatives.

(c) A reception centre should be established in order to accommodate and facilitate the presence of governing agencies, aircraft operator representatives, health care agencies, police, customs or any other organization involved. The reception centre will be the natural point of contact for families, friends, meeters and greeters to get in contact with passengers.

(d) When considering areas where the various functions for caring of survivors can take place, thought should be given to, at minimum, the following factors:

(1) Security of the area;

(2) Access/egress;

(3) The size of the area;

(4) Facilities such as seating, toilets, etc.;

(5) Telephones/facsimile machines;

(6) Refreshments, etc.;

(7) Processes that need to be undertaken within areas such as triage, medical and welfare;

(8) Wheelchair and stretcher access;

(9) Identification of all persons, including passengers;

(10) Areas for relatives, friends and authorized personnel;

(11) Location and availability of various supplies such as first-aid kits, blankets, stretchers, etc.;

(12) Power supply for equipment; and

(13) Removal and distribution of luggage and personal effects.

(e) The reception centre and areas where equipment is located should be shown in the AEP. The list of information that should be kept in an emergency kit at reception centres is as follows:

(1) All personnel of the centre should have knowledge of the location of the emergency kit. The kit should contain writing pads or forms on which to list the following information for each passenger:

(i) Name, address and home telephone number of the passenger;

(ii) Name and telephone number of the person to be notified of the passenger's condition;

(iii) Arrangement requests of the passenger (i.e., future flight, hotel, transportation within the local area, etc.); and

(iv) Where the passenger can be contacted during the next 72 hours.

(2) The kit should also contain adhesive name tags to identify passengers who have been processed and those for whom arrangements have been made.

(3) Telephone numbers for the following resources should be available in the emergency kit:

(i) Doctors to attend to minor injuries: Each aircraft operator should have a letter of agreement with a physician(s) who will respond to a designated holding area;

(ii) Hotels where passengers can be billeted: It is beneficial to place passengers in the same hotel, or at least in groups at hotels;

(iii) Linguists, who should be available on a 24-hour basis and preferably people who work on the aerodrome, for quick response. (Local schools and private language departments can also be contacted);

(iv) Caterer (if commissary items are required);

(v) All local reservations offices of aircraft operators;

(vi) Ambulance companies, in case a passenger unexpectedly requires transportation;

(vii) Taxicab companies; and

(viii) Emergency telephone numbers to be disseminated on radio and television, so that families of the casualties may telephone and receive information.

(4) A current copy of a recognized airline guide should be available in the emergency kit. Local airline schedules would be most helpful for registrars who will be making reservation arrangements on future flights.

(f) Consideration needs to be given to arrangements for the release of survivors from the Reception Centre, as follows:

(1) Reconciliation with relatives;

(2) Survivors without waiting relatives; and

(3) Survivors waiting for other survivors.

(g) Friends and Relatives Reception Centre

(1) A secure and comfortable area should be provided for the assembly of friends and relatives, located landside in a discreet and comfortable location which is secure and out of the eye of the public. There, these persons can be registered as legitimate friends and relatives of the passengers involved in the accident/incident. This is the first place that families and friends are taken to provide for their basic needs, to record details of the family and to provide information updates.

(2) The Care of Relatives Plan should be automatically activated when the emergency operational response to the following emergencies is activated:

(i) Aircraft crash on-aerodrome; and

(ii) Aircraft crash off-aerodrome, where the aircraft originated from or was destined for the aerodrome.

(3) A senior official of the aircraft operator will be responsible for the initial notification of relatives and friends.

(h) Reunion and Exit Centre

(1) A secure and comfortable area for the exit of uninjured passengers and their reunification with friends and relatives should be established. This may include a private area where friends and relatives will receive information of a passenger's status.

(i) Survivor Reception Centre

(1) In the transportation area(s), the Incident Command Post should control and record the transportation of every survivor.

(2) For uninjured survivors, the aerodrome operator , aircraft operator (where involved) or other predesignated agency selected for the purpose is responsible for:

(i) Interviewing the uninjured and recording their names, addresses, phone numbers and where they can be reached for the next 72 hours;

(ii) Notifying relatives or next of kin where deemed necessary;

(iii) Co-ordinating efforts with the designated international relief agency (Red Cross, etc.);

(iv) Preventing interference by unauthorized persons or those not officially connected with the operation in progress; and

(v) Keeping contact data for every survivor so that the emergency response process can be continued.

(j) Survivor Repatriation Centre

(1) A survivor repatriation centre is a facility that helps individuals who have survived traumatic events at aerodromes and in need repatriation assistance.

(2) For uninjured survivors, the aerodrome operator, aircraft operator (where involved) or other predesignated agency selected for the purpose is responsible for:

(i) medical care;

(ii) counselling;

(iii) legal aid;

(iv) accommodation;

(v) travel arrangements; and

(vi) other necessary resources to support their return to the home country or intended destination safely.

(k) Aircraft Operator Roles and Responsibilities

(1) The aircraft operator is normally the best entity to establish whether or not a person has been involved in an aircraft accident. UAE legislation requires each aircraft operator to maintain a passenger manifest. It is important for the aircraft operator to establish strict control on the dissemination of passenger manifest to prevent release to unauthorised persons/organisations. The aircraft operator is also required to establish family assistance plan in accordance with UAE regulation UAE National Aviation Disaster Family Assistance Plan regulation for the provision of family assistance in the event of an accident. The plan covers necessary safety and well-being support, crisis counselling, etc. For detailed information on the UAE aviation disaster family assistance plan, refer to Civil Aviation Regulations Family Assistance Plan (CAR FAP).

(2) The aircraft operator is required to provide a high level of protection of passengers by establishing common rules on care and assistance to passengers in the event of denied boarding, cancellation, delay and diversion of flights. Aircraft operators are required to establish regulations and policies required to implement effective coordination and control of the efforts to provide a passenger welfare programme. This regulation requires aircraft operators flying to/from and diverting to aerodromes located in the United Arab Emirates implement a passenger welfare programme, which can be part of their business continuity plan, and ensure that the programme is implemented, supervised and audited as necessary. For further guidance on the provision of passenger welfare programme, refer to Civil Aviation Regulations Passenger Welfare Programme (CAR PWP).

(3) The aircraft operator should have suitably qualified and trained persons available to answer inquiries concerning the passengers involved. In general, aircraft operators have an extensive and comprehensive emergency plan for handling accidents. These plans should be synchronized with the emergency plans of the aerodrome to minimize any reduction of effectiveness of deployed resources.

(4) The Airline Coordinator.

(i) Normally this would be the senior representative from the airline whose aircraft had the accident. In the event of a charter or non-scheduled flight, the representative of the airline designated to provide ground services for that flight should take charge. In the event of an overflight or carrier without personnel based at an aerodrome, representative authority would have to be determined by those responding. The person in charge should have radio communication to the airline operations or other designated emergency centre. Telephones should be available in the holding areas. The person in command oversees the overall airline operations, making arrangements for additional medical services if required, commissary items, and so forth.

(ii) The receptionist should meet the transportation vehicles as they arrive from the scene of the accident and direct the passengers to the registrars' tables where they will be processed. The receptionist should know where toilet facilities are located.

(5) Registrars.

(i) The registrars should have emergency kits available to them. Two people should constitute one registrar team. Several teams can be required to process the passengers swiftly and efficiently. One member should enter the passenger's name on the manifest and determine what reservation requirements are desired (hotel

accommodations, another flight, transportation, etc.) and any persons to be notified of the passenger's condition and plans. The other member of the registrar team should make out an ID tag or sticker (available from the emergency kit) and place it on the passenger. This action can assist in identifying the passenger when accommodations have been made and, more important, will indicate that the passenger has been processed. The registrars should direct the victims to the welfare coordinators when their registration is completed. See Figure-3 for an example of a registrar form.

(ii) Welfare coordinators are the nucleus of psychological first aid. They should attempt to stimulate passenger discussion. Special attention should be given to those who do not join in the discussion. In giving psychological first aid, welfare coordinators should note that some persons become more disturbed than others. Giving those persons sympathetic understanding can be the first step toward helping them. Overwhelming victims with pity could only increase their fear and feelings of helplessness. A person who exhibits bodily trembling, rapid breathing, rapid pulse, shortness of breath, and so forth, should be engaged in conversation, and professional medical attention should be requested as soon as available.

(iii) A sizable personnel force can be provided by most aircraft operators; however, there can be a problem at aerodromes with a small operation. As a result, a mutual aid assistance programme of all airline personnel (and, if necessary, other aerodrome tenants based at an aerodrome) should be established. Training can be acquired from local mental health care and Red Cross units. This training is not extensive but would provide education for passenger service in an emergency. In addition to caring for the victims evacuated from an accident site, training also should include a simulated exercise of a traumatic situation that could develop in the gate area of the terminal building.

(6) Emergency Kits.

(i) Each airline should prepare an emergency kit that can be readily available to all airline personnel during all hours of operation. This kit should never be placed in an office that is locked during certain hours of the day. All station personnel should have knowledge of the location of the emergency kit. The contents of the kit should include the following:

(A) Tablets or forms to record the victims' names, addresses, and home phone numbers; name and phone number of person to be notified of passenger's

condition; accommodation request of passenger (i.e., future flight, hotel, transportation within the local area). See Figure-3 for an example of a registrar's form.

(B) Stick-on, adhesive-type name tags to identify passengers who have been processed and to identify victims when accommodations have been made

(C) Telephone numbers of the following:

(D) Doctors to attend to minor injuries. Each airline should have a letter of agreement with physicians who will respond to a designated holding area.

(E) Hotels where victims can be billeted. It is beneficial to place victims in the same hotel or at least in groups at hotels.

(F) Linguists, preferably ones who work on the aerodrome premises, for quick response.

(G) Caterer, if commissary items are required.

(H) All airline reservations offices.

(I) Ambulance companies, in case a victim requires hospitalization.

(J) Taxi/cab companies.

(K) A current copy of the Official Airline Guide (OAG). Local airline schedules can be helpful for registrars who will be making arrangements on future flights.

GM3 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

CARE OF AMBULATORY SURVIVORS

(a) The aerodrome operator, aircraft operator (where involved), or other predesignated agency selected for the purpose is responsible to:

(1) select the most suitable holding area for the particular emergency from those predesignated in the aerodrome emergency plan;

(2) provide for the transportation of the uninjured from the accident site to the designated holding area;

(3) arrange for doctor(s), nurse(s) or teams qualified in first aid to examine and treat the supposedly uninjured, especially for nervous traumatism (shock) and/or smoke inhalation, where pertinent;

(4) furnish a full passenger and crew manifest for accountability purposes;

(5) interview the uninjured and record their names, addresses, phone numbers, and where they can be reached for the next 72 hours;

(6) notify relatives or next of kin, where deemed necessary;

(7) co-ordinate efforts with the designated international relief agency (Red Cross, etc.); and

(8) prevent interference by unauthorized persons or those not officially connected with the operation in progress.

(b) Prearrangement should be made for the immediate transportation by bus or by other suitable transport of the "walking injured"/ambulatory from the accident site to the designated holding area. This plan should be implemented automatically following notification of the emergency. A nurse or a person trained in first aid should accompany these people to the holding area. Each and every passenger and crew member should be examined for nervous traumatism (shock) and smoke inhalation. Cold or inclement weather may require additional provisions for their protection and comfort.

(c) Occupants departing an aircraft using evacuation slides may be barefoot or without proper wearing apparel.

(d) Where the aircraft accident occurred in water, swamps or desert areas, these people may be deplorable and uncomfortable conditions. These problems should be anticipated by having supplies of clothing, footwear, and blankets readily available. It may be necessary to establish a special holding area which can supply warmth and clothing to prevent hypothermia, heat related illness and be used for examination purposes, before these persons are transported to the designated ambulatory holding area.

GM4 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

TRIAGE AND MEDICAL CARE

IMMEDIATE NEED FOR CARE OF INJURED PERSONS IN AIRCRAFT ACCIDENTS

(a) In the aftermath of an aircraft accident, many lives may be lost and many injuries aggravated if immediate medical attention is not provided by trained rescue personnel. Survivors should be triaged, given available emergency medical aid as required, and then promptly evacuated to appropriate medical facilities.

TRIAGE PRINCIPLES (ALL EMERGENCIES)

(a) "Triage" is the sorting and classification of casualties to determine the order of priority for treatment and transportation. Casualties should be classified into four categories:

(1) Priority I: Immediate care (RED)

(2) Priority II: Delayed care (YELLOW)

(3) Priority III: Minor care (GREEN)

(4) Priority IV: Deceased (BLACK)

(b) The first qualified, medically trained person to arrive at the site should immediately begin initial triage. This person(s) will continue performing triage until relieved by a more qualified person or the designated aerodrome triage officer.

(c) Victims should be moved from the triage area to the appropriate care holding areas before definitive treatment is rendered. Casualties should be stabilized at the care holding areas and then transported to an appropriate facility.

(d) Every effort should be made to ensure that Priority I casualties are treated first and receive ambulance transportation priority when stabilized. This is the responsibility of the triage officer.

(e) Triage is most efficiently accomplished in place. However, the conditions at an accident scene may demand the immediate movement of casualties before triage can be safely accomplished. In that case, the casualties should be moved the shortest distance possible, well away from firefighting operations, and upwind and uphill from the scene.

(f) Triage of casualties should include the use of casualty identification tags to aid in the sorting of the injured and their transportation to a designated hospital. This technique is especially suited to multilingual situations.

STANDARDIZED CASUALTY IDENTIFICATION TAGS AND THEIR USE

(a) Need for standardized tags. Casualty identification tags should be standardized through colour coding and symbols to make the tag as simple as possible. Tags help to expedite the treatment of mass casualties in a triage situation and thus permit more rapid evacuation of the injured to medical facilities.

(b) Tag design. Standardized tags should be designed to require only minimal information to be entered thereon, be usable under adverse weather conditions, and be water resistant. An example of such a tag is illustrated in Figure-11 below. In this tag, numerals and symbols indicate the medical priority classification of casualties as follows:

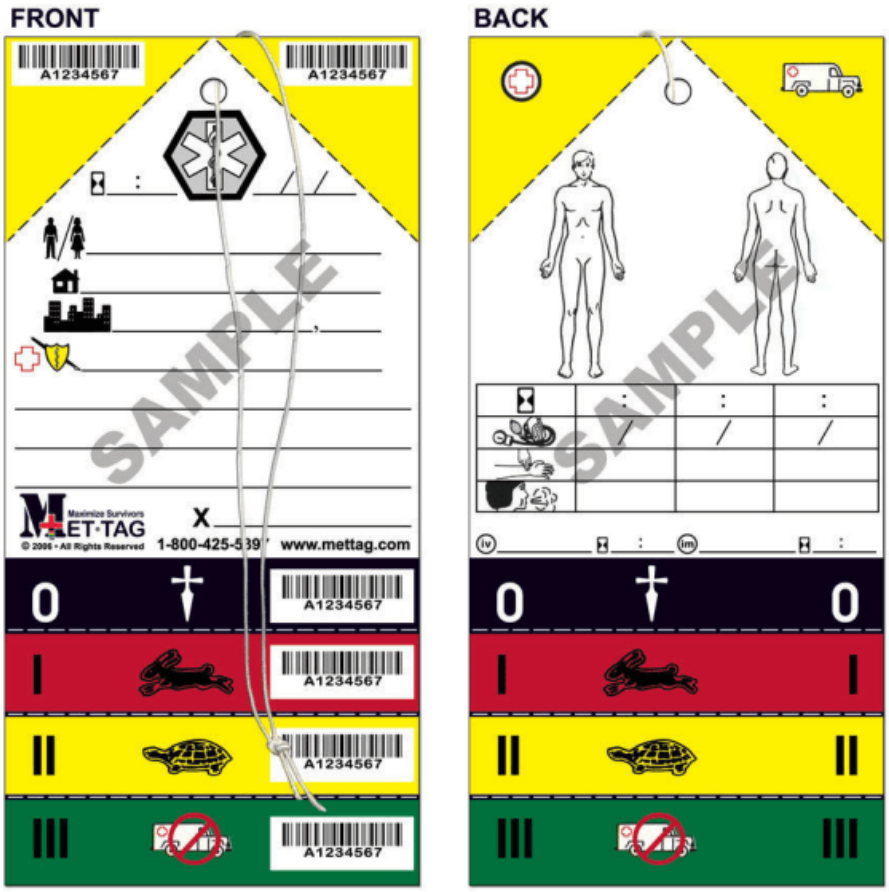


Figure-11: Example of a triage tag

(1) Priority I or immediate care: RED tag (Roman numeral I; rabbit symbol);

(2) Priority II or delayed care: YELLOW tag (Roman numeral II; turtle symbol);

(3) Priority III or minor care: GREEN tag (Roman numeral III; ambulance with X symbol);

(4) Priority IV or deceased: BLACK tag

(c) Where tags are unavailable, casualties may be classified by using Roman numerals on adhesive tape or by placing marks directly on the forehead or on other exposed skin areas to indicate priority and/or treatment needs. Where marking pens are unavailable, lipstick can be used. Felt tipped pens are not advisable as they may smear in rain, sand or hail and freeze in low temperatures.

CARE PRINCIPLES

(a) Stabilization of the seriously injured should be accomplished at the accident site. The immediate transportation of the seriously injured before stabilization should be avoided.

(b) In accidents occurring on or adjacent to the aerodrome, rescue and firefighting personnel are generally the first emergency personnel on the scene. These personnel should be aware that it is imperative that seriously injured casualties be located and stabilized as quickly as possible. In

cases where fire control or prevention does not require the efforts of all rescue and firefighting personnel, available persons should immediately commence casualty stabilization under the direction of the most qualified trauma-trained individual on the scene. First response rescue vehicles should carry initial supplies of casualty-care equipment, including artificial airways, compresses, bandages, oxygen and other related equipment used for the stabilization of smoke inhalation casualties and severe trauma. Sufficient oxygen should be available for use on rescue and firefighting personnel. However, oxygen should not be used in areas where fuel spills or fuel-soaked clothing is present due to the explosion hazard.

(c) Actions taken during the first few minutes of medical treatment should stabilize the casualties until more qualified medical care is available. When specialized trauma teams arrive, more sophisticated medical care (i.e. cardiopulmonary resuscitation, etc.) will be provided.

(d) The triage procedure and subsequent medical care should be placed under the command of one authority, the designated medical commander, upon this officer's arrival. Prior to this, the command of triage should be assumed by the individual designated by the commanding rescue and firefighting chief and should continue until relieved by the predesignated medical co-ordinator.

(e) The medical commander has responsibility for all medical aspects of the incident and should report directly to the aerodrome incident commander. The medical commander's primary function will be administrative, not as a participant of the medical team treating the injured.

(f) As a means to easily identify and distinguish the medical co-ordinator, a white hard hat and highly visible white coat or vest should be worn, with "**MEDICAL COMMANDER**" displayed front and back in reflective red lettering (see Figure-12).

Figure-12: Example of a medical commander tabard

(g) **Care of Priority I (Immediate care) casualties**. This type of casualty includes:

(1) major haemorrhages;

(2) severe smoke inhalation;

(3) asphyxiating thoracic and cervico-maxillo-facial injuries;

(4) cranial traumata with coma and rapidly progressive shock;

(5) compound fractures;

(6) extensive burns (more than 30 per cent);

(7) crush injuries;

(8) any type of shock; and

(9) spinal cord injuries.

(h) The following actions are recommended:

(1) first aid (clearing of the wind pipe, stopping of haemorrhages by means of haemostatic pads, and positioning

(2) the casualty in the recovery position;

(3) resuscitation;

(4) oxygen administration, except in areas of fuel or fuel soaked clothing; and

(5) placing the injured under shelter pending transportation.

(i) **Care of Priority II (Delayed care) casualties**. This type of casualty includes:

(1) non-asphyxiating thoracic trauma;

(2) closed fractures of the extremities;

(3) limited burns (less than 30 per cent);

(4) cranial trauma without coma or shock; and

(5) injuries to soft parts.

(j) Care of casualties sustaining injuries which do not need immediate emergency medical treatment to sustain life can be delayed until Priority I casualties have been stabilized. Transportation of Priority II casualties will be performed following minimum on-site care.

(k) **Care of Priority III (Minor care) casualties**. This type of casualty includes minor injuries only. Certain accidents/incidents will occur where passengers have either minor or no injuries, or appear not to be injured. Because these casualties can interfere with other priorities and operations, it is important that they be transported from the accident/incident site to the designated holding area where they should be re-examined.

(l) It is important that provisions be made for the care, comfort, and identification of Priority III casualties. This should be provided through aerodrome operations, the aircraft operator (where involved), or international relief organization (Red Cross, etc.). Specific treatment areas should be predesignated for this purpose, such as an empty hangar, a designated area in a passenger terminal, a fire station, or other available sites of sufficient size (hotel, school, etc.). Any such area

selected should be equipped with heating or cooling systems, electric light and power, water, telephones and toilet facilities. A number of such preselected sites should be available so that, when an accident occurs, the most advantageous site can be selected based on both travel distance and space needs (number of casualties involved). All aircraft operator personnel and aerodrome tenants should know the location of such designated facilities.

CONTROL OF THE FLOW OF THE INJURED

(a) The injured should pass through four areas which should be carefully located and easily identified. See Figure-13 below.

(1) **Aircraft survivor and crew collection area** — location where initial collection of the aircraft survivors and crew from the incident area is accomplished. Need for the establishment of this area will be dependent upon the type of accident and the circumstances surrounding the accident site. Custody of casualties is normally transferred from the rescue and firefighting personnel to medical services at this point. The rapid deployment of an aircraft passenger evacuation management system (PEMS) will provide effective aid by leading and guiding passengers and crew to safe and secure area. In most cases, however, this transfer will occur at the triage area.

(2) **Triage area** — The triage area should be located at least 90 m upwind of the accident site to avoid possible exposure to fire and smoke. If necessary, more than one triage area may be established. Where necessary, secondary triage area/facility may be considered to protect the survivability of casualties due to ambient heat and humid conditions.

(3) **Care area** — Initially, there will be a single care area. Subsequently, this area should be subdivided into three subareas according to the three categories of injured, i.e. Deceased (Priority 0), Immediate care (Priority I), Urgent care (Priority II), Delayed care (Priority III), and Uninjured Holding Area. Care areas can be colour coded for identification purposes (Red — Immediate, Yellow — Urgent, and Green — Delayed). The use of coloured tents, tarpaulin ground sheets, traffic cones, flags, etc., may be used.

(4) **Transportation area** — A transportation area is made up of one or more staging areas for the recording, dispatching and evacuation of injured and uninjured survivors should be located between the triage area and the egress road. The transportation area should be safe and facilitates rapid movement of vehicles without causing a traffic congestion at the scene. A coordinator should be designated at each staging area to control and coordinate the safe movements of vehicles. If there is more than one transportation area, it is essential to have communications between them.

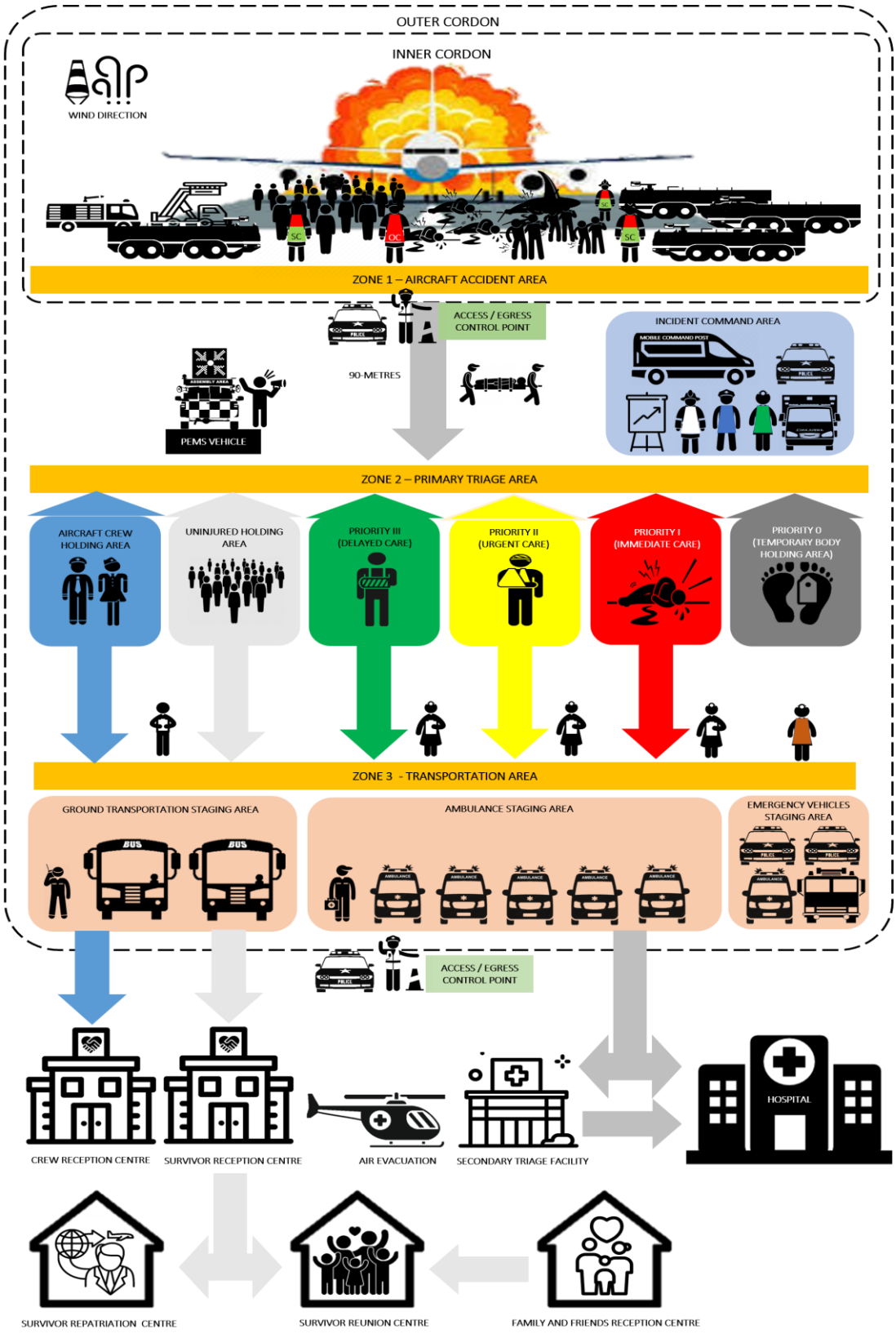


Figure-13: Triage and medical care at an aircraft accident scene

(5) Ambulance staging area

(6) Ground transportation staging area

(7) Emergency vehicles staging area

(b) Mobile facilities for the stabilization and treatment of Priorities I and II casualties are recommended. Ideally these facilities should be operational in less than thirty (30) minutes. Their design should therefore permit rapid conveyance to the site and rapid activation to receive casualties. These facilities should consist of:

(1) conventional or resuscitation ambulances. A resuscitation ambulance is an ideal shelter for a Priority I casualty. The casualty may be treated there and subsequently conveyed directly to a hospital;

(2) red tents to accommodate Priority I casualty - serious or extremely urgent cases. These facilities, with provisions for integrated heating and lighting, can be transported to the scene together with all the necessary medical equipment;

(3) yellow tents to accommodate Priority II casualties. Transportable mobile hospitals or ambulances can be used for stabilization treatment for all casualties; and

(4) green tents to accommodate Priority III casualties or uninjured survivors. Ground transport or airside buses or vans can be used to house these survivors.

GM5 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning

CARE OF DECEASED AND FATALITIES

(a) Evidence should be preserved when caring for the deceased/fatalities during an aircraft accident. It is important to realize that an undisturbed site will produce the most reliable evidence for determining cause and/or future corrective action that may help prevent a similar accident.

(b) The plan should include contingencies that address management of the fatalities at the scene of the emergency.

(c) The plan needs to designate the person(s) responsible for contacting and co-ordinating with the forensic doctor. Rescue and firefighting personnel and other rescue personnel should understand the basic need for and the techniques and procedures used in aircraft accident investigation. Whenever possible, the wreckage should remain undisturbed until the arrival of the appropriate accident investigation authority.

(d) Areas immediately surrounding the location of the fatality should be completely secured. Areas in which a large number of fatalities or dismembered bodies are located should be left undisturbed until the arrival of the forensic doctor and the aircraft accident investigator or a designee.

(e) A sufficient supply of disposable plastic gloves and leather gloves should be available for stretcher bearers removing the remains of the fatalities. Although disposable plastic gloves are acceptable, they are easily cut or torn by aircraft wreckage and debris. Leather gloves do not rip or tear but do absorb body fluids and decrease the sense of touch. it is suggested that one plastic and one leather glove be worn by the individual stretcher bearer or two bearers can work as a team. All gloves should be burned following use in gathering body parts.

(f) If it becomes necessary to move bodies or parts of the wreckage, photographs should be taken showing the relative position of bodies and parts within the wreckage and a sketch of their respective positions should be made prior to removal. In addition, tags should be affixed to each body or body part displaced and corresponding stakes or tags should be placed where the body parts were found in the wreckage. A journal should be kept of all tags issued. Special precautions should be taken to avoid disturbing anything in the cockpit area. Should any flight controls be required to be displaced, photographs, drawings, or notes should be taken before displacement.

(g) The fatalities should be extricated and personal effects removed from the wreckage prior to the arrival of the forensic doctor or appropriate authority only to prevent their destruction by fire or for other similar compelling reasons.

(h) When bodies should be moved, previously mentioned precautions should be taken. Provisions should be made to obtain sufficient body bags to contain all bodies as well as personal effects.

(i) Body bags are normally available from major local suppliers of caskets, funeral directors and their equipment and supply firms, and from nearby military facilities. Stocks of body bags at each aerodrome are desirable.

(j) Body identification and determination of cause of death is conducted with the concurrence of the GCAA designated for this duty. This operation is generally conducted with the co-operation of forensic teams and other specialists.

(k) Accidents which result in a large number of fatalities will overload normal morgue facilities. In areas where delay or temperature may contribute to the deterioration of tissue, refrigerated storage should be available. This may be provided either by a permanently located cooler or refrigerated semitrailers. The area for post-mortem examination should be located near the refrigerated storage and be arranged to provide a high level of security. This should be a suitable working area with electricity and running water, large enough for initial body sorting.

(l) The morgue should be isolated in an area remote from places where relatives or the general public have access.

(m) After identification has been made of the fatality, efforts to contact next of kin should commence. Agencies such as aircraft operators, public service organizations (i.e. international relief agencies and police), or clergy should be utilized.

(n) The aircraft accident investigation team has the GCAA and the need to require autopsies and toxicological analyses of flight crew members, and in special cases, passengers. The need for these tests should be determined prior to the release of bodies.

(o) As soon as practical after the emergency, all participants in the firefighting and rescue effort should be debriefed. Their observations should be recorded by the proper authorities. Sketches, diagrams, photographs, movie films, and tape and video recordings made on the accident site as well as appropriate details on the tagging of bodies and body parts removed from their positions are invaluable tools for investigators.

(p) The forensic officer in charge should wear a dark brown hard hat and vest or other apparel, with "**FORENSIC OFFICER**" displayed front and back in distinctive lettering (see Figure-14).

Figure-14: Example of a Forensic Officer Tabard

AMC7 ACM.OPS.CERT.D.005(a) Emergency planning

MULTI-RUNWAY AERODROME OPERATIONS

(a) Where the aerodrome operates more than one operational runway, an assessment of the adequacy of the emergency plan in dealing with simultaneous aircraft emergencies occurring at an aerodrome should be conducted, with the following considerations:

(1) design and layout of runways and taxiways;

(2) type of aircraft operations;

(3) type of aerodrome activities;

(4) adequacy of rescue and firefighting service provisions – personnel, appliances, equipment and competency;

(5) availability of on and off aerodrome agencies' resources and equipment;

(6) adequacy of supplementary water supply – location and capacities;

(7) emergency alerting and notification system;

(8) emergency communication network;

(9) adequacy of emergency reception facilities - location and size;

(10) triage and medical care protocols;

(11) incident management plans and procedures; and

(12) business continuity and recovery plans and procedures.

GM AMC7 ACM.OPS.CERT.D.005(a) Emergency planning

RISK-BASED APPROACH TO MULTIPLE RUNWAY OPERATIONS

(a) Adopting a risk-based thinking approach to emergency planning at these aerodromes provides a safe and proactive approach to identify, assess, and prioritize risks based on their probability and potential impact. This approach allows aerodromes to allocate their resources effectively, focusing on the most significant risks that require immediate attention. It also enables a continuous improvement cycle, where aerodromes can monitor and review their emergency plans, update risk assessments, and learn from incidents and near misses to enhance their overall preparedness.

(b) By adopting risk-based thinking, aerodromes can ensure that their emergency plans are grounded in a solid understanding of the potential risks they may face and are designed to minimize their impact. A risk-based thinking approach to aerodrome emergency planning brings the following benefits:

(1) improves overall aerodrome incident management governance framework;

(2) enhances safety management system at an aerodrome;

(3) establishes safe and proactive culture of continuous improvements;

(4) assists with statutory and regulatory compliance;

(5) assures consistency of delivering of emergency response actions from on and off aerodrome agencies;

(6) strengthen stakeholders' inter-operability, intra-operability and confidence; and

(7) business resilience plans.

(c) The risk-based approach strategy covers all aspects of aerodrome emergency preparedness, including risk assessment, response planning, and continual improvement. It entails identifying potential hazards, determining their probability and impact, prioritizing risks, and developing risk criteria. It also includes the formulation of emergency response processes, the specification of roles and duties, the construction of communication protocols, and the execution of training

and drills. The work also emphasizes the importance of continuous monitoring and review of emergency plans, updating risk assessments as new information becomes available, and learning from incidents and near misses to adopt essential adjustments. By addressing these essential areas, this work seeks to create a thorough and strong framework for aerodrome emergency preparedness.

(d) It is understood that managing multiple emergencies at an aerodrome will cause severe strain to the incident management system, resources and personnel. If not meticulously planned, such situation may cause the overall incident management system to collapse. When planning for such emergencies, the emergency plan should not solely base on the provision of aerodrome rescue and firefighting category of the aerodrome but also consider other pertinent factors. The emergency plan should consider a risk-based approach when planning for such emergencies. A concept of emergency operations detailing the appropriate level of emergency response at an aerodrome should be developed. An emergency response model should be scalable and adaptable to any emergency without compromising the principal objective of an aerodrome emergency planning.

(e) Assessment for multiple emergencies at an aerodrome should consider the emergency plan's adequacy to cope with another emergency situation occurring on the other operational runway/s whilst managing the first emergency at other runway. When conducting such assessment, the support and inputs from other aerodrome agencies – air traffic services, airfield operations, ground handling companies, aerodrome medical facility, etc, may be necessary.

(f) Aerodromes may consider applying the principles and guidelines outlined in the ISO 31000 risk-based thinking framework to enhance emergency planning processes at these aerodromes. This framework delves into the various aspects of risk-based thinking, including the identification and assessment of risks in emergency scenarios, the development of risk mitigation strategies, and the continuous improvement of emergency preparedness measures (see Figure-15). The research will consider the challenges and considerations specific to large aerodromes, as well as the roles and responsibilities of stakeholders involved in the implementation of the risk-based thinking approach.

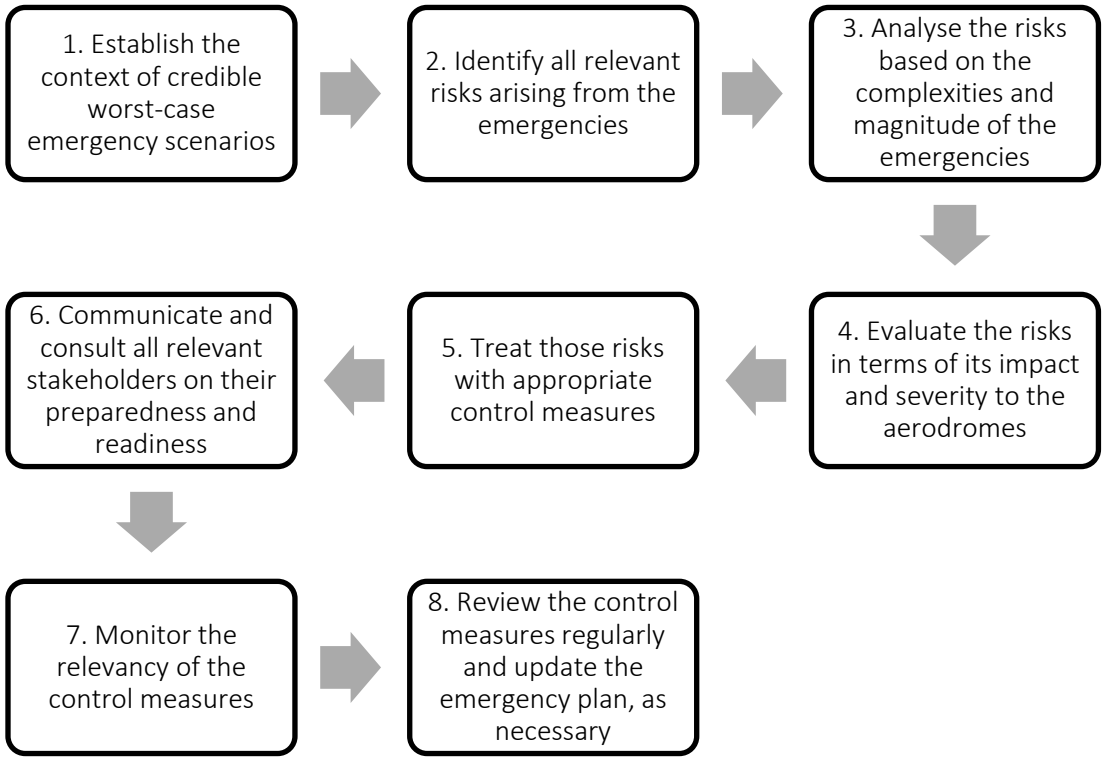


Figure-15: Risk-based approach for multi-runways operations

(1) Establishing the context of credible worst-case aircraft emergency scenarios at airports with multiple runways involves a comprehensive process of identifying, analysing, and preparing for the most severe and plausible emergency situations that could occur at the airport. This process is essential for effective risk management and emergency response planning in complex airport environments.

(i) **Understanding Airport Dynamics**: This involves a deep understanding of the operational complexities of airports with multiple runways. Factors like runway layout, traffic volume, types of aircraft, and airport usage (commercial, cargo, military) play significant roles.

(ii) **Scenario Identification**: Identifying worst-case scenarios requires considering a range of potential emergencies. This could include multiple aircraft incidents occurring simultaneously, severe weather events, terrorist threats, or catastrophic mechanical failures.

(iii) **Risk Assessment**: Evaluating the likelihood and potential impact of each identified scenario. This assessment takes into account historical data, current airport operations, and foreseeable changes in aviation trends.

(iv) **Vulnerability Analysis**: Determining how susceptible the airport's infrastructure, operations, and safety measures are to these scenarios. This analysis helps in identifying critical areas that need strengthening.

(v) **Stakeholder Consultation:** Engage with a wide range of stakeholders, including airline operators, emergency services, local authorities, and airport staff, to gain diverse perspectives on potential worst-case scenarios.

(vi) **Resource Evaluation:** Review the resources available for handling such scenarios, including emergency response teams, equipment, and communication systems. Identify any gaps in resources that could hinder an effective response.

(vii) **Regulatory and Best Practice Alignment:** Ensure that the scenarios and subsequent plans align with national and international regulatory requirements and industry best practices.

(2) Identifying all relevant risks arising from aircraft emergencies at airports with multiple runways involves examining a range of factors that could potentially contribute to or exacerbate emergency situations. Identifying these risks is a critical step in developing comprehensive safety and emergency response strategies for airports with multiple runways. Each risk requires specific attention in planning, training, and resource allocation to ensure preparedness and effective management in emergency situations.

(i) **Runway Incursions and Collisions:** With multiple runways, the risk of runway incursions (unauthorized aircraft, vehicle, or person on a runway) and collisions increases, particularly during high traffic periods or poor visibility conditions.

(ii) **Air Traffic Congestion:** High traffic volumes can lead to increased risk of mid-air or ground collisions, especially during take-offs, landings, and taxiing.

(iii) **Crosswind and Weather Hazards:** Multiple runways often mean varied orientations, which can be challenging during crosswinds or severe weather, increasing the risk of runway excursions or accidents.

(iv) **Communication Breakdowns:** Effective communication between air traffic control, pilots, and ground crews is crucial. Miscommunication can lead to serious incidents, especially in complex multi-runway environments.

(v) **Emergency Response Complexity:** Coordinating emergency response in a multi-runway airport can be complicated due to the size and complexity of the airport layout, potentially delaying critical response efforts.

(vi) **Navigational Challenges:** Pilots navigating busy, multi-runway airports, especially those unfamiliar with the layout, can face increased risks of error, contributing to potential emergencies.

(vii) **Mechanical Failures:** Aircraft emergencies related to mechanical failures can have amplified effects at busy airports, where a single incident can disrupt numerous flights and pose risks to other aircraft.

(viii) **Terrorist Threats and Security Breaches:** Larger airports with multiple runways may be more attractive targets for terrorist actions or security breaches, posing significant risks to safety.

(ix) **Environmental and Wildlife Hazards:** Wildlife strikes or environmental concerns, like fog or ice, can be more challenging to manage across multiple runways, increasing the risk of accidents.

(3) Analysing the risks associated with aircraft emergencies at airports with multiple runways involves a detailed examination of both the complexities and magnitude of potential emergencies. This process is crucial for effective risk management and emergency response planning. By analysing these aspects, airports can develop targeted strategies to mitigate risks and prepare effective emergency response plans. This analysis is dynamic, requiring regular updates to reflect changes in airport operations, traffic patterns, and emerging threats.

(i) **Complexity of the Airport Layout:** Airports with multiple runways have intricate layouts that can complicate emergency responses. The analysis includes understanding runway intersections, taxiway configurations, and potential bottlenecks that could impact emergency access and evacuation routes.

(ii) **Air Traffic Volume and Patterns:** High traffic volumes increase the likelihood of runway incursions or collisions. Risk analysis considers peak traffic times, types of aircraft (commercial, cargo, private), and flight schedules to assess potential emergency scenarios.

(iii) **Nature of Emergencies:** The analysis covers a wide range of emergencies, from aircraft malfunctions, crashes, and runway overruns to external threats like terrorism or natural disasters. Each type of emergency has unique risks and requires specific response strategies.

(iv) **Magnitude and Severity:** The potential impact of each emergency scenario is assessed in terms of severity. This includes potential casualties, infrastructure damage, and disruption to airport operations. Larger-scale emergencies, like a major

crash or terrorist attack, have far-reaching consequences that need comprehensive response plans.

(v) **Interdependent Systems:** Airports operate with interlinked systems including air traffic control, ground handling, and emergency services. Risk analysis examines how an emergency in one area can cascade and affect other operations.

(vi) **Resource Availability and Response Time:** Assessing the availability and readiness of emergency resources (firefighting equipment, medical personnel, evacuation facilities) and the response time is crucial. Delays in response can exacerbate the situation, especially in large-scale emergencies.

(vii) **External Factors:** Factors such as weather conditions, geographical location (proximity to urban areas), and external emergency support services are also considered. For instance, an airport near a city might face different risks and have different resources compared to a remote airport.

(4) Evaluating the risks in terms of their impact and severity on an aerodrome operating multiple aircraft emergencies involves a comprehensive analysis of potential incidents and their consequences. By thoroughly evaluating these risks, airport emergency planners can prioritize areas for improvement in their emergency response plans, ensuring that they are prepared to effectively manage and mitigate the impacts of various emergency scenarios.

(i) **Assessing Probability and Impact:** The first step is to assess the likelihood of various emergencies, such as aircraft collisions, system failures, or natural disasters, and their potential impact on airport operations and safety.

(ii) **Safety of Personnel and Passengers:** Evaluating risks involves prioritizing the safety of passengers, crew, and ground staff. High-severity scenarios include those with a high potential for causing injuries or fatalities.

(iii) **Operational Disruption:** The analysis includes how emergencies might disrupt operations. High-impact risks are those that could lead to significant delays, cancellations, or diversion of flights, especially during peak operational times.

(iv) **Infrastructure Damage Assessment:** This involves estimating the potential damage to airport facilities, including runways, terminals, and navigation aids. Severe risks are those that could cause extensive damage, requiring significant time and resources for repair.

(v) **Resource Availability for Emergency Response:** Evaluating whether the airport has sufficient resources (personnel, equipment, medical facilities) to handle multiple emergencies simultaneously is crucial. A lack of resources constitutes a higher risk.

(vi) **Environmental and Economic Impact:** Consideration of the environmental repercussions, such as fuel spills, and the broader economic impact of airport shutdowns or damage to aircraft and facilities is also part of the risk evaluation.

(vii) **Reputation and Public Perception:** Understanding the potential impact on the airport's reputation and public trust, especially in the event of severe emergencies or perceived poor handling of the situation.

(viii) **Cascading Effects:** Particularly in an aerodrome with multiple runways and high traffic volumes, the risk evaluation considers the potential for cascading effects, where an incident in one area can exacerbate issues in another.

(5) Establishing appropriate control measures for managing risks in airport emergency situations, especially at aerodromes operating with multiple runways, involves a strategic and multi-faceted approach. By implementing these control measures, an aerodrome can effectively manage the risks associated with multiple aircraft emergencies, minimizing impact and ensuring the safety and well-being of passengers, staff, and the surrounding community.

(i) **Enhanced Surveillance and Monitoring Systems:** Implement advanced systems for real-time monitoring of air traffic and runway operations. This helps in early detection and management of potential emergencies.

(ii) **Robust Emergency Response Plan:** Develop a comprehensive emergency response plan that includes protocols for various types of emergencies. Ensure this plan is regularly reviewed and updated.

(iii) **Dedicated Emergency Response Teams:** Establish specialized teams trained to handle different emergency scenarios, including firefighting, medical response, and hazardous material containment.

(iv) **Effective Communication Systems:** Set up reliable communication networks between air traffic control, ground staff, emergency services, and external agencies. Clear and quick communication is crucial during emergencies.

(v) **Regular Training and Drills:** Conduct routine emergency drills and training for all relevant personnel. This ensures preparedness and effective execution of emergency plans.

(vi) **Infrastructure Preparedness:** Ensure that the airport infrastructure supports emergency responses. This includes clear emergency access routes, well-equipped medical facilities, and designated evacuation areas.

(vii) **Resource Availability:** Maintain a readily available supply of emergency resources such as firefighting equipment, medical supplies, and evacuation vehicles.

(viii) **Collaboration with External Agencies:** Establish partnerships with local authorities, hospitals, and other relevant organizations for coordinated emergency responses.

(ix) **Public Information and Guidance Systems:** Have systems in place for timely and accurate dissemination of information to the public and guidance for evacuation or other safety measures.

(x) **Post-Emergency Recovery Plans:** Develop plans for rapid recovery and resumption of normal operations following an emergency, including infrastructure repair and support for affected individuals.

(xi) **Psychological Support Services**: Offer psychological support services for passengers, staff, and responders' post-emergency.

(6) Communicating and consulting with all relevant stakeholders on their preparedness and readiness for airport emergencies, especially at aerodromes with multiple runways, is a critical aspect of comprehensive emergency management. By maintaining open lines of communication and actively involving all stakeholders in preparedness and readiness activities, an airport can ensure a coordinated and effective response in the event of an emergency.

(i) **Identify Stakeholders:** First, identify all relevant stakeholders involved in airport operations and emergency response. This includes airport management, airline operators, air traffic control, emergency response teams, local authorities, and potentially affected community groups.

(ii) **Regular Meetings and Workshops:** Organize regular meetings and workshops with stakeholders to discuss and review emergency plans. These meetings provide opportunities for stakeholders to understand their roles, raise concerns, and offer suggestions.

(iii) **Clear Communication Channels**: Establish clear and reliable channels of communication. This could be through regular emails, a dedicated intranet, newsletters, or emergency alert system.

(iv) **Joint Emergency Drills:** Conduct joint emergency drills involving all stakeholders. These drills not only test the readiness of each party but also enhance coordination and communication among them.

(v) **Feedback Mechanism:** Implement a feedback mechanism after drills and real emergencies. Encourage stakeholders to provide insights into what worked well and what needs improvement.

(vi) **Training Programs:** Offer training programs tailored to different stakeholders. Training should cover specific responsibilities, communication protocols, and emergency procedures.

(vii) **Information Sharing:** Share relevant information, such as changes in airport operations, new risks identified, and updates in emergency procedures, with all stakeholders. Ensure that the information is accessible and easy to understand.

(viii) **Collaborative Decision-Making:** Involve stakeholders in decision-making processes related to emergency preparedness. This collaborative approach ensures that different perspectives and expertise are considered.

(ix) **Community Engagement:** Engage with the local community, especially those living near the airport. Inform them about emergency procedures and how they might be impacted in an emergency situation.

(x) **Review and Update Contact Lists:** Regularly update contact lists to ensure that all stakeholders can be reached quickly in an emergency.

(xi) **Transparent Reporting:** Maintain transparency in reporting the state of preparedness and readiness. Share reports and updates on training exercises, equipment status, and response capabilities.

(7) Monitoring the relevancy of control measures in the context of airport emergency management, particularly for aerodromes with multiple runways, is vital to ensure ongoing effectiveness and adaptability to changing circumstances. By actively monitoring and updating control measures, an aerodrome can maintain a high level of preparedness and ensure that its emergency response strategies remain effective, relevant, and aligned with the evolving nature of risks and airport operations.

(i) **Regular Review and Assessment:** Schedule periodic reviews of all control measures. This involves assessing their effectiveness in recent drills or actual emergencies and determining if they meet current operational needs.

(ii) **Stakeholder Feedback**: Collect and analyse feedback from all stakeholders, including airport staff, emergency response teams, airline operators, and local authorities. Their insights can reveal practical challenges and areas for improvement.

(iii) **Benchmarking Against Industry Standards:** Compare your control measures with industry standards and best practices. This benchmarking can highlight areas where your measures may be outdated or need enhancement.

(iv) **Updating Risk Assessments:** As new threats emerge and airport operations evolve, regularly update your risk assessments. Ensure that your control measures align with the latest risk profiles.

(v) **Technological Advancements:** Stay informed about technological advancements in airport safety and emergency response. Incorporate relevant technologies to enhance your control measures.

(vi) **Training Efficacy:** Evaluate the effectiveness of training programs in preparing staff for emergencies. Adjust training content and methods based on performance in drills and real incidents.

(vii) **Incident Analysis:** After any emergency incident, conduct a thorough analysis to understand what worked well and what didn't. Use these insights to refine your control measures.

(viii) **Regulatory Compliance:** Ensure that all control measures comply with current regulations and legal requirements. Regulatory changes may necessitate updates to your measures.

(ix) **Change Management:** Be prepared to manage changes effectively. When a control measure is updated, communicate changes clearly to all stakeholders and provide necessary training.

(x) **Continual Improvement Process:** Adopt a culture of continual improvement, encouraging suggestions for enhancements and innovations in control measures.

(xi) **Emergency Response Plan Testing:** Regularly test the entire emergency response plan. This not only checks the efficacy of individual control measures but also their collective effectiveness in a simulated emergency situation.

(8) Regularly reviewing and updating control measures and the emergency plan is a critical process for ensuring the ongoing effectiveness of airport emergency management, especially in complex environments like aerodromes with multiple runways. By regularly reviewing and updating control measures and the emergency plan, an aerodrome can maintain a state of readiness and ensure its response strategies are robust, effective, and aligned with the current operational environment and emerging risks.

(i) **Scheduled Reviews:** Set a regular schedule for reviewing the emergency plan and its associated control measures. Depending on the complexity of the airport operations and the frequency of changes in risk factors, this could be annually, biannually, or following significant changes in operations or infrastructure.

(ii) **Incorporate Stakeholder Input:** Involve all relevant stakeholders in the review process. This includes airport management, airline representatives, emergency response teams, air traffic control, local authorities, and potentially affected community groups. Stakeholder meetings or surveys can be effective ways to gather feedback.

(iii) **Analyse Recent Incidents and Drills:** Use data and insights from recent emergency situations and drills to assess the effectiveness of current control measures. Identify any weaknesses or areas where the response could be improved.

(iv) **Assess Changes in Risk Environment:** Evaluate any new risks or changes in the operational environment. This might include new types of aircraft using the airport, changes in traffic volume, construction projects, or evolving external threats.

(v) **Update Based on Technological Advancements:** Keep abreast of technological advancements that can enhance emergency response and management. Incorporating new technologies might involve updating procedures, training, or equipment.

(vi) **Regulatory Compliance:** Ensure that the emergency plan and its control measures comply with current regulations and industry standards. Regulatory changes might necessitate updates to the plan.

(vii) **Training and Competency Assessments:** Review the effectiveness of training programs and conduct competency assessments. Ensure that all personnel are sufficiently trained for their roles in emergency response.

(viii) **Documentation and Communication:** Update all documentation related to the emergency plan and control measures. Communicate any changes clearly to all involved parties. This might involve revising manuals, updating digital resources, and conducting briefings or training sessions.

(ix) **Plan for Continuous Improvement:** Adopt a continuous improvement approach to emergency management. Encourage feedback and suggestions from all levels of staff and stakeholders.

(x) **Test the Updated Plan:** Once updates are made, test the revised emergency plan through drills and simulations. This testing phase is critical for ensuring that the changes are effective and that all participants understand their revised roles and responsibilities.

(xi) **Review External Partnerships:** Reassess the roles and effectiveness of external partners, such as local emergency services, hospitals, mutual aid agencies, etc. Ensure that these relationships and protocols remain effective and relevant.

AMC8 ACM.OPS.CERT.D.005(a) Emergency planning

ADDITIONAL AERODROME HAZARDS

(a) Where there are additional hazards resulting from supporting facilities and operational activities at the aerodrome, the emergency plan should include:

(1) sufficient emergency orders and instructions to deal with emergencies arising from these hazards.; and

(2) where the rescue and firefighting service is expected to deal with these additional hazards, determine the additional amount of extinguishing agents, number of personnel, vehicles and equipment required, as these requirements may exceed the promulgated level of aerodrome fire protection.

GM AMC8 ACM.OPS.CERT.D.005(a) Emergency planning

ADDITIONAL AERODROME HAZARDS

The business of managing an aerodrome may generate other hazards in addition to those created by the types of aircrafts operating at an aerodrome. Some aerodromes handle vast amounts of cargo and, in some instances, chemicals and specialized hazardous materials including radioactive substances. Aerodromes may have significant large fuel storage installations which in themselves may present considerable hazards. Re-assessment of the additional amounts of extinguishing agents and number of personnel required to deal with such emergencies must be conducted.

AMC9 ACM.OPS.CERT.D.005(a) Emergency planning

COORDINATION WITH OTHER AGENCIES AND ORGANISATIONS

(a) The emergency plan should:

(1) describes the procedures for coordinating the response of different aerodrome agencies organisations or services and those agencies in the surrounding community that could be of assistance in responding to an emergency;

(2) provides for the cooperation and coordination with the appropriate rescue coordination centre, as necessary;

(3) includes mutual aid emergency agreements which define the aerodrome rescue and firefighting service is the lead unit for aircraft accident at an aerodrome, specify clear

roles, responsibilities and/or liabilities of each mutual aid agency responding to an emergency; and

(4) includes sufficient rendezvous signs are strategically provided at an aerodrome, consistent, and conform to the local road transport authority standards.

GM1 AMC9 ACM.OPS.CERT.D.005(a) Emergency planning

COORDINATION WITH OTHER AGENCIES AND ORGANISATIONS

(a) The aerodrome emergency plan should describe the procedures for coordinating the response of different aerodrome agencies organisations or services (e.g. ground handlers, airlines, security services) and those agencies in the surrounding community that could be of assistance in responding to an emergency.

(b) Emergency mutual aid agreements should be established to define responsibilities and/or liabilities of each external agency responding to an emergency. These agreements should include the following:

(1) clarification of the political and jurisdictional responsibilities of the several agencies (e.g. police, local firefighting services, local authorities, accident investigation bodies, etc.) that could be involved in order to avoid problems when an emergency occurs;

(2) establishment of the command authority; i.e. a single on-the-scene commander (with designated alternates if necessary);

(3) designation of communication priorities at the accident site;

(4) organisation of emergency transportation facilities under (a) pre-designated coordinator(s);

(5) predetermination of the legal authorities and liabilities of all cooperating emergency personnel; and

(6) pre-arrangements for use of portable and heavy rescue equipment from available sources.

(c) The aerodrome emergency plan should be implemented similarly at an aircraft accident/incident whether it is an on or an off-aerodrome.

GM2 AMC9 ACM.OPS.CERT.D.005(a) Emergency planning

MUTUAL AID EMERGENCY AGREEMENTS

(a) The close proximity of an aerodrome to surrounding communities and the possibility of an off-aerodrome aircraft accident give rise to the need for mutual aid emergency agreements.

(b) A mutual aid emergency agreement should specify initial notification and response assignments. It should not specify the responsibilities of the agency concerned as this will be contained in the emergency plan. See Figure-16 for a sample of emergency mutual-aid agreement.

AGENCY (Name and Address):

_____

_____

Endorses the XYZ (International) Airport Emergency Plan, associated airport emergency plan document dated (insert date), and attached procedures and agrees to comply with all the procedures and instructions, and fulfill all applicable responsibilities therein.

_____

Signature of Authorized Representative

_____

Date

Figure-16: Example of emergency mutual-aid agreement

(c) Mutual aid emergency agreements should be prearranged and duly authorized. The aerodrome operator may have to act as co-ordinating agency if more complicated jurisdictional or multi-agency agreements are necessary. This guidance is to assist the preparation of mutual aid emergency agreements with local fire authority for accidents occurring on and off the aerodrome.

(d) Procedure for local fire authority — aircraft accident on-aerodrome:

(1) When a response is initiated, local fire authority shall proceed directly to the rendezvous point or staging area at an aerodrome. An escort will be provided by aerodrome police/security from the rendezvous point or staging area to the accident site.

(2) It is imperative that mutual aid fire department(s) members recognize that unless the aerodrome is closed to flight operations, unescorted movement on aerodrome property is extremely dangerous and may result in conflict with aircraft movements.

(e) Upon arrival at the accident site:

(1) The most senior officer of the aerodrome rescue and firefighting service receiving mutual aid has full authority at the scene;

(2) fire department mutual aid communications shall be carried out on the pre-designated communication channel; and

(3) communication transmissions will be prefaced by aerodrome rescue and firefighting/local fire department call number.

(f) Procedure for local fire authority — aircraft accident off-aerodrome:

(1) A call to an off-aerodrome aircraft accident will normally be received from air traffic services or police. Should that not be the case, the local fire authority shall notify air traffic services or police via radio or telephone that an accident has occurred and give the approximate location on the grid map.

(g) Upon arrival at the accident site, the local fire authority shall:

(1) ensure that the mutual aid emergency agreement is initiated;

(2) establish a command post (This may be a temporary post until the aerodrome operator mobile command post is available and operative.); and

(3) ensure that all communications are on the designated aircraft accident channel.

(h) The local fire authority shall advise air traffic services or police of the following:

(1) exact location of the accident site;

(2) location of the command post;

(3) specific location/rendezvous points on the grid map to which fire units should respond; and

(4) any request for specialized equipment if necessary.

GM3 AMC9 ACM.OPS.CERT.D.005(a) Emergency planning

PRESERVATION OF EVIDENCE

(a) Aerodrome RFF personnel and other emergency response personnel should understand the basic need for and the techniques and procedures used in aircraft accident investigation. Whenever possible the wreckage should remain undisturbed until the arrival of the first aircraft accident investigator. However, when absolutely necessary for the rescue or fire suppression activities, the wreckage may be disturbed. Disturbance should be kept to a minimum.

(b) The bodies of the deceased should remain in the position they were found. If it becomes necessary to move bodies or parts of the wreckage, a sketch plan of their respective positions prior to removal should be made as soon as possible. Photographs from four separate angles, if possible,

should be taken showing the relative position of bodies and parts within the wreckage. In addition, tags should be affixed to each body or part displaced and corresponding stakes or tags should be placed where they were found in the wreckage. Special precautions should be taken to prevent disturbance of anything in the cockpit area. Should any control be displaced voluntarily or accidentally, the occurrence should be recorded and brought to the attention of the UAE GCAA Air Accident Investigation Sector.

(c) Isolation of and security measures within the wreckage area should be established as soon as possible. All authorized personnel should possess and display proper "Emergency Access" identification as required by the aerodrome emergency plan.

(d) All security personnel should be briefed on proper identification procedures. Two-way radio communication with appropriate authorities on the site can help identify any person seeking entry whose credentials are questionable.

(e) Accident sites can be exceptionally dangerous areas, owing to the possible presence of flammable fuels, dangerous goods and scattered pieces of wreckage. All necessary safety precautions in the emergency area should be carried out rigidly. These include exercising good judgement during fire control and throughout all rescue efforts. Safety equipment and protective clothing should be worn by all personnel involved.

(f) As soon as practical after the emergency, all participants in the firefighting and rescue efforts should be debriefed and their observations recorded by the proper authorities. Sketches, diagrams, photographs, movie films, and tape and video recordings made on the accident site as well as appropriate details on the tagging of bodies and parts removed from their locations are invaluable tools for investigators and should be handed to the investigator-in-charge upon this officer's arrival.

GM4 AMC9 ACM.OPS.CERT.D.005(a) Emergency planning

ON AND OFF AERODROME AGENCIES

(a) Examples of agencies are:

(1) on the aerodrome:

(i) air traffic control units, rescue and firefighting services, aerodrome administration, medical and ambulance services, aircraft operators, security services, and police;

(2) off the aerodrome:

(i) local fire authority, police, health authorities (including medical, ambulance, hospital and public health services), military, and harbour patrol or coast guard.

(b) Public health services include planning to minimize adverse effects to the community from health-related events and deal with population health issues rather than provision of health services to individuals.

AMC10 ACM.OPS.CERT.D.005(a) Emergency planning

COORDINATION WITH OTHER LEGISLATIONS AND REGULATIONS

(a) The emergency plan should:

(1) coordinate with other applicable plans in compliance with the relevant legislations and regulations:

(i) aerodrome security plan;

(ii) passenger welfare programme;

(iii) air accident investigation regulation;

(iv) aviation disaster family assistance plan;

(v) communicable disease management plan;

(vi) disabled aircraft removal plan;

(vii) search and rescue plan.; and

(2) ensure rescue and firefighting personnel and other emergency response personnel are trained and competent on the preservation of evidences at aircraft accident scene.

AMC11 ACM.OPS.CERT.D.005(a) Emergency planning

HUMAN FACTOR PRINCIPLES IN EMERGENCY PLANNING

(a) The emergency plan should consider human factors principles to achieve optimum response by all existing agencies participating in emergency operations.

GM AMC11 ACM.OPS.CERT.D.005(a) Emergency planning

HUMAN FACTOR PRINCIPLES IN EMERGENCY PLANNING

(a) Emergency planning is the process of preparing the aerodrome to cope with an emergency occurring at an aerodrome or in its vicinity. The objective of emergency planning is to minimize the effect of an emergency particularly in respect of saving lives and maintaining aircraft operation. The overall safety and efficiency of the civil aviation system depends on human operators as the ultimate integrators of the numerous system elements.

(b) This dependence is unlikely to decrease, and may even increase in unanticipated ways, as additional advanced technology is implemented. To a greater extent, understanding and

accounting for the role of humans, including their positive and negative contributions, will be important to maintaining and improving safety while improving efficiency.

(c) Human Factors is about people in their living and working situations; about their relationship with machines, with procedures and with the environment around them; and also, about their relationships with other people. “Human Factors is concerned to optimize the relationship between people and their activities, by the systematic application of human sciences, integrated within the framework of systems engineering”.

(d) The human sciences study the structure and nature of human beings, their capabilities and limitations, and their behaviours both singly and in groups. The notion of integration within systems engineering refers to the Human Factors practitioner’s attempts to understand the goals and methods as well as the difficulties and constraints under which people working in interrelated areas of engineering should make decisions. Human Factors uses this information based on its relevance to practical problems.

(e) The aviation industry need for human factors is based on its impact on two broad areas, which interrelate so closely that in many cases their influences overlap and factors affecting one may also affect the other. These areas are:

(1) Effectiveness of the system:

(i) Safety

(ii) Efficiency

(2) Well-being of operational personnel.

GUIDANCE AND PROCEDURES

(a) Definitions Human Factors Principles

(1) It refers to principles which apply to aeronautical design, certification, training, operations, and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

(b) General

(1) The human factors concept concerns the interaction between:

(i) People and people

(ii) People and equipment

(iii) People and the environment

(iv) People and procedures

(c) Concepts Are Involved in Human Factor

(1) Three key concepts are involved in human factors understanding and eventual implementation. These are:

(i) Human-centred Automation;

(ii) Situational Awareness; and

(iii) Error Management.

(iv) Human-Centred Automation

(2) Automated aids can be designed from a technology-centred perspective or a human-centred perspective. A technology-centred approach automates whatever functions it is possible to automate and leaves the human to do the rest. This places the operator in the role of custodian to the automation; the human becomes responsible for the "care and feeding" of the computer.

(3) In contrast, a human-centred approach provides the operator with automated assistance that saves time and effort; the operator's task performance is supported, not managed, by computing machinery.

(d) Situational Awareness

(1) Situational awareness (SA) can be defined as the perception of the elements in the environment within a volume of time and space, the comprehension of their meaning, and the projection of their status in the near future. Thus, the most important Human Factors issue in regard to human technology interface is the ability of the human operator to maintain situational/system awareness. It is an established fact that human technology interfaces have not always been intuitive. Non-intuitive, 'opaque' interfaces lead to operational complexity which often forces the operator to allocate increased attention to maintain an sufficient mental model of the situation/system status. This becomes the breeding ground for loss of situational awareness, decreased system performance and eventually human error and safety breakdowns.

(2) Elements of Situational Awareness - The elements listed below are highly dynamic and present subtle to large changes that may occur at short notice, and that can or will influence how an employee works or performs at any particular moment. How these changes interact with an employee's SA may only be recognized after having gained considerable experience in general, and at a specific location in particular:

(i) Personal factors

(ii) Weather

(iii) Aerodrome infrastructure

(iv) Individual differences

(v) Traffic

(vi) Operators and pilots

(vii) Environment

(viii) Navigational aids

(ix) Aircraft performance

(x) Equipment

(xi) Adjacent units

(e) Error Management

(1) It has always been considered that human error was an individual trait that could be prevented by the right training, attitudes or by automating as many human tasks as possible. However, this has not been able to eliminate error. The aviation industry thus shifted its focus from eliminating error to preventing and managing error. Human error is recognized as an inevitable component of human performance. Complex socio-technological systems therefore should take this into account by design. The concept of error tolerance and error resistance in technology design best exemplify this new focus. The following are some of the causes of error:

(i) Lack of Communication

(ii) Lack of Communication

(iii) Lack of Knowledge

(iv) Complacency

(v) Distraction

(vi) Lack of Teamwork

(vii) Fatigue

(viii) Lack of Resources

(ix) Pressure

(x) Lack of Assertiveness

(xi) Stress

(xii) Lack of Awareness

(2) Norms

(i) Error management has two components: error reduction and error containment.

(ii) Error reduction comprises measures designed to limit the occurrence of errors. Since this will never be wholly successful, there is also a need for error containment — measures designed to limit the adverse consequences of the errors that still occur.

(3) Error management includes:

(i) measures to minimize the error liability of the individual or team

(ii) measures to reduce the error vulnerability of tasks or task elements.

(iii) measures to discover, assess, and then eliminate error factors within the workplace;

(iv) measures to diagnose organizational factors that create error-producing factors within the individual, the team, the task, or the workplace

(v) measures to enhance error detection

(vi) measures to increase the error tolerance of the workplace or system; and

(vii) measures to make latent conditions more visible to those who operate and manage the system.

(f) Aerodrome emergency plan should contain policies, procedures and guidelines for emergency responders to consider human factors principles to ensure optimum response to an accident/incident.

THE NEED FOR HUMAN FACTORS IN AERODROME EMERGENCY PLANNING

(a) This need for Human Factors is based on its impact on two broad areas, which interrelate so closely that in many cases their influences overlap and factors affecting one may also affect the other.

Figure-17: Human factors SHEL model

(b) Effectiveness of the system – Safety

(1) The SHEL model provides a conceptual framework to help understand Human Factors. It illustrates the various constituents and the interfaces — or points of interaction — which comprise the subject (see Figure–17).

(2) According to SHEL's model, Human Factors elements can be divided into four basic conceptual categories:

(i) **Software:** the rules, procedures, written documents etc., which are part of the standard operating procedures. etc.

(ii) **Hardware:** the fire control room, vehicles/vessels and their configuration, controls and surfaces, displays and functional systems, equipment, etc.

(iii) **Environment:** the situation in which the L-H-S system should function, the social and economic climate as well as the natural environment.

(iv) **Liveware:** the human beings - the incident commanders, operational personnel, management and administration people - within in the system.

(3) According to the SHELL Model, a mismatch between the Liveware and other four S-H-E-L components contributes to human error and decrease in performance. Thus, these interactions should be assessed and considered in all sectors of the emergency response system.

(4) Liveware

(i) The critical focus of the model is the human participant, or liveware, the most critical as well as the most flexible component in the system. The edges of this block are not simple and straight, and so the other components of the system should be carefully matched to them if stress in the system and eventual breakdown are to be avoided.

(ii) However, of all the dimensions in the model, this is the one which is least predictable and most susceptible to the effects of internal (hunger, fatigue, motivation, etc.) and external (temperature, light, noise, workload, etc.) changes.

(iii) Human Error is often seen as the negative consequence of the liveware dimension in this interactive system. Sometimes, two simplistic alternatives are proposed in addressing error: there is no point in trying to remove errors from human performance, they are independent of training; or, humans are error prone systems, therefore they should be removed from decision making in risky situations and replaced by computer-controlled devices. Neither of these alternatives are particularly helpful in managing errors.

(5) Liveware-Liveware (L – L): The interface between people and other people

(i) This is the interface between people. In this interface, we are concerned with leadership, co-operation, teamwork and personality interactions. It includes:

(A) Incident command skills

(B) Communication skills

(C) Listening skills

(D) Observation skills

(E) Operational management skills

(F) Crisis leadership

(G) Problem-solving

(H) Decision-making

(6) Liveware-Hardware (L-H): The interface between people and hardware

(i) Another interactive component of the SHELL model is the interface between liveware and hardware. This interface is the one most commonly considered when speaking of human-machine systems: design of seats to fit the sitting characteristics of the human body, of displays to match the sensory and information processing characteristics of the user, of controls with proper movement, coding and location. Hardware, for example in Fire Control Room, refers to the physical features within the controlling environment, especially those relating to the work stations. As an example, the press to talk switch is a hardware component which interfaces with liveware. The switch will have been designed to meet a number of expectations, including the probability that when it is pressed the controller has a live line to talk. Similarly, switches should have been positioned in locations that can be easily accessed by controllers in various situations and the manipulation of equipment should not impede the reading of displayed information or other devices which might need to be used at the same time. Others include:

(A) Scanning Detection Decision-making

(B) Vehicle cabin adjustment Instrument interpretation/situational awareness

(C) Manual dexterity Selection of alternative procedures

(D) Reaction to breakdowns/failures/defects

(E) Emergency warnings

(F) Workload; physical, allocation of tasks

(G) Vigilance

(7) Liveware-Environment (L-E): The interface between people and the environment.

(i) The liveware - environment interface refers to those interactions which may be out of the direct control of humans, namely the physical environment - temperature, weather, etc., but within which people vehicles and equipment operate. Much of the human factor development in this area has been concerned with designing ways in which people or equipment can be protected, developing protective systems for lights, noise, and radiation. The appropriate matching of the liveware - environmental

interactions involve a wide array of disparate disciplines, from environmental studies, physiology, psychology through to physics and engineering. Others include:

(A) Adaptation

(B) Observation

(C) Situational awareness

(D) Stress management

(E) Risk management

(F) Prioritization and attention management

(G) Coping/emotional control

(H) Decision-making

(8) Liveware-Software (L-S): The interface between people and software

(i) Software is the collective term which refers to all the laws, rules, regulations, orders, standard operating procedures, customs and conventions and the normal way in which things are done. Increasingly, software also refers to the computer-based programmes developed to operate the automated systems.

(ii) In order to achieve a safe, effective operation between the liveware and software it is important to ensure that the software, particularly if it concerns rules and procedures, is capable of being implemented. Also, attention needs to be shown with phraseologies which are error prone, confusing or too complex. More intangible are difficulties in symbology and the conceptual design of systems include:

(A) Computer literacy

(B) Self-discipline and procedural behaviour Interpretation

(C) Time management

(D) Self-motivation

(E) Task allocation

(c) Effectiveness of the system - Efficiency

(1) Application of team dynamics and group interaction principles.

(2) The proper layout of aerodrome facilities, access points, design and performance of fire appliances promote and enhance effectiveness.

(3) Properly trained and supervised fire crew members are likely to perform more efficiently.

(4) From the perspective of efficiency, standard operating procedures (SOPs), are developed to provide the most effective methods of operations and should be regarded as a means of measuring the performance of all members involved in the incident and exercise.

(5) Well-being of emergency personnel

(i) Fatigue

(A) Fatigue may be considered a condition reflecting insufficient rest, as well as a collection of symptoms associated with displaced or disturbed biological rhythms. Acute fatigue is induced by long duty periods or by a string of particularly demanding tasks performed in a short term. Personnel performing shift duties are highly susceptible to fatigue. Shift system should be designed as to reduce fatigue to emergency personnel A fatigue risk management plan should be developed to identify high risk areas and sufficient mitigation measures are employed to deal with the hazards.

(ii) Body rhythm disturbance

(A) Safety, efficiency, and well-being of emergency responders are affected by the disturbed pattern of biological rhythms typical of today's long working hours. Health and performance Certain pathological conditions, gastrointestinal disorders, heart attacks, etc., have caused sudden failure on human performance. Where shift personnel are expected to perform duties exceeding 10-hours, sufficient rest areas or sleeping quarters should be provided.

(iii) Stress

(A) Stress can be found in many jobs especially working under emergency situations like responding to an aircraft accident, and the aviation environment is particularly rich in potential stressors. Of main interest is the effect of stress on performance. In the early days of aviation, stressors were created by the environment: noise, vibration, temperature, humidity, acceleration forces, etc., and were mainly physiological in nature.

(iv) Today, some of these have been replaced by new sources of stress: irregular working and resting patterns and life events. In the centre of the model is a person, the most critical as well as the most flexible component in the system. Yet people are subject to considerable variations in performance and suffer many limitations, most of which are now predictable in general terms.

(6) The edges of this block are not simple and straight, and so the other components of the system should be carefully matched to them if stress in the system and eventual breakdown are to be avoided.

(d) For further guidance on human factors principles in emergency planning refer to ICAO Doc 9137 Airport Services Manual Part 1 - Rescue and firefighting and Doc 9683 - Human Factors Training Manual.

(e) General principles and procedures on the training of aerodrome personnel, including training programmes and competence checks, are specified in the PANS-Aerodromes (Doc 9981)

AMC1 ACM.OPS.CERT.D.005(b) Emergency planning

REVIEW OF EMERGENCY PLAN DOCUMENT

(a) Policies and procedures should be implemented for managing subsequent changes to the emergency plan, according to the aerodrome operator's safety management system, including:

(1) a systematic process to review, revise, and validate the emergency plan;

(2) a documentation control process;

(3) quality assurance and audit process;

(4) an approval process by the Accountable Manager or a delegated executive; and

(5) an updated plan provided to the GCAA.

GM AMC12 ACM.OPS.CERT.D.005(b) Emergency planning

REVIEW OF EMERGENCY PLAN DOCUMENT

1. OBJECTIVE AND SCOPE

(a) The objective of this guidance is to ensure that aerodrome operators establish and maintain a systematic process to review, revise, and validate the AEP as part of the continuous improvement cycle embedded in the SMS. The scope of this requirement applies to all elements of the AEP, including the structure, stakeholder roles, procedures, contact information, resource availability, and coordination arrangements with external agencies.

(b) The integration of AEP with SMS processes provides a risk-based, performance-oriented framework to ensure the AEP remains responsive to both internal changes (e.g., infrastructure, personnel, aircraft types) and external developments (e.g., regulatory updates, threat

2. PROCESS FOR EMERGENCY PLAN MAINTENANCE

(a) The aerodrome operator shall establish a formalised process for the periodic review, revision, and validation of the AEP. This process must be documented within the SMS and incorporate the following core components:

(1) **Review Frequency:** The AEP should be reviewed at least annually, or more frequently in response to significant operational, organisational, or environmental changes.

(2) **Change Triggers:** The following triggers should initiate a review of the AEP: expansion of facilities; changes in aircraft type, volume, or critical areas; stakeholder role amendments; outcome of emergency exercises; lessons from actual emergencies; and regulatory amendments.

(3) **Stakeholder Involvement:** All agencies with assigned roles in the AEP should be involved in the review process to ensure accuracy, ownership, and interoperability. This includes airport units, air traffic control, RFFS, medical responders, law enforcement, customs, airlines, and external civil defence and emergency authorities.

3. DOCUMENTATION AND VERSION CONTROL

(a) The aerodrome operator should establish document control procedures in accordance with SMS documentation policies to ensure that all versions of the AEP are:

(1) Properly authorised, dated, and version-controlled;

(2) Accessible to authorised users in a timely manner;

(3) Distributed in both physical and electronic formats to all concerned stakeholders; and

(4) Archived in accordance with regulatory and organisational records retention policies.

(b) A change log should be maintained to track the nature of revisions, the reason for the change, the approval authority, and the date of implementation. This facilitates traceability, accountability, and audit readiness.

4. INTEGRATION WITH QUALITY ASSURANCE AND AUDITS

(a) The AEP update process should be embedded within the aerodrome operator's SMS quality assurance programme, including:

(1) **Internal Audits:** Periodic internal audits should be conducted to assess the adequacy, currency, and effectiveness of the AEP against defined performance objectives, regulatory standards, and exercise outcomes.

(2) **Corrective and Preventive Actions (CAPA):** Deficiencies identified through audits, exercises, or incident investigations must be addressed through a documented CAPA process with clear timelines, responsibilities, and verification steps.

(3) **Safety Performance Monitoring:** Emergency response performance data should be captured, analysed, and reviewed during safety meetings or by the Safety Action Group. Metrics may include response times, resource availability, communication efficiency, and inter-agency coordination.

ACM.OPS.CERT.D.010 Emergency planning

AERODROME EMERGENCY EXERCISES

(a) An aerodrome operator shall ensure emergency plan contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness by conducting:

(1) a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected;

or

(2) a series of modular tests commencing in the first year and concluding in a full-scale aerodrome emergency exercise at intervals not exceeding three years;

and

(3) reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency.

(b) A full-scale emergency exercise or modular testing plan at the aerodrome shall be planned and managed according to the aerodrome operator's safety management system.

AMC1 ACM.OPS.CERT.D.010(a) Emergency planning

TESTING AND EXERCISING THE EMERGENCY PLAN

(a) Testing and exercising the emergency plan should:

(1) commensurate with the types of aircraft operations and operational activities;

(2) ensure emergency exercises are sufficiently planned and managed with clear aims, objectives, performance criteria and understood by all participant agencies;

(3) include the participation of on and off aerodrome agencies and its associated personnel and resources;

(4) identify core elements of the emergency plan and established how and when these elements are tested;

(5) ensure key aerodrome personnel participate in exercises as per their assigned strategic, tactical and operational roles and responsibilities in the emergency plan;

(6) include safety assessment of emergency exercises in accordance against the agreed aim and objectives of the exercise plan;

(7) where an aerodrome operates aircraft movement and other major operational activities at night, conduct emergency exercises during the hours of darkness; and

(8) include records of the emergency exercises and ensure such records are readily available for audit and inspection by the GCAA.

GM1 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning

TESTING AND EXERCISING THE EMERGENCY PLAN

(a) It may be appropriate to test some parts of the emergency plan in isolation, provided satisfactory assurance of overall effectiveness of the emergency plan can be achieved.

(b) The GCAA may attend exercise pre-briefing, testing or debriefing, or choose to attend emergency exercises conducted by the aerodrome.

GM2 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning

1. PURPOSE OF AERODROME EMERGENCY EXERCISE

(a) The purpose of an aerodrome emergency exercise is to ensure the adequacy of the following:

(1) response of all personnel involved;

(2) emergency plans and procedures; and

(3) emergency equipment and communications.

(b) It is therefore important that the plan contain procedures requiring that an aerodrome emergency plan be tested. This test should correct as many deficiencies as possible and familiarize all personnel and agencies concerned with the aerodrome environment, the other agencies and their role in the emergency plan.

(c) The aerodrome emergency plan provides the framework which enables aerodrome and community fire protection, security, medical, and other resources to join in an effective, co-ordinated response to aerodrome emergencies. By using any of several types of aerodrome emergency exercises, aerodrome operator s and community emergency resource managers can, first, produce an integrated emergency plan with a response based upon need and emergency location and, second, practice the procedures and co-ordination needed to accomplish an effective emergency response in minimum time. In addition, aerodrome operator s cannot truly have confidence in the aerodrome's plan until they study it, revise it, study it again, and test it. Testing is crucial for determining where serious gaps may exist in the plan. For example, some individuals involved in the plan may have misconceptions or misunderstandings about it; some of the procedures that seem workable on paper may not work in practice; the written estimates of time, distance or available resources may be sufficiently inaccurate to cause problems. Testing the plan may afford emergency response personnel from the aerodrome an opportunity to get to know each other and to know how

other services operate. It may provide emergency response personnel from outside the aerodrome an opportunity to meet aerodrome personnel and to familiarize themselves with aerodrome facilities, resources, traffic pattern, and identifiable hazard areas. The exercises should be conducted in daylight, twilight and darkness and in various conditions of weather and visibility.

11. TYPES OF AERODROME EMERGENCY EXERCISES

(a) There are four methods of testing the aerodrome emergency plan:

(1) Full-scale emergency exercises (FEX);

(2) Partial emergency exercises (PEX);

(3) Table top emergency exercises (TEX); and

(4) Modular testing exercises (MEX)

(b) These tests should be conducted on the following schedule:

(1) Full-scale (biennial): At least once every two years:

(2) Partial: At least once each year that a full-scale exercise is not held or as required to maintain proficiency;

(3) Table top: At least once each six months, except during that six-month period when a full-scale exercise is held.; and

(4) Modular (triennial): at least every 3 – 4 months for each module of the 10 modules ending with a full-scale exercise at the end of the third year.

12. TABLETOP EXERCISES (TTX)

(a) Table-top exercise is a test of the integration and capability of emergency response resources without the expense and disruption of services incurred by a partial and full emergency exercise. The exercise may be held as a co-ordination exercise prior to the full-scale exercise, or it may be held at intervening times in order to reconfirm procedures, policy, telephone numbers, radio frequencies, and changes in key personnel.

(b) Table-top exercise is the simplest type of drill to stage, requiring only a meeting room, a large-scale map of the aerodrome, and a senior representative of each participating unit in attendance. A probable accident location is selected on the map and each participant describes what actions their unit would take to respond. This exercise will quickly reveal operational problems, such as conflicting communications frequencies, lack of equipment, confusing terminology and areas of jurisdiction. These exercises should be held semi-annually, but not coincidental with other exercises.

(c) Table-top exercises can be delivered in any forms – face to face, virtual or blended as long as the aim and objectives are achieved.

13. PARTIAL EMERGENCY EXERCISES (PTX)

(a) Partial emergency exercises are required for some participating units in order to train new personnel, evaluate new equipment or techniques, or to comply with mandatory recurrent training requirements. These drills are economical because of their limited scope and can be repeated as often as required in order to maintain a high standard of proficiency. They may involve only one unit, such as rescue and firefighting services or medical, or a combination of several units, as desired. These exercises should be held at least once each year that a full-scale exercise is not held to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected.

14. FULL-SCALE EXERCISES (FTX)

(a) Full scale emergency exercises are required to test the full deployment of on and off aerodrome agencies and its associated equipment in dealing with a credible worst-case emergency scenario at an aerodrome. Worst-case scenarios include different types of aircraft and non-aircraft related emergencies as detailed in the emergency plan.

(b) The aerodrome emergency plan should be given full-scale emergency exercises to test all facilities and associated agencies at intervals not exceeding two years or three years in modular testing plan. The exercise should be followed by a full debriefing, critique and analysis. Representatives of all organizations which participate in the exercise should also actively participate in the critique.

(c) The first step in planning full-scale emergency exercises is to have the support of all aerodrome and community authorities concerned. All departments and agency personnel should be considered.

(1) **Develop Objectives.** In conducting an aerodrome full-scale emergency exercise, the first and most basic step aerodrome and community emergency response planners and workers should decide is exactly what should be achieved. As funds and personnel are often difficult to obtain, it is prudent for management to make plans to accomplish specific goals.

(2) **Selecting an objective.** There are numerous objectives that can be set for an emergency exercise. For example, it may be desirable to hold an exercise at night to test the reactions of response personnel under night-time conditions. Similarly, it may be desirable to test

the ability of local emergency response teams to react to the discovery of hazardous materials in the cargo of an aircraft.

(3) **Setting limits on goals.** It is likely that more than one objective could be accomplished during an exercise. The pitfall in combining several objectives is that more may be set than can be achieved. As part of the objective setting effort, planners should limit the scope of the problems that will be explored or they run the risk of confusing and frustrating response personnel. Actual emergencies may create confusion and frustration, but confusion and frustration in training exercises will only produce a negative learning experience. This represents a misspent opportunity for emergency planners and may decrease the ability of the community to respond in real emergencies.

(4) **Assessing results.** After the exercise, it should be possible to look back and see specific skills that were learned, new environmental conditions that were explored, communications systems that were tried out, additional mutual aid units that were integrated into the emergency plan, new equipment that was used, as well as other benefits or problems.

(d) All agency heads should be thoroughly familiar with the aerodrome emergency plan and should develop a plan for their individual departments in co-ordination with the general plan. The agency heads should meet regularly to develop an understanding of their agencies' responsibilities and requirements in co-operation with other agencies.

(e) The use of a large passenger aircraft or similar size simulator should be sought for the full-scale emergency exercise to add realism to the on-aerodrome exercise and to familiarize participants with the problems of removing casualties from aircraft. If an aircraft is not available, a bus or similar large vehicle may be used.

(f) The emergency exercises should be held in locations which will provide maximum realism while ensuring minimum disruption of the aerodrome operations. Various scenarios can be used. The exercise may be held either during the day or at night on the aerodrome, in the runway end safety area, or in the surrounding community. Scenarios include accidents involving:

(1) aircraft/structures;

(2) aircraft/aircraft; or

(3) aircraft/ground vehicles.

(g) Since about 80 per cent of all aircraft accidents occur on the runway, the runway end safety areas, or the approach or take-off areas, the majority of exercises should be held in the aforementioned locations. Where aircraft is not available, inclusion of small fires in the area can add realism for the fire services. Volunteer casualties should be moulage in order to provide

realism for the medical responders. The use of large number of volunteers and role players provide realism for the police services.

15. EXERCISE PLANNING AND MANAGEMENT

(a) At least 120 days prior to the scheduled full-scale emergency exercise, the aerodrome operator should hold a meeting of all key supervisory personnel of principal participating agencies. At this time, the aims of the exercise should be outlined, a scenario formulated, work tasks assigned, and duties of all agencies and personnel defined. Table 7 provides a suggested time schedule and checklist for planning and conducting full scale emergency exercise.

Table 7: Schedule and checklist for a full-scale emergency exercise

Exercise schedule	Suggested actions
D — 120 days	Supervisory personnel of participating agencies hold organizational meetings to outline aims, formulate the scenario, assign work tasks, and select emergency plan co-ordinators
D — 90 days	First progress report on arrangements.
D — 70 days	First meeting of all participating agencies (individual committee representatives)
D — 60 days	Complete arrangements for full-scale emergency exercise site or staging area. Written scenario completed
D — 50 days	Training for moulage team begins. Second meeting of individual committee representatives. A moulage chairman can be selected from hospitals, rescue and firefighting personnel, civil defence, military personnel, etc.
D — 40 days	Arrangements for transportation, feeding, stretcher bearers and volunteer workers completed
D — 30 days	Third meeting of individual committee representative. A preliminary “warm-up” communication exercise is held. Notify GCAA.
D — 21 days	Fourth meeting of individual committee representatives. Make-up for members who missed previous team training and arrangements for volunteer casualties completed
D — 14 days	Final meeting and briefing for all participants, including critique team
D — 7 days	Final meeting of supervisory personnel to review assignments
D — 0 days	Exercise day
D + 1 to 7 days	A critique following the exercise so that all participants may hear the observers' reports
D + 30 days	Supervisory personnel meet to review written critiques submitted by observers and participants; revise procedures to correct mistakes and shortcomings indicated in the exercise.

(b) In preparing the scenario, the use of real names of aircraft operators and types of aircraft should be avoided. This will prevent any possible embarrassment to civil aviation companies or agencies.

(c) In order to obtain the maximum benefit from a full-scale emergency exercise, it is important to review the entire proceedings. An observer critique team should be organized, comprised of members who are familiar with mass casualty accident proceedings. A team chairman should be appointed and should be present at all meetings. The team should be present at the final organizational meeting (seven days prior to the drill) and, in co-ordination with the GCAA in charge, ensure that significant problems are introduced into the exercise. Each member of the critique team should observe the entire exercise and complete the appropriate emergency drill critique forms.

(d) As soon as convenient after the exercise, a hot debrief should be conducted to seek immediate feedback on critical exercise areas and an exercise critique meeting should be held within 2 weeks so members of the team can present their full findings and observations. A final exercise review meeting to be attended by all participating agencies should be held within 2 months to present and discuss all exercise findings, observations and recommendations for improvement of the aerodrome emergency plan procedures and associated aerodrome emergency plan document. Where there are serious findings and/or observations arising from the full-scale emergency exercise, partial exercises should be conducted at the following year to test these improvement areas.

GM3 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning

PLANNING AND MANAGING AERODROME EMERGENCY EXERCISE

(a) This guidance document is to assists aerodrome operator in planning and managing aerodrome emergency exercises safely and effectively.

A. INTRODUCTION

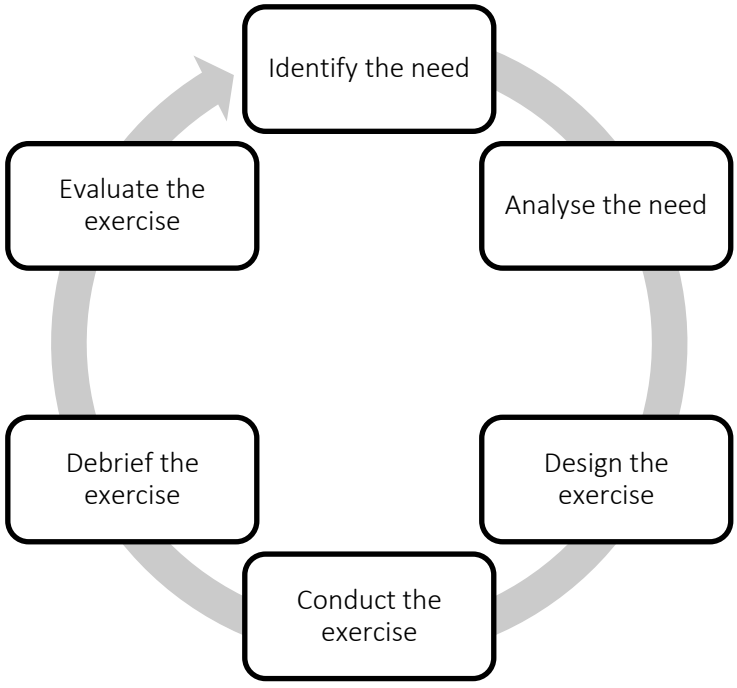
(1) This document provides guidance to aerodrome emergency planners to design, plan and manage aerodrome emergency exercises to ensure the intended aim and objectives of testing aerodrome emergency plan are achieved.

B. THE EXERCISE MANAGEMENT MODEL

(1) The success of any exercise will almost certainly be enhanced by the adoption of a structured approach to its design, conduct and evaluation. The Exercise Management Model provides such an approach.

(2) This model takes a cyclical approach to exercise management, whereby one phase is dependent upon the substantial completion of the previous and the outcomes of an exercise can contribute to the inputs or development of future exercises.

Aerodrome Emergency Exercise Management Model



(a) Identifying and analysing the need

(1) The first step in the process is to ask 'why are we conducting an exercise?'

(2) Exercises should begin with a specific need to test, evaluate, assess, practise, train or demonstrate aspects of policy, plans, procedures, systems, training of individuals or group performance. This need may have been identified from past planning, training, exercises, actual responses or as a legislative or regulatory requirement, such as with the conduct of aerodrome exercises.

(3) Once it is determined why we are conducting an exercise, this can be analysed to determine the aim and objectives to be achieved by the exercise.

(4) The aim should tell emergency planners, in a short concise statement, why we are conducting the exercise. An example might be:

"The aim of this exercise is to test the effectiveness of the response arrangements documented in the xxx Aerodrome Emergency Plan".

(5) The exercise objectives will build on the aim and provide an indication as to the expected outcomes from the exercise. Building on the aim stated above, examples of objectives may include:

- Assess the ability of emergency services to perform their prescribed roles during the response to a large aircraft incident on the xxx Aerodrome.
- Assess the ability of the xxx Aerodrome owners to provide access to emergency services and support their needs during the response to a large aircraft incident on the Aerodrome.

(6) As a rule of thumb, the number of objectives for an exercise should be kept to less than five. In a multiagency exercise, each agency involved may wish to identify their own agency objectives. If allowed, these should be consistent with the overall objectives of the exercise. For example, a response agency wishing to assess its response times to the aerodrome, may be outside the scope of the exercise described above.

(7) Exercise managers need to be mindful of how they will identify if the exercise objectives have, or have not, been achieved. An effective way of doing this is to identify a number of actions or tangible outcomes that can be observed or measured which indicate an objective has been met or not met. These performance measures or performance indicators should be documented and agreed upon, so it is clear what is expected of participants during the exercise.

<u>(b). Design the exercise</u>

(1) Once the aim and objectives have been identified it is time to look at the scope, type and participants for the exercise.

(2) The scope will identify what is included in the exercise and may also identify what is not included in the exercise. It is important that this be established early in the design phase, as there is a tendency for other influences to impact on the scope. Any variation to the scope may mean that the aim and objectives need to be reviewed. (This is called "scope creep" and at best should be avoided.) For example: The scope of the exercise will be limited to:

- The response arrangements documented in the xxx Aerodrome Emergency Plan, and

- Those agencies listed as having responsibilities during the response to an aerodrome emergency.

(3) There are three broad types of exercise used by emergency managers. These are table-top, partial and full-scale exercises. Each of these has a number of variations and it is important to select the type of exercise that will best suit the aim, objectives and scope of a particular exercise. For example, a discussion exercise would not be suitable for assessing the performance of a particular role. In the aerodrome exercise example, if one of the objectives was to familiarise emergency services with their roles during a response, a discussion exercise may be appropriate.

(4) The participants and their level of participation need to be carefully assessed. Exercise managers need to pay particular attention to who should be involved and their particular role during an exercise. Once agreed, details need to be clearly communicated during the design of the exercise and articulated in exercise documentation.

(5) An issue with emergency management exercises is that conflicting commitments can often limit participation. To avoid this, participants need to be engaged at the earliest opportunity and continually informed of developments during the design phase of the exercise.

(6) Once the exercise aim, objectives and scope have been endorsed and the type of exercise and participants agreed, it is time to give consideration to the detailed scenario and look at what needs to be done before conducting an exercise.

(7) The size and complexity of an exercise will indicate how much preparation is required. A simple exercise can be designed by an experienced exercise manager, however, more detailed exercises may require a dedicated team and many months of preparation. Exercise design will also require a range of meetings and detailed documents. One thing is certain, exercises do not occur by osmosis and the

(8) amount of time and effort applied to the preparation will almost certainly contribute to the success of the exercise.

<u>(c). Conduct the exercise</u>

(1) Exercise managers often focus on the exercise itself as the end state. The reality is that the conduct of the exercise includes those activities that involve the participants and exercise staff in the lead up to the exercise, during the exercise and immediately after the exercise.

(2) **Before the exercise**, it is essential to ensure that all participants and exercise staff are aware of what is required of them during, and immediately after, the exercise. This should occur by way

of written information in advance of the exercise and a briefing immediately before the exercise. Suggested topics for the briefing include:

- Exercise aims and objectives
- Roles and responsibilities during the exercise
- Information, communication and/or technology systems
- Action in the event of unforeseen circumstances
- Post exercise requirements
- Appropriate parts of the scenario

(3) In addition to briefing participants, sufficient time should be allowed to establish and test the facilities and the resources required to conduct the exercise.

(4) If careful attention is paid to pre-exercise activities, all will be in place for person appointed to the role of Exercise Director to commence the exercise.

(5) **During the exercise**, activities should occur in a predetermined way. This will commence with the Exercise Director starting the exercise, right through to its termination. These activities should occur in accordance with a pre-determined script, often referred to as the 'master schedule'. The master schedule should detail when particular activities are expected to take place, when exercise inputs should occur and if appropriate, information about the actions or responses expected from participants.

(6) **After the exercise**, it is essential to ensure that all participants, directing staff and role players are aware that the exercise has concluded. A typical way to do this is to conduct a 'hot debrief' to wrap up activities and to disengage participants and staff from the exercise activities. A hot debrief should bring the exercise scenario to a logical conclusion and advise those involved of any follow up activities, such as formal debriefs and evaluation activities. In addition to this, any resources, facilities or sites used during the exercise need to be returned to their pre-exercise state.

(d). Debrief the exercise

(1) All exercises benefit from a formal debrief at some stage following the conclusion of the exercise. The aim of such is to identify whether or not the exercise met its aim and objectives. It is also an opportunity to allow participants and participating organisations to reflect on their performance during the exercise.

(2) Debriefs have typically look at what went well, what could be improved and recommendations that should be considered for future activities. More recently, there has been an inclination for agencies to replace debriefs with a process referred to as an After-Action Review (AAR).

While the concept of an AAR sits well in some circumstances its purpose differs from that of a debrief and those responsible for conducting exercises are encouraged to include some form of formal debrief, as described above, following their exercise.

(3) When conducting debriefs, it is essential that the outcomes are recorded and made available to those involved. These outcomes will contribute to any review or evaluation process applied to an exercise.

(e). Evaluate the exercise

(1) It is recommended that a process for evaluating an exercise be considered right from the very first exercise planning meeting. The evaluation process may run in conjunction with the exercise planning process and those appointed to evaluation positions should wherever possible, work independently of those planning and conducting the exercise. The evaluation process should include both; how the participants respond to the developing scenario and also the way in which the exercise was designed and conducted. The latter point is often overlooked in the evaluation process and requires greater attention by exercise managers.

(2) An evaluation process needs to be useful, accurate, ethical, feasible and cost effective. The outcomes of the exercise evaluation process should ultimately contribute to the way in which future exercises are conducted and the way in which emergency management agencies manage their responsibilities in the real event.

(f). Conclusion

(1) The amount of time, effort and resources that are required to design, conduct and evaluate an effective exercise should not be underestimated. All but the simplest of exercises will require a team of people dedicated to the tasks required to conduct an exercise.

(2) The team needs to work in a cohesive manner and have a common understanding of the requirements of the process adopted, such as the exercise management model described above.

(3) The exercise design needs to be centred around a clearly defined aim, objectives and scope. The exercise manager should make use of the aim, objectives and scope to ensure that their exercise is not derailed by an overly ambitious scenario or other agenda.

C. EXERCISE WORK PLAN

(1) For exercises to have an effective outcome there needs to be a work plan. This plan could range from a simple action list of when and where certain activities will occur to more complex detailed activity schedules of flow charts, meeting agendas, etc. It is necessary to identify the

type and scale of exercise required then develop the appropriate work plan. Details of the requirements for an exercise work plan are listed below.

Example of Aerodrome Emergency Exercise Work Plan

A. INTRODUCTION

(1) The detail required in a work plan depends on the size and type of exercise to be undertaken. The plan should clearly identify the course to be taken and the requirements of those agencies involved in the exercise. Development of this work plan should take place well before the exercise to allow for its complete development and the inclusion of all necessary criteria.

B. POLICY MEETING

(1) A policy meeting is needed early in the planning process in order to identify the scale and timings of the proposed exercise. The attendees at this meeting should be from management, staff responsible for the implementation of the exercise and persons with the GCAA to make decisions on the discussion issues listed below.

(2) To give sufficient time for completion of all logistical requirements, this meeting should be held at least twelve weeks prior to a full-scale exercise or eight weeks prior to a partial exercise. Items for discussion might include:

- Type, nature and scope of exercise;
- Aim and objectives;
- Duration;
- Policy directives;
- Organisations involved;
- Key appointments;
- Budget considerations;
- Location;
- Timings;
- Coordination;
- Logistics;
- Industrial implications;
- Planning meetings;
- Method of evaluation;
- Exercise planning committee nominations; and
- Occupational health and safety.

C. EXERCISE PLANNING COMMITTEE

(1) The exercise planning committee established through recommendations from the policy meeting should comprise representatives from all the organisations involved. The role of this committee is to write the formal exercise papers incorporating the decisions and recommendations identified at the policy meeting.

(2) Other areas to be addressed by this committee include:

- Format of the exercise;
- Schedule of events;
- Actors for role plays; and
- Exercise control requirements.

D. PROGRESS MEETINGS

(1) These meetings are necessary for the continued development of the papers including checks on authenticity of the General and Special Idea (Refer Appendix B)

(2) Other areas that may require ongoing development are:

- General instructions; and
- Intelligence background.

E. DOCUMENTS

(1) The exercise documents should be prepared by persons nominated by the exercise planning committee. Appendix B discusses the documents in more detail. The exercise planning committee should also examine and approve the exercise documents.

(2) It is also important that all organisations involved in the exercise agree to the final content prior to acceptance by the exercise director.

F. COORDINATION AND TIMINGS

(1) Participating organisations need to receive the final exercise instruction several weeks prior to the exercise to allow time for the assessment of resource commitments. If the exercise is designed to test operational response, the special idea and commencement times should be withheld until activation.

(2) The exercise planning committee also requires time to organise logistics and brief the actors in their role plays. An exercise control briefing and actors briefing needs to be held approximately four days before the exercise. A further briefing of actors is advisable before the exercise.

G. DEBRIEFING

(1) The debrief provides an opportunity for the participating organisations to report on their effectiveness to respond and operate within the AEP guidelines and for the exercise director and evaluators to report on the exercise from their perspective. Several debriefs are held after exercises with the primary of these being called the "Hot Wash up" and "Cold Wash up". The Hot Wash up debrief is held immediately after the exercise and is attended by all the exercise control staff. This type of debrief is also held by all the participating organisations individually including all participants. The Cold Wash up debrief is usually held 24 hours later and is attended by at least one representative from each of the participating organisations.

(2) The type of questions that should be asked at these debriefs are:

- Were the objectives achieved?
- What skills and knowledge were gained as a result?
- How could procedures be improved?
- Was the exercise justified?
- What are the recommendations from the exercise?

H. POST EXERCISE ACTIVITIES

(1) There are several post exercise activities that should be undertaken immediately or as soon as practical after the end of exercise play. These include:

- Inspection and clearance of the site;
- Restoration of the site;
- Damage control report;
- Letters of appreciation;
- Payment of costs etc; and
- AEP revision/amendment as necessary

D. EXERCISE DOCUMENTS

(1) Exercise documents are necessary for the participating organisations to enable them to identify the guidelines under which they are to operate and what is to be achieved from the exercise. The scope and type of the proposed exercise will dictate the nature of the supporting documentation. Details of exercise documents are provided below:

Example of Aerodrome Emergency Exercise Instructional Plan

A. INTRODUCTION

(1) It is necessary to develop the exercise documents to suit the type and scale of exercise that is to be undertaken in accordance with this regulation. The content of this document should allow organisations to understand the parameters that they should operate within. Poor documentation will lead to confusion and poor performance by participating organisations.

(2) Points to be considered when developing an exercise instruction are as follows:

B. EXERCISE CODE NAME

(1) A code name should be considered for all exercises so they are not confused with normal every day operational activities or other exercises being held simultaneous. The name should be kept short and relevant to the activities.

C. EXERCISE INSTRUCTION

(1) The exercise instruction outlines Why, When, Where and How the exercise is to be run. There are several topics that should be addressed in the document. These are discussed below. The classification status for the exercise should also be included.

References.

Details are given here of any references that relate to the operational response associated with the exercise, i.e. AEP, SOPs etc.

Introduction.

The introduction contains information on the following:

- An explanation of the type of exercise;
- When and where the exercise will be conducted;
- Reason for the exercise;
- Participating organisations; and
- Exercise limitations.

Aim.

This is a broad statement of intent which gives direction as to what will be achieved by the exercise. The aim should be clear, concise, and practical. Examples of an aim are as follows:

- To practice coordination of rescue resources to an aircraft incident;
- To test call out procedures for an emergency at an aerodrome; and
- To evaluate the efficiency of information recording in the emergency operations centre.

Objectives.

The objectives are precise statements of the intended outcomes in terms of the knowledge, skills, attitudes and/or operating procedures to be measured or observed during and after the exercise at individual, group and agency level. They should support the aim. Objectives should state the performance required, the conditions under which performance is to be tested and the standards to be achieved. When developing exercise objectives, consider the use of SMART (Specific, Measurable, Achievable, Realistic and Time-specific) acronym. Examples of objectives are as follows:

Exercise Format.

Information necessary for the conduct of the exercise should include the following points:

- Activation and stand down times;
- Pre-exercise information;
- The level to which the exercise will be taken; and
- Intelligence gathered relevant to the exercise.

Safety/Medical.

Details of safety precautions and names of safety officers should be identified, including emergency procedures for real injury situations together with emergency contacts. Instructions should cover the use of a code word such as “No Duff” so that the exercise can be terminated should a real injury or incident occur which requires resources that are committed to the exercise.

Damage.

A damage control officer should be nominated to oversee the protection of buildings, property and other facilities including the reporting of damage caused during the exercise.

Administration.

Several areas may need clarification under this heading. These may include:

- Exercise area including any restrictions;
- Information for role players including briefing points; and
- Briefing and debriefing arrangements for exercise control staff and participants.

Security.

Areas needing security consideration are:

- Exercise area security;
- Documentation security; and
- Visitors/observers designated areas.

Media and Public Relations.

Media interaction should be considered. In particular whether there should be partial activation (internal only) or a full-scale activation of all media for public information.

Command and Control.

This applies to the organisation of the exercise and should identify the following:

- Control staff;
- Participants;
- Observers; and
- Visitors.

Reference should also be made to the prefixing of all exercise communications with the nominated code name to avoid confusion with the normal ongoing transmissions.

Annexes.

A list of all supporting documents should be attached.

Distribution List.

This is a list of organisations and personnel that the documents should be distributed to.

Authority.

A signature of the exercise director should be included for authenticity.

D. GENERAL IDEA

(1) This is a narrative designed to inform participants of general background knowledge that would normally be available during a real incident. The general idea 'sets the scene' for the exercise.

E. SPECIAL IDEA

(1) This is a narrative providing specific information to selected personnel or organisations detailing events not written into the general idea. This information may include timings relevant to the activation of the exercise and a specific sequence of events identifying the exercise scenario and casualty extent. The special idea is to be restricted to control staff until immediately prior to the commencement of the exercise then released to selected organisational representatives.

Note: Both the general and special idea documents are normally only used in partial or table top exercises.

F. SEQUENCE OF EVENTS

(1) A detailed script for the sequence of events is recommended to assist with the effective control and input to the exercise. The sequence of events script should be restricted to exercise control staff only.

G. CONTROL STAFF LISTING

(1) All exercise control staff is listed by name, the organisation they represent and the function they are to perform during the exercise. A detailed list of role players may also be added in this section.

H. ORGANISATION CHART

(1) An organisational diagram depicting the command and control structure may be added.

I. SUPPORTING ORGANISATIONS AIMS AND OBJECTIVES

(1) Each organisations aims and objectives should be listed to clarify their roles and to avoid confusion during the exercise.

J. MAPS

(1) Maps identifying the exercise site and other applicable information should be attached.

K. EXERCISE REPORT

(1) On completion of the exercise, a report should be prepared which addresses all aspects of the exercise from planning through to the clean-up. The report, to be delivered in a timely manner, should highlight the good points, address deficiencies identified and make recommendations for the future.

Note: The format given above is not intended to be restrictive and should be adjusted to suit the type and scope of exercise.

E. EXERCISE ROLES

(1) Depending on the complexity, exercises can use a large number of staff and players. Considering the level of control, coordination and resources required during aerodrome emergency exercises, there is usually a need for several field exercise control staff to cover the range of activities. Roles to be considered are:

- Exercise Director: a senior management of the aerodrome operator who has the overall authority for the exercise, commencing, stopping etc;
- Exercise Controller: controls all exercise input, pace, rulings etc;
- Umpires: make rulings for participants and control the pace on behalf of the controller;
- Evaluators: take no active part in the play, but record reactions, responses and critique the exercise. They are selected based on their knowledge and experience;

- Observers: interested parties who have no direct involvement other than observing for their own benefit and knowledge;
- Higher Control: represent authorities higher than exercise participants;
- Lower Control: represents authorities lower than exercise participants i.e. field teams etc; and
- Role Players: represent industry, victims, media, public, meeters/greeters etc.

(2) Despite the number of roles outlined above, most can be filled by multi-tasked personnel. Role players may represent both higher and lower controls. Evaluators need to be aware of who is filling what roles before exercise play commences.

(3) The exercise director and controller, umpires, evaluators and observers should be clearly identified (usually by the use of tabards) to ensure that they do not get mistaken for exercise players.

F. EXERCISE SAFETY

(1) The safety of all participants including role players, operational response organisations and exercise control staff should be monitored during the exercise by nominated safety officers overseeing all activities.

(2) A code word needs to be identified for prioritising communications during the exercise. This may be required for the termination of all or part of the exercise due to a real life injury or emergency. A commonly used code word understood by most organisations is “NO DUFF”, and its meaning should be made general knowledge to all participants.

G. EXERCISE MEDIA / PUBLIC RELATIONS

(1) Media participation is important during all exercise activities and can be a valuable asset for advising or alerting the community. Areas for media participation are:

- **Pre-exercise:** Media should be utilised to notify the community of the pending exercise to alleviate the possibility of hysteria due to a lack of understanding at what is being undertaken. The media may also advise of the reasons for the exercise and proposed outcomes;
- **During exercise:** It is important to subject operational management and response organisations to a realistic media interaction to test liaison and coordination capabilities during the exercise operation; and

- **Post exercise:** Public education is important and media may advise on the state of operational readiness and higher safety standards achieved as a result of the exercise and ongoing planning.

H. EXERCISE EVALUATION

(1) Evaluation is aimed at providing valid judgements about how well the exercise objectives were achieved. The objectives should be S.M.A.R.T. They should be clearly defined during planning.

(2) The ultimate result of evaluation should be a list of specific recommendations to be implemented in order to increase preparedness.

Exercise Objectives

To sufficiently assess the effectiveness of any exercise, there should first have been written objectives against which the success of the exercise can be measured.

Exercise Evaluators

Evaluators should:

(1) Be familiar with the subject being exercised (Aerodrome Emergencies);

(2) Be familiar with Aerodrome Emergency Procedures;

(3) Observe and record functional performance during the exercise;

(4) Participate in the exercise debriefing;

(5) Analyse evaluation data; and

(6) Develop follow-up conclusions and recommendations.

Principles of Evaluation

Participant Evaluation: Participants, role players, and control staff, have a role in evaluation. A complete exercise report should contain all views, not just that of designated evaluators.

Evaluator Guidelines: Whether evaluators are evaluating only, or are doubling as role players or control staff, there are a number of applicable guidelines:

- They should remain objective;
- They should be prepared to observe the unexpected,
- They should know what they are looking for;
- They should not interfere with operations; and
- They should not provide evaluation information to participants during the exercise.

All evaluation does not have to wait until the conclusion of the exercise. Evaluators can be a valuable mechanism to help control the progress of the exercise. They can make critical

observations about the scenario and responses and give controllers the opportunity to redirect the exercise play as necessary to ensure the maintenance of realism.

Immediate Debriefing: During the "hot washup" or debriefing at the end of play, the exercise is given a fairly thorough overview by participants who critique their performance. Guidelines are required to avoid the debrief wandering or becoming rancorous.

Though exercise developers are responsible for the debrief, some guidelines are stated here to provide evaluators with a more constructive guidelines for the debriefing:

- The debrief should be held soon as possible after the end of the exercise;
- Only provide constructive criticism (blame-fixing should be avoided);
- Contributions should be progressively prepared during the exercise;
- Focus on correcting identified problems; and
- Focus on cooperation.

Participant reactions which may be sought by evaluators during debrief include:

- Overall general reactions, suggested improvements, modifications;
- Usefulness of AEP guidelines, job cards and other suggested improvements;
- Reactions and suggested improvements to control arrangements i.e., physical layouts, information displays, staffing etc;
- Realism of the scenario, suggested improvements;
- Reactions to exercise format, length;
- Effectiveness of individual lead-up training, suggested improvements;
- Reaction to information management and flow; and
- Effectiveness of management issues such as briefings, instructions, participation etc.

While there are obviously many more issues which can be addressed, according to the particular interests of evaluators, the debrief is not the only evaluation forum. It is only the start.

Comments at the debriefing should be recorded and treated as data for the evaluation report. Evaluators should complete the evaluation objectively and develop recommendations for follow-up action. These recommendations should be aimed at improving preparedness. An evaluation report should be developed from individual reports and circulated to participants for review and comment.

<u>Evaluation Method</u>

To dictate in detail how each evaluator should actually perform an assessment, and when and where these assessments should be undertaken, would be too directive and counter-productive. A

critique format for the exercise should be standardised, but also should allow each evaluator to have some flexibility in how they evaluate their designated area. By using the same format for each component of each exercise, some commonality of perception can be achieved, thus enhancing the quality of input into each exercise follow-up.

Evaluation Reports

Each evaluator's report should present an analysis of needed improvements in the AEP, based on an examination of such response during the exercise. Each report should reflect the evaluator's view of proceedings, (depending on which areas were evaluated), their view of the measure of proceedings against the exercise objectives, and their view of the actual exercise management (realism v practicality, time constraints, optimism v reality etc). A useful format for an evaluator's report is to use the objectives as subheadings. An analysis of what went well and what did not can then be developed from the various sources of information. The analysis should address:

- Evaluator's group observations;
- Players' debriefing comments;
- Comments from controllers and/or umpires and observers; and
- Any subsequent clarification and/or discussion with players.

The overall evaluation report should be directed to the Aerodrome Emergency Planning Committee and should be the subject of review and discussion. It should not be seen as an edict handed down by evaluators. The best recommendations (those with the greatest chance of being implemented) are those that are agreed by all involved agencies.

A draft evaluation report should be prepared by evaluators based on their individual reports. This draft report should be discussed at a meeting of at least the main exercise evaluators, exercise planners, and exercise participants. The focus should be on developing a consensus on which recommendations can and should be implemented with recommended priorities.

The final evaluation report can be a useful tool for future exercises and for improving the emergency response system. The following format for preparing recommendations in the report may be useful:

Sample Recommendation

- SUBJECT:
- PROBLEM DESCRIPTION:
- ACTION REQUIRED:
- ACTION AGENCY:
- PROPOSED COMPLETION DATE:

- SUBMITTED BY:

Example of Aerodrome Emergency Exercise Evaluation Checklist

EXERCISE EVALUATION FORM	
Name of Evaluator:	
Organisation:	
Aerodrome/Facility:	
Exercise Activity / Area:	
Date:	
Evaluation:	
NOTE: RATE THE FOLLOWING CRITERIA FROM 1 TO 10 WITH 1 BEING THE LOWEST. ADD COMMENTS AS NECESSARY	
1. Was there a clearly defined overall exercise aim?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
2. Were there clear and relevant objectives for each participating organisation?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
3. Did the exercise address the aims and objectives?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
4. Was the exercise realistic for the scale of normal operations at an aerodrome (timings, scenario, etc.)?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
5. Was the exercise carried out in a logical sequence?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
6. Were the response times realistic?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	
7. Was the response to the exercise in accordance with local plans?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Comments:	

8. Was the debrief conducted effectively to identify issues from all response organisations?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
9. Were the recommendations from the last exercise implemented?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
10. Was the exercise planned and staged as an effective evaluation tool?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
Overall Score:	0-20%	21-40%	41-60%	61-80%	81-100%
Overall Comments: (did the exercise achieved the aim and objectives?)					
Evaluator Signature:					

AMC2 ACM.OPS.CERT.D.010(a) Emergency planning

MODULAR TESTING

(a) Modular testing plan should, at least, include the following modules:

(1) emergency alerting and notification;

(2) rendezvous point management;

(3) mobile command post/operational command;

(4) emergency operations centre/tactical command;

(5) crisis management centre/strategic command;

(6) triage and medical care protocols;

(7) emergency reception centres/facilities;

(8) post-accident/preservation of evidence;

(9) business continuity/recovery operations; and

(10) full-scale emergency exercise.

(b) The implementation of a modular testing plan should be agreed with the GCAA and the relevant AEP stakeholders.

GM AMC2 ACM.OPS.CERT.D.010(a) Emergency planning

MODULAR TESTING (MTX)

(a) The purpose of modular tests is to provide an alternative exercise testing method to the aerodrome operator by enabling concentrated effort on specific components of an aerodrome emergency plan.

(b) A modular testing plan comprises a series of modules, which if completed over a measured time period will at least equal the current arrangement and in most cases exceed the arrangement for testing the plan whereby a full-scale exercise is conducted biennially and a partial exercise in the intervening year.

(c) This system of modularised tests will result in conducting numerous smaller, more detailed elements with a shorter time scale between each module. Due to interdependencies of the modules, it may be beneficial to combine some modules. When combining modules, assessments should be conducted to ensure the intended aim and objectives are not compromised and the gap between modules should not exceed 3-months. All modules should be completed within a maximum 3-year and will conclude with module 10, the full-scale exercise.

(d) To ensure that an aerodrome has a robust emergency plan, which meets regulatory requirements, the appropriate regulations and that the current guidance to aerodromes is sufficient and appropriate, enabling aerodromes to test their plan by selecting an alternative method other than the full-scale biennial practical test.

(e) The aerodrome operator opting for a modular test exercise approach should develop a three-year plan containing the following modules with high-level enabling objectives to be achieved during each of the ten modules which, once complete, should ensure the main objective is achieved (see Table 8).

Table 8: Modular testing plan

Module	Objectives/Tasks
Module 1: Emergency alerting and notification This module focuses on the emergency call out systems; it covers the period from commencement of the incident until all relevant agencies have been informed. It is envisaged that this module would be run using the actual procedures, resources and equipment required as if it were in a live time	**Objective: Test Call Out System** 1. Initiating the call - Instigated by ATC. Alerting method and communications. Test Omni crash / direct line. Communications with AFS, on and off aerodrome response include each LAES 2. Differing levels / types of emergencies - Description of Aircraft accident, Ground incident, Full emergency, Local Standby, etc

incident. The exercise could be conducted on numerous occasions over a given time period to ensure competence by all those expected to become involved; evidence may be recorded from actual incidents.	3. Terminology / abbreviations - AGI. A/C accident imminent on/off AD 4. Normal methods / contingencies - Power failure, loss of communication 5. Communications exercise - Aerodrome switch board / PBX / ATC etc. 6. Organisations involved - ATC, ARFFS, OPS, PBX, MAES, Security, etc. 7. EPC and Emergency Planner - Policy, Procedures, Planning, Preparing, Training, and Risk Register 8. Training - Assess adequacy of prior training given to those expected to become involved. 9. Assessment and Feedback - Assessed locally on each occasion the module is tested, or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 10. Recording outcomes 11. Accurate records maintained
Module 2: Rendezvous Point (RVP) This module deals with the RVP, it focuses on the incident from the period that the call has been received, all those services from both on and off the aerodrome are in position at the RVP and ready to move forward. This module will include practical demonstration of escorting members of the ES from the RVP to an incident site. It is envisaged that this module would be run using the actual procedures, equipment and resources from	**Objective: Test RVP** 1. Determine which RVP is to be used 2. (Appropriate only where there are multiple RVPs provided). The test should be planned so that each RVP is practiced on a rotational basis over varying times of day and night. 3. RVP Directional signage 4. Ensure they are Visible, Sufficient, and Appropriate to responding services that may not necessarily be familiar with the aerodrome. 5. Opening / security of RVP

all of the organisations required as if it were in a live time incident.	6. Sufficient staffing at RVP, training/procedures, physical barriers, locks, chains etc. 7. Fit for purpose 8. Marshalling / manoeuvring area, parking, lighting, communications, information, maps etc. 9. Escorts 10. Sufficient amounts of trained staff/vehicles, procedures 11. Traffic management 12. Police, security, Ops, procedures 13. EPC and Emergency Planners 14. Policy, Procedures, Planning, Preparing, Training, Liaison, and Risk Register 15. Training 16. Assess adequacy of prior training given to those expected to become involved including training records. 17. Assessment and Feedback 18. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 19. Recording outcomes 20. Accurate records maintained
Module 3: Operational Command (Bronze) This module deals with the Operational Command at the Incident. It focuses on the operations at the incident, more specifically at command. It is envisaged that this module	**Objective: Test Operational Command** 1. Liaison 2. Inter service on/off aerodrome liaison visits/training days, interoperability procedures and operational practices. 3. Organisational Structure

could be run using simulation, possibly tabletop. It should involve organisations from on and off the aerodrome together with members from all ES who may attend the incident. Using modern virtual reality (VR) technology, it could be run on aerodrome or at a remote site.	4. Identification of commanders 5. Decision making 6. Staff training, procedures. Decisions taken are appropriate to Operational Commanders. Support available if required 7. Communications 8. Effective communications between services/departments both on and off aerodrome? 9. Forward Control 10. Is there a dedicated forward control point vehicle and, is it effective? 11. Cordons 12. Sufficient resources, trained staff, procedures. 13. EPC and Emergency Planners 14. Policy, Procedures, Planning, Preparing, Training, Liaison, and Risk Register 15. Training 16. Assess adequacy of prior training given to those expected to become involved including training records. 17. Assessment and Feedback 18. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 19. Recording outcomes 20. Accurate records maintained
Module 4: Triage and Medical Services This module deals with the Triage and Medical services at the Incident. It focuses on	**Objective: Test Medical Response** 1. Liaison 2. Inter service on/off aerodrome liaison visits

the practical aspects of medical care and evacuation of any casualties. It may be conducted on or off aerodrome, should involve organisations from both on and off the aerodrome together with members from the Local Health Authority, or Hospital Authority who may attend the incident. It could be run as a tabletop or using simulation and modern virtual reality (VR) technology.	3. Organisational Structure 4. Identification of commanders 5. Triage 6. Worst first walking wounded etc. Staff training, procedures 7. Communications 8. Is there effective communications between ARFFS, other MAES / departments both on and off aerodrome? 9. Emergency shelters 10. Are sufficient facilities to provide emergency shelter available, from on or off aerodrome? Resources; training, testing / inspecting. 11. Transport 12. Removal of Casualties. Sufficient resources. 13. Evacuation routes 14. Consider one-way routes. Contingency if access is blocked 15. Local hospitals 16. Contingency for possible large number of casualties. 17. EPC and Emergency Planners 18. Policy, Procedures, Planning, Preparing, Training, Liaison, and Risk Register 19. Training 20. Assess adequacy of prior training given to those expected to become involved including training records. 21. Assessment and Feedback 22. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided

	and acted upon. If successful move forward, or repeat module. 23. Recording outcomes 24. Accurate records maintained
Module 5: Tactical Command (Silver) This module deals with tactical command at the incident. It focuses on the tactical aspects of the incident from a point in the incident when sufficient resource has arrived to instigate Tactical Command. It should involve organisations from both on and off the aerodrome together with members from all ES who may attend the incident. It could be run as a tabletop exercise or using simulation and modern virtual reality (VR) technology; it could be run on aerodrome or at a remote site.	**Objective: Test Tactical Command** 1. Liaison 2. Inter service on/off aerodrome liaison visits 3. Organisational Structure 4. Identification of commanders 4.3 Decision making 5. Staff training, procedures. Decisions taken are appropriate to Tactical Commanders. Support available if required. 6. Location 7. Consider best location to set up Tactical Command. Is there a dedicated on aerodrome facility. 8. Communications 9. Effective communications between services/departments both on and off aerodrome. Sufficient telephone, fax, computers. 10. Resources 11. Are sufficient resources made available? White boards, flip charts maps, and writing aids. Training, procedures. 12. Training 13. Assess adequacy of prior training given to those expected to become involved including training records. 14. EPC, Emergency Planners and Crisis Management Team

	15. Policy, Procedures, Planning, Preparing, Training, Liaison, and Risk Register appropriate to Silver Command 16. Assessment and Feedback 17. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 18. Recording outcomes 19. Accurate records maintained
Module 6: Strategic Command (Gold) This module deals with Strategic Command at the incident. It focuses on the strategic aspects of the incident from a point in the incident when sufficient resource has arrived to instigate Strategic Command. It should involve senior managers from both on and off the aerodrome, senior local council officers together with senior members from all ES who may attend the incident. It could be run as a tabletop exercise or using simulation and modern virtual reality (VR) technology; it could be run on aerodrome or at a remote site.	**Objective: Test Strategic Command** 1. Organisational Structure 2. Identification of commanders 3. Location 4. Consider the Emergency Plan and identify pre-determined location for Strategic Command. 5. Communications 6. Effective communications between services/departments both on and off aerodrome. 7. EPC and Emergency Planners and Crisis Management Team 8. Identify link into Strategic Command Centre. Policy, Procedures, Planning, Preparing, Training, Liaison, and Risk Register 9. Assessment and Feedback 10. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module.

	11. Recording outcomes 12. Accurate records maintained
Module 7: Emergency Facilities and Reception Centres / Non-Emergency Services Response This module deals with the assistance provided by agencies other than ARFFS and other ES. It focuses on the incident from a point when survivors / casualties are being removed from the scene of operations and efforts are being made to reunite them with their friends and families. It should involve organisations from both on and off the aerodrome who might be expected to participate. It is envisaged that this would be conducted as a practical exercise on aerodrome in the actual building/location that has been set-aside for the purpose.	**Objective: Test FRC / SRC / Voluntary Agencies** 1. Liaison 2. Planning, Training, Liaison 3. Roles and responsibilities 4. Procedures, roles and responsibilities of Aerodrome, Airline and Handling Agent. Staff training / familiarisation 5. Friends and Relatives Reception Centre (FRC) 6. Assess the building; room, shelter, screens etc are they sufficient for the expected numbers of casualties commensurate to the scale of operation? Procedures / Staff training / familiarisation. The reunion process. 6.4 Survivors Reception Centre (SRC) 7. Assess the building; room, shelter, screens etc are they sufficient for the expected numbers of casualties commensurate to the scale of operation? Resources / Procedures / Staff training / familiarization 8. Media Area 9. Is there a suitable area set aside for the media, away from the scene of operations and those attending FRC/SRC? 10. Voluntary Organisations 11. Ministers of religion, social services etc. Liaison visits & training including procedures for gaining access onto the aerodrome. 12. Information Centres

	13. The role of Airlines Emergency Planning Coordination Unit (EPIC) or other information service providers. 14. EPC and Emergency Planners 15. Policy, Procedures. Planning, Preparing, Training, 16. Assessment and Feedback 17. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 18. Recording outcomes 19. Accurate records maintained
Module 8: Post Disaster Management (Survivor Repatriation Centre) This module deals with Post Disaster management. It focuses on the latter stages of the incident from a point when all survivors / casualties have been removed and the work of body recovery, Police investigators and the Air Accident Investigation Sector (AAIS) begins. Primarily it will involve the Police, the Aerodrome operator and the AAIS. Training could be via a tabletop exercise, or as a simulation on or off aerodrome.	**Objective: Test Post Disaster Management Procedures** 1. Air Accident Investigation Sector, UAE 2. The role of the AAIS 3. Body recovery 4. Specialist Police unit 5. Temporary mortuary 6. Identify if there is any appropriate local facility near the aerodrome as agreed with the Coroner and EPC 7. Body holding area 8. Local facility appropriate to the aerodrome 9. Body identification 10. Specialist Police unit, Coroner, casualty bureau 11. Undertakers 12. Specialist recovery agencies 13. Family liaison / Assistance centres 14. Local authorities, social services

	15. EPG and Emergency Planners 16. Policy, Procedures, Planning, Preparing, Training 17. Assessment and Feedback 18. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 19. Recording outcomes 20. Accurate records maintained
Module 9: Business Continuity / Recovery This module deals with Business Recovery. It focuses on the end of the incident from a point when all survivors / casualties and the deceased have been removed, the investigators have concluded their investigation and the aerodrome is working towards returning to business as usual. It will involve the Police liaising closely with the Aerodrome operator, the GCAA, the AAIS and the EPC. It is envisaged that this would be conducted as a tabletop or simulated exercise on or off aerodrome.	**Objective: Test Business Continuity / Recovery** 1. Short / long term closure 2. Local decision on Aerodrome closure 3. Evacuation 4. Local procedures 5. Aircraft Recovery 6. Local procedure 7. Accommodation 8. Local facility appropriate to the aerodrome here food and shelter may be provided 9. Contingency plans 10. Robust contingency plans covering all eventualities, local to each aerodrome 11. EPC and Emergency Planners 12. Policy, Procedures, Planning, Preparing, Training 13. Assessment and Feedback 14. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. 15. Recording outcomes

	16. Accurate records maintained
Module 10: Live Full-Scale Emergency Exercise This module deals with the practical Firefighting, search and rescue operation of the incident. It focuses on the point from when the aircraft has recently crashed up to the point when all survivors are released. It will involve the ARFFS, members from each of the other ES who may be expected to attend the aerodrome, Aerodrome Operations, Aerodrome Security and senior aerodrome managers. It may be held on or off the aerodrome and should closely simulate an actual aircraft accident commensurate to the size of aircraft operating from the aerodrome. It may be possible to pre assemble all those playing an active role in the exercise at a suitable location close to the scene.	**Objective: Testing of Emergency Plan (Modules 1 – 9)** 1. Aim & Objectives 2. Specific aim & objectives to be tested 3. ARFFS attendance 4. ARFFS tactics / techniques. ARFFS Objectives 5. Other MAES attendance 6. Specific Objectives for each of the MAES. Fire, Police & Ambulance, consider other agencies where appropriate i.e. Coast Guard, Military. 7. AAIS 8. Scene preservation 9. Liaison 10. Interoperability, prior liaison and training days involving each service 11. Incident Command (Bronze) 12. Joint Operational Command involving the ARFFS and each MAES 13. Aim & Objectives 14. Specific aim & objectives to be tested 15. ARFFS attendance 16. ARFFS tactics / techniques. ARFFS Objectives 17. Other MAES attendance 18. Specific Objectives for each of the MAES. Fire, Police & Ambulance, consider other agencies where appropriate i.e. Coast Guard, Military. 19. AAIS 20. Scene preservation 21. Liaison 22. Interoperability, prior liaison and training days involving each service 23. Incident Command (Bronze)

	24. Joint Operational Command involving the ARFFS and each MAES 25. Sectorisation 26. Cordons, specific areas of operations 27. Debriefing 28. Hot debrief at the end of exercise followed by full formal debrief where learning is identified, notes are taken and actions are cleared. 29. Assessment and Feedback 30. Assessed locally on each occasion the module is tested or externally by GCAA Inspectors during their visits. Feedback sought/provided and acted upon. If successful move forward, or repeat module. 31. Recording outcomes 32. Accurate records maintained

AMC3 ACM.OPS.CERT.D.010(a) Emergency planning

REVIEWING OF EMERGENCY PLAN

(a) Reviewing of the emergency plan should include:

(1) results, findings or lessons after emergency exercises, accident or incident at the aerodrome for the purpose of continuous improvements to the plan; and

(2) retaining records of emergency exercises for at least five years.

GM1 AMC3 ACM.OPS.CERT.D.010(a) Emergency planning

REVIEWING OF EMERGENCY PLAN AFTER AN EXERCISE

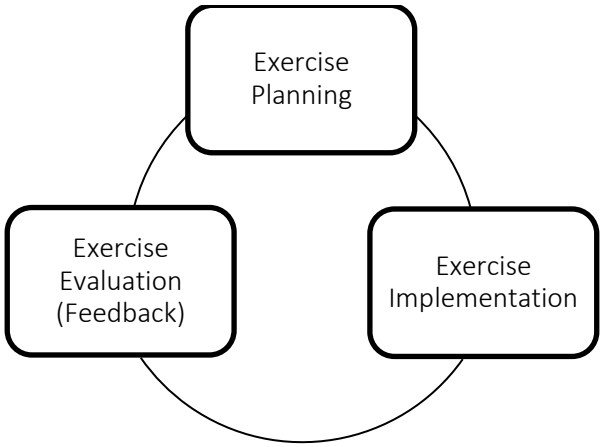
EXERCISE PLANNING, IMPLEMENTATION AND EVALUATION PROCESS

(a) Evaluating the plan. Exercises provide aerodrome operator s and exercise planners an excellent opportunity for evaluating the effectiveness and efficiency of the plan. To maximize the usefulness of evaluation, planners should carefully design the system of evaluation.

(b) Planning. In accordance with the objectives of the exercise, planners should develop an evaluation system that includes feedback, identifies benefits, and obtains the services of evaluators well before the exercise takes place.

(1) "Feedback loop". Figure below illustrates the classic project management system for project planning and implementation. A project is planned, implemented, and then evaluated (given feedback). The feedback leads to the development of modifications, where needed, after which the cycle begins anew.

Figure: Exercise planning, implementation and evaluation process



(2) Benefits. Planning an effective evaluation system for any size aerodrome emergency response exercise is important not only for detecting problems in the exercise itself, but more importantly, for finding areas of the aerodrome or community emergency response plans that may need refinement.

(3) Evaluators. The exercise should be totally open to a select group of knowledgeable evaluators, identifiable by distinctive clothing. The evaluators should not be involved in the planning or conduct of the exercise. Normally, government agencies, other aerodromes, and private aviation organizations can provide experienced evaluators which can benefit both the aerodrome holding the exercise and themselves. Evaluators need to be identified well before the exercise and familiarized with the aerodrome plans, including evaluation and reporting guidelines.

(c) Preparation. Evaluators experienced in aerodrome operations, emergency response, and emergency exercises require no training by drill planners. However, a preliminary meeting detailing the scope and objectives of the exercise enables the evaluators to do their jobs effectively and thus yield the greatest benefit to the aerodrome.

(1) Preparing evaluators. Evaluators should receive information packets and critique sheets well before the exercise takes place. Assigning evaluators to assess command, control, and communications and the emergency response functional areas ensures that the key elements of emergency response are observed in detail. Other evaluators should be assigned to critique the entire exercise. They will move about the site and observe all of the functional areas and response efforts. Outside evaluators often have preferences or certain areas of expertise, such as security or medical, which planners should determine before making evaluation assignments.

(2) Critique sheet. A critique sheet is a considerable aid in the evaluation of an emergency exercise. It is most effective if it is divided into separate sections addressing each of the distinct functional areas with sufficient space for taking notes. Questions asked should be general since being too specific may consume evaluators' time with details and prevent them from seeing the drill from a larger perspective.

(3) Briefings. Planners should brief evaluators on their functions and last-minute changes the day before the exercise. At that time, planners may give them final copies of exercise information and critique sheets and distribute distinctive vests, apparel, hats, badges, or other means of identification. Evaluators should also attend media and response unit briefings, at which they can raise questions about the plan, identify the exercise participants, and familiarize themselves with the marking or clothing that identifies each emergency response function.

(d) Feedback. Three systems of feedback common in exercises are on-site or immediate feedback, critique conferences, and written reports. One or more of these systems should be used.

(1) On-site or immediate feedback. On-site feedback involves assembling representatives from all participating groups immediately after the exercise to get their comments while the exercise is fresh in their minds. Naturally enough, many details may escape as an evaluator tries to summarize several hours of intense activity in a five-minute oral report. Evaluators will overlook other details until later, when they compare notes with other response personnel. The great advantage of on-site feedback is that everyone's interest is at its peak; the most critical problems will likely be discovered immediately. To conduct an on-site feedback session, aerodrome operator s and exercise planners should set up rules of order to ensure uninterrupted speaking opportunities. A stenographer or tape recorder should record the session for later review.

(2) Feedback conference. The feedback conference will usually involve planners and managers of the various emergency response units involved in the exercise and the plan. Planners should schedule it no sooner than one week after the exercise. Managers will probably need at least

a week to hold feedback sessions with their own personnel and gather valuable information to share at the conference. Local emergency co-ordinators should attend the feedback conference, both to benefit the aerodrome in its use of community resources and to ensure that the community benefits from the aerodrome's experience.

(3) Written reports. Evaluators experienced in exercises and critiques should write reports of their observations. Exercise planners may also ask other personnel for written reports. Written reports are often more candid than comments made in the on-site feedback sessions, where participants might be sensitive to outsiders' comments.

(e) The aerodrome operator should make every effort to contact other agencies who have been involved in actual aircraft accidents and those who have conducted full-scale emergency exercises to acquire data and procedures to correct and upgrade their aerodrome emergency plan.

GM2 AMC3 ACM.OPS.CERT.D.010(a) Emergency planning

REVIEW OF EMERGENCY PLAN AFTER AN ACCIDENT

(a) As soon as practicable following an aircraft accident or serious incident, the aerodrome operator should ensure responding agencies obtain all necessary oral or written reports from their personnel and document all emergency response actions taken during the accident/incident.

(b) The aerodrome emergency planning committee should review these documents and make recommendations for changes to the emergency plan to improve the response capability for future emergencies.

(c) Following an aircraft accident or serious incident within or outside the aerodrome, where the aerodrome operator has sufficient evidence to demonstrate that the response to the accident or serious incident is delivered in accordance with the provisions detailed in the emergency plan, the aerodrome operator may submit a request to the GCAA for the deferment of the next scheduled emergency exercise i.e. a full-scale or partial exercise. Upon successful deferment request, the aerodrome operator should ensure that the next emergency exercise is a full-scale exercise at an aerodrome. Emergency planning

AMC4 ACM.OPS.CERT.D.010(a) Emergency planning

CONDUCT OF AERODROME EMERGENCY EXERCISE

(a) Implementation of the emergency exercise plan should include:

(1) submitting the exercise plan to the GCAA and participating agencies, at least 90-days before the exercise;

(2) where the exercise plan does not commensurate with the emergency plan, the GCAA will determine the exercise plan for implementation by the aerodrome operator; and

(3) results of emergency exercises are recorded and addressed.

(b) Where the aerodrome operator fails to implement the exercise plan, the aerodrome operator should:

(1) immediately notify GCAA and all participating agencies;

(2) conduct partial and full-scale emergency exercises within 120-days; or as determined by the GCAA.

GM AMC4 ACM.OPS.CERT.D.010(a) Emergency planning

IMPLEMENTING EMERGENCY EXERCISE PLAN

(a) Implementation of the emergency exercise plan includes but not limited to pre-exercise planning and preparation, safety assessment, exercise evaluation, after exercise review, post exercise report, etc.

(b) In ensuring safe and effective conduct of the emergency exercise plan, aerodrome operator should provide the necessary procedures, resources and personnel.

(c) Follow-up actions after the emergency exercise include, but not limited to: regulatory observations, exercise post-mortem briefings/meetings, stakeholders' engagements, reviews of recorded transcripts, interviews, site inspection, etc.

(d) Clear and valid justifications must be provided for any extension request to the emergency exercise.

AMC5 ACM.OPS.CERT.D.010(a) Emergency planning

EMERGENCY EXERCISE ARRANGEMENTS

(a) Emergency exercise arrangements should include:

(1) before the exercise,

(i) confirm the logistics and transport arrangements of the full-scale emergency exercise with the GCAA, at least, 7-days in advance, including the date, time, location, and a brief description of the exercise scenario;

(2) during the exercise,

(i) brief the GCAA on overview of the exercise, any updates or changes to the exercise plan, safety protocols and emergency procedures relevant to the exercise;

(ii) ensure that the GCAA has unrestricted access to all areas of the exercise that are relevant to their evaluation including exercise site, command centres, reception centres, exercise personnel, etc;

(iii) facilitate real-time communication between the GCAA, exercise participants and coordinators to ensure that the GCAA can observe critical moments of the exercise and assess the effectiveness of emergency response procedures;

(iv) implement and enforce all safety measures outlined in the exercise plan;

(3) after the exercise,

(i) conduct a post exercise evaluation within 14-days and review meeting with relevant exercise evaluators and participants within 30 days;

(ii) submit a detailed exercise report to the GCAA within 30 days after the exercise review meeting including:

(A) summary of the exercise, including objectives and outcomes,

(B) analysis of performance against objectives,

(C) any deviations from the exercise plan and the reasons for those deviations,

(D) action plan including corrective and preventive actions, addressing GCAA feedback, findings and observations identified during the exercise; and

(E) maintain records of the full-scale emergency exercise, including all planning documents, execution details, and post-exercise evaluations, for a minimum of five years. These records should be made available to the GCAA during audit, inspection or upon request.

AMC6 ACM.OPS.CERT.D.010(a) Emergency planning

DEFERMENT OF EMERGENCY EXERCISES

(a) Following an aircraft accident or serious incident occurring at the aerodrome, the aerodrome operator may submit a request to the GCAA for the deferment of planned emergency exercises at the aerodrome. Deferment request should be submitted to the GCAA, in writing, include:

(1) a detailed assessment of all actions taken by the responding on and off aerodrome agencies during the aircraft accident referenced against the relevant emergency orders and instructions contained in the emergency plan; and

(2) supporting reports, transcripts, log records, and other relevant evidences.

(b) Where the deferment request is successful, the aerodrome operator should conduct table-top, partial and full-scale emergency exercises no later than 18-months; or as determined by the GCAA.

GM AMC6 ACM.OPS.CERT.D.010(a) Emergency planning

DEFERMENT OF AERODROME EMERGENCY EXERCISES

Request for deferment of emergency exercise should include detailed assessment of the response actions to the accident/incident, transcripts, reports, interviews, log records, etc.

AMC1 ACM.OPS.CERT.D.010(b) Emergency planning

MANAGING AERODROME EMERGENCY EXERCISE PLAN

(a) Policies and procedures should be implemented for the planning, conduct and review on the effectiveness of the full-scale emergency exercise or modular testing plan, in accordance with the aerodrome operator's safety management system, including:

(1) a systematic process to review, revise, and validate the exercise plan;

(2) a documentation control process;

(3) quality assurance and audit process;

(4) an approval process by the Accountable Manager or a delegated executive; and

(5) submit the final exercise plan to the GCAA.

GM AMC1 ACM.OPS.CERT.D.010(b) Emergency planning

MANAGING AERODROME EMERGENCY EXERCISE PLAN

1. INTRODUCTION

(a) The objective of this guidance is to ensure that aerodrome operators adopt a formalised, risk-based, and quality-assured approach to the management of their emergency exercise programmes. The scope covers full-scale exercises, modular or component-based tests, and table-top simulations that form part of the aerodrome emergency preparedness cycle.

(b) The exercise monitoring system must be embedded within the aerodrome's SMS to support performance monitoring, identification of systemic gaps, enhancement of inter-agency coordination, and compliance with regulatory expectations.

2. SYSTEMATIC REVIEW AND VALIDATION OF EXERCISE PLAN

(a) The aerodrome operator must establish a systematic process for the review, revision, and validation of the emergency exercise or modular testing plan. This process must be documented within the SMS and include:

(1) Clear exercise objectives aligned with risk scenarios from the aerodrome emergency plan (AEP);

(2) Defined roles and responsibilities for planning, control, and evaluation teams;

(3) Stakeholder consultation and integration of feedback from previous exercises or incidents;

(4) Use of standardised planning tools, timelines, and resource templates;

(5) Pre-exercise briefings and pre-mortem analysis of anticipated challenges.

(b) The exercise plan should be validated through senior-level review to ensure it reflects current operations, infrastructure, stakeholder roles, and updated regulatory expectations.

3. DOCUMENTATION AND CONTROL PROCESS

(a) All documents related to the exercise programme i.e. plans, scripts, participant lists, evaluation checklists, debrief reports, and lessons learned, must be managed under a controlled documentation system, consistent with the SMS documentation policy.

(b) Version control must be applied to exercise plans, ensuring that updates are properly recorded, approved, and communicated to all stakeholders. All documentation must be stored in accordance with records management procedures and made available for audit or inspection by the GCAA.

(c) Exercise debriefs and post-incident reports should be compiled promptly following the exercise and must include a summary of findings, gaps identified, recommendations for improvement, and an implementation tracking matrix.

4. QUALITY ASSURANCE AND AUDIT PROCESS

(a) The aerodrome operator must implement a quality assurance mechanism to monitor the planning and execution of exercises. This includes:

(1) Conducting internal audits on the adequacy of exercise planning and stakeholder coordination;

(2) Monitoring compliance with planned exercise timelines, objectives, and scope;

(3) Verifying the corrective and preventive action plans arising from previous exercise reports;

(4) Reviewing the consistency of exercises with regulatory requirements and safety performance indicators.

(b) Findings from these quality assurance processes should be reported to the appropriate safety forum and integrated into the aerodrome's continuous improvement and risk assessment processes.

5. APPROVAL PROCESS

(a) The emergency exercise plan, including its schedule, scope, and objectives, must be formally approved by the Accountable Manager or by a delegated senior executive, prior to the conduct of the exercise.

(b) The approval must confirm the adequacy of resources, stakeholder coordination, and strategic alignment of the exercise with broader safety objectives and operational context.

(c) Delegation of approval authority must be documented and consistent with the aerodrome's organisational governance framework and SMS roles and responsibilities.

6. SUBMISSION TO THE GCAA

(a) A copy of the approved emergency exercise plan or modular testing schedule, along with the planned dates and scope of the exercise, must be submitted to the GCAA at least 30 days in advance of the proposed exercise date.

(b) Following the exercise, the aerodrome operator must provide the GCAA with:

(1) A copy of the exercise evaluation report;

(2) The corrective action plan, including timelines and responsible persons;

(3) Evidence of implementation and tracking of improvement actions.

ACM.OPS.CERT.D.015 Emergency planning

DIFFICULT ENVIRONMENTS AND 1 000 METRES RESPONSE AREA

(a) An aerodrome operator shall ensure the emergency plan includes the ready availability of, and coordination with, appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water, difficult terrain, and/or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

AMC1 ACM.OPS.CERT.D.015(a) Emergency planning

RESPONSES TO EMERGENCIES IN DIFFICULT ENVIRONMENTS AND 1 000 METRES AREA

(a) For land aerodrome located close to water, swampy areas, or difficult terrain, the emergency plan should include the establishment, testing and assessment at regular intervals of a pre-determined response for the specialist rescue services.

(b) For a water aerodrome, the emergency plan should consider the particular hazards associated with seaplane operations, including:

(1) passenger evacuation into a further life-threatening environment, e.g., deep water; the onset of hypothermia, and its associated effects, during and following prolonged immersion in cold water; and

(2) the immediate toxicity and respiratory effects on survivors in the water following the ingestion of floating fuel and oils and their associated vapours, and fire suppressant foams, powders and gases;

(3) contain sufficient provisions for water rescue and fire response; and

(c) An assessment on the approach and departure areas within 1 000 m from the runway threshold should be conducted to determine the options available for intervention in the event of an aircraft accident at these areas.

GM1 AMC1 ACM.OPS.CERT.D.015(a) Emergency planning

AIRCRAFT ACCIDENTS IN THE WATER

(a) Where aerodromes are situated adjacent to large bodies of water (such as sea, rivers or lakes) or where they are located on coastlines, special provisions should be made for rescue and firefighting operations in the event of an aircraft accident/incident in the water. Specialized equipment for rescue and firefighting may include fire/rescue vessels, aircushion vehicles, helicopters, coastal patrol vessels, or amphibious vehicles.

(b) Consideration of unusual terrain and water conditions such as tidal flats and swamps dictates the choice of the unique types of vehicles most suitable to these conditions. Helicopters, air-cushion, and amphibious vehicles as well as conventional watercraft may be found to provide this specialized service.

(c) In developing the water rescue service, consideration should be given to public services (such as marine search and rescue units, harbour police, or fire departments) and private rescue services (such as rescue squads, power and communication companies, offshore oil field operators, or shipping and waterway operators) that may be available and are capable of rendering assistance. A signal system for alerting private or public services in time of emergency should be prearranged.

(d) Many aircrafts do not carry personnel flotation devices on board, especially those not engaged on extended flights over water. Such flotation devices should be available in numbers sufficient to meet the needs of the maximum passenger capacity of the largest aircraft normally using the aerodrome. Where the largest aircraft are equipped for scheduled over-water operation, the aerodrome may reduce the amount of personnel flotation devices.

(e) Probability of fire. Where accidents occur in the water, the possibility of fire is normally reduced because of the suppression of ignition sources by the water contact and the cooling of heated surfaces. In a situation where fire is present, control and extinguishment will require the availability of specialized equipment.

(f) Spillage of fuel on water surfaces. It should be anticipated that the impact of the aircraft hitting the water might rupture fuel tanks and lines. It is thus reasonable to assume that quantities of fuel will be found floating on the surface of the water. Vessels having exhausts at the waterline may present an ignition hazard if operated where this condition is present. Where fire is present, approach should be made after considering wind direction and velocity and water current. Fire may be moved away from the area by using a sweeping technique with hose streams. Foam and other extinguishing agents should be used where necessary. Wind and water currents should be considered to deal effectively with floating fuel and to prevent it from moving into areas where it would be hazardous to rescue operations. As soon as possible, pockets of fuel should be broken up or moved with high volume nozzles, neutralized by covering them with foam or a special inert material, or boomed to contain the fuel in a safe area prior to absorption, dilution, or removal. With preplanning, the water pollution control authorities may provide emergency assistance during this operation.

(g) Rescue vessels. Rescue vessels should be capable of shallow water operations. Vessels powered by jet-type propulsion eliminate the dangers of propellers puncturing inflatable equipment or injuring survivors during rescue operations. Vessels powered by conventional propellers may prevent the hazards of puncture and injury by being equipped with fan-type guards or cowls. Inflatable vessels may be punctured by wreckage or barnacles.

(h) If the water environment is subject to freezing, vehicles suitable for operation on ice (i.e. hovercraft, swamp vessels, etc.) should be available.

(i) Vessels and other rescue vehicles should be so located that they can be brought into action in minimum time. Special boathouses or launching ramps should be provided in order to reduce response time.

(j) Vessels should be of such size as to efficiently carry the flotation equipment required with sufficient space for the crew. Sufficient working space should be provided to permit rapid dispersal of the flotation devices. Inflatable life rafts should be the prime flotation equipment carried; there should be a sufficient quantity on hand to accommodate the maximum passenger load of the largest aircraft normally using the aerodrome. Once this flotation equipment has been distributed, there should be sufficient space to accommodate a limited number of litter cases brought aboard in the rescue process.

(k) Sufficient two-way radio equipment should be provided in all rescue vessels in order to permit communications with other rescue units, such as helicopters, air cushion or amphibious equipment, and water-land based units.

(l) A minimum of two floodlights should be provided for night operations.

(m) Radar reflectors should be used to facilitate navigation and rendezvous efforts.

(n) Even though occupied sections of the aircraft may be submerged, the possibility remains that enough air may be trapped inside to maintain life. Entry by divers should be made at the deepest point possible.

(o) Organizing diving units/use of divers. Diving units should be dispatched to the scene. When available, helicopters can be used to expedite the transportation of personnel divers to the actual area of the crash. Rescue personnel or divers who may be called for this type of service should be highly trained in surface and underwater search and recovery techniques. In areas where there are no operating governmental or municipal underwater search and recovery teams, agreements may be made with private diving clubs. In all operations where divers are in the water, standard diving flags should be flown and vessels operating in the area should be warned to exercise extreme caution (see Figure-18).

Figure-18: Standard diver / Alpha flag when personnel or divers are working on the water.

(p) It should be anticipated that victims are more apt to be found downwind or downstream from the accident site. This should be taken into consideration in planning the operation. Where only the approximate location of the crash is established upon arrival, divers should use standard underwater search patterns and mark the locations of the major parts of the aircraft with marker buoys. If sufficient divers are not available, dragging operations should be conducted from surface craft. In no instance should dragging and diving operations be conducted simultaneously.

(q) A command post should be established at the most feasible location on an adjacent shore. This should be located in a position to facilitate implementing the aerodrome/community emergency plan (see Figure–19).

Figure-19: Responding to aircraft accident in the water

GM2 AMC1 ACM.OPS.CERT.D.015 Emergency planning

ASSESSMENTS FOR ACCIDENTS BEYOND RUNWAY THRESHOLDS (1 000 METRES RESPONSE AREA)

(a) Studies of the ICAO Accident Incident Data Reporting (ADREP) System show that a large (more than 25 percent) portion of accidents occurred on the area (1 000 m long and 60 m width) beyond the runway end. With this reason, an assessment of the approach and departure areas within 1 000 m of the runway threshold should be carried out to determine the options available for rescue, including suitable resources that should be provided. In considering the need for any specialist rescue and access routes, the following factors should be considered:

(1) the environment, in particular the topography and composition of the surface;

(2) physical hazards and associated risks that exist within the area;

(3) options for access and for RFF purposes;

(4) hazards, risks and control measures of the options for rescue;

(5) use of external services;

(6) an analysis of the advantages and disadvantages of the options;

(7) policies and procedures to define and implement practices;

(8) competence standards to match the above; and

(9) monitoring testing and review of the capability.

(b) Aerodrome operator s should ensure the development of special procedures and availability of equipment to deal with accidents or incidents that may occur in these areas. The facilities that house this equipment need not be located on, or provided by, the aerodrome, if they can be

made available within reasonable time frames by off-aerodrome agencies as detailed in the Aerodrome Emergency Plan.

(c) Where the 1 000 metres response area falls outside the aerodrome boundary and ARFFS is required to respond to aircraft accidents or incidents using the public road and/or highway, an assessment of the implications of such a response should be carried out. The following should be considered:

(1) agreement with mutual-aid emergency services on the notification, mobilisation, assignment of roles and responsibilities;

(2) legal requirements for ARFFS vehicles and drivers;

(3) suitable ARFFS policies and procedures are in place;

(4) competence and training requirements for ARFFS drivers;

(5) pre-planning of routes for suitability; and

(6) monitoring and review of such responses.

(d) Consideration also should be given to the following:

(1) provide direct access to the operational runway(s);

(2) designate access routes to the response area (consider debris and casualties);

(3) maintenance of roads and access routes (including construction activities);

(4) mitigate the possibility of any public and/or private non-emergency vehicle blocking the progress of responding emergency vehicles;

(5) consider the gross weight and maximum dimensions of the ARFFS vehicle(s) expected to use these routes/roads; or any other responding vehicles;

(6) that roads are capable of being traversed in expected conditions;

(7) exit/access gates or frangible sections in the security fence that are constructed to allow ARFFS vehicles to safely pass through with minimal delay;

(8) exit/access points will need to be clearly identified. Retro-reflective tape or markers will be of assistance where the aerodrome may need to be accessible during the hours of darkness or conditions of low visibility;

(9) the mitigation of impediments to RFF vehicle mobility; and

(10) provide sufficient vertical clearance from overhead obstructions for the largest ARFFS vehicles.

ACM.OPS.CERT.D.020 Emergency planning

UNIFIED AIRPORT EMERGENCY PLANNING

(a) Where an aerodrome operator managing multiple aerodromes is considering a unified emergency planning approach, the aerodrome operator shall, in addition to applicable requirements stated in **ACM.OPS.CERT.D.005 Emergency planning**, **ACM.OPS.CERT.D.010 Aerodrome emergency exercises**, and **ACM.OPS.CERT.D.015 Difficult environments and 1 000 metres response area**, conduct a detailed assessment in determining operational suitability for a unified emergency planning approach.

(b) Implementation of a unified emergency plan shall be agreed with the GCAA and relevant AEP stakeholders.

GM1 ACM.OPS.CERT.D.020(a) Emergency planning

UNIFIED AIRPORT EMERGENCY PLANNING

(a) The principal aim of a Unified Aerodrome Emergency Planning (UAEP) is to establish an integrated, consistent, coordinated, and efficient framework for managing emergencies across multiple aerodromes operated by a single aerodrome operator. This approach seeks to enhance the collective safety and security of passengers, staff, and infrastructures by ensuring that all aerodromes within the network are prepared to respond effectively to a wide range of emergencies, while also optimizing resources, standardizing procedures, and facilitating seamless communication and coordination.

(b) A Unified Airport Emergency Plan (UAEP) is a comprehensive and integrated emergency management strategy that applies to multiple aerodromes operated by the same operator under the same jurisdiction. The purpose of a UAEP is to create a consistent and coordinated approach to handling emergencies across all the aerodromes within the network. This plan integrates the incident management system, emergency orders, instructions, resource allocation, communication protocols, and stakeholder coordination into a single unified and cohesive framework.

(c) The requirements contained in this section detail the development, implementation, and maintenance of a Unified Aerodrome Emergency Plan (UAEP) that encompasses all aerodromes under the aerodrome operator’s control within the same jurisdiction.

(d) A Unified Airport Emergency Plan (UAEP) approach offers numerous benefits, however there are conditions where this approach may not be applicable or implementable to some aerodrome, such as significantly different local regulatory environments, large geographical separation, complex stakeholder structures, conflicting incident command structures, different emergency preparedness maturity levels, political and administrative complexities, etc.

GM2 ACM.OPS.CERT.D.020(a) Emergency planning

DETERMINING SUITABILITY OF UNIFIED AERODROME EMERGENCY PLANNING

Determining the suitability of an aerodrome operator to adopt a Unified Airport Emergency Planning (UAEP) approach involves a comprehensive safety assessment evaluating several factors to ensure that this strategy aligns with the operator's capabilities, stakeholders' emergency preparedness levels, the characteristics of the aerodromes, and the regulatory environment (see Figure-20 on conducting unified airport emergency planning assessment). The aerodrome operator should:

(a) Assess Operational Characteristics

(1) Evaluate the size, complexity, and operational focus of the aerodromes. If the aerodromes vary significantly (e.g., a mix of large international hubs and small regional aerodromes), a unified approach may require careful adaptation to ensure it meets the needs of each airport.

(2) Consider the types of operations at each aerodrome, such as passenger services, cargo handling, or specialised operations (e.g., military, VIP services). A unified plan should be flexible enough to cover diverse operational contexts.

(b) Evaluate Regulatory and Legal Requirements

(1) Review the regulatory environment across the aerodromes. If the aerodromes are in different countries or regions with distinct regulatory requirements, a unified approach may face challenges in ensuring compliance across all jurisdictions.

(2) Assess the legal implications of adopting a unified plan. Ensure that the plan can meet the legal obligations of each aerodrome, including liability considerations and compliance with local laws.

(c) Analyse Risk Profiles

(1) Identify risks that are common across all aerodromes in the network, such as aviation accidents, security threats, or natural disasters. A unified plan is more suitable if these risks are similar and can be addressed collectively.

(2) Determine if there are unique risks at specific aerodromes that may require specialized planning. The plan should be adaptable to include local annexes that address these unique challenges without compromising the overall unity of the approach.

(d) Examine Resource Availability

(1) Assess the potential for sharing resources such as emergency equipment, personnel, and expertise across the aerodromes. A unified approach is more feasible if resources can be effectively pooled and redistributed as needed.

(2) Consider whether the infrastructure at each aerodrome can support a unified approach, particularly in terms of communication systems, emergency facilities, and command centres.

(e) Evaluate Incident Management Structure

(1) Determine the existing incident management structure of the aerodrome operator. If the operator already has a centralized incident management system, a unified approach may be easier to implement. Conversely, if the management is highly decentralized, adopting a unified plan may require significant restructuring.

(2) Assess the level of alignment among stakeholders, including local airport authorities, emergency services, and external partners. A unified plan requires strong coordination and collaboration across all parties involved.

(f) Consider Geographical Factors

(1) Evaluate the geographic proximity of the aerodromes. A unified approach is more suitable if the aerodromes are located within a reasonable distance of each other, facilitating resource sharing and coordinated responses.

(2) Consider the environmental conditions at each aerodrome, such as climate, terrain, and proximity to water bodies. If these conditions vary widely, the unified plan must be flexible enough to accommodate different environmental challenges.

(g) Assess Communication Systems

(1) Ensure that the communication systems used across the aerodromes are compatible and can support a unified emergency response. If significant upgrades or changes are required, consider whether this is feasible within the operator's budget and timeline.

(2) Evaluate the potential for integrating technology platforms across the aerodromes to support real-time communication, data sharing, and coordination during emergencies.

(h) Review Training and Preparedness Levels

(1) Assess whether existing training programs can be standardized across all aerodromes. If there are large disparities in training and preparedness levels, the operator may need to invest in harmonising these before implementing a unified plan.

(2) Determine the readiness of the aerodromes to participate in joint emergency exercises, which are critical for testing the effectiveness of a unified plan.

(i) Conduct Operational Readiness and Testing

(1) Consider piloting the unified plan at a few aerodromes to test its effectiveness before full-scale implementation. This can provide valuable insights and allow for adjustments based on real-world experience.

(2) Gather feedback from all stakeholders, including airport staff, emergency responders, and regulatory bodies, to assess the suitability of the unified approach.

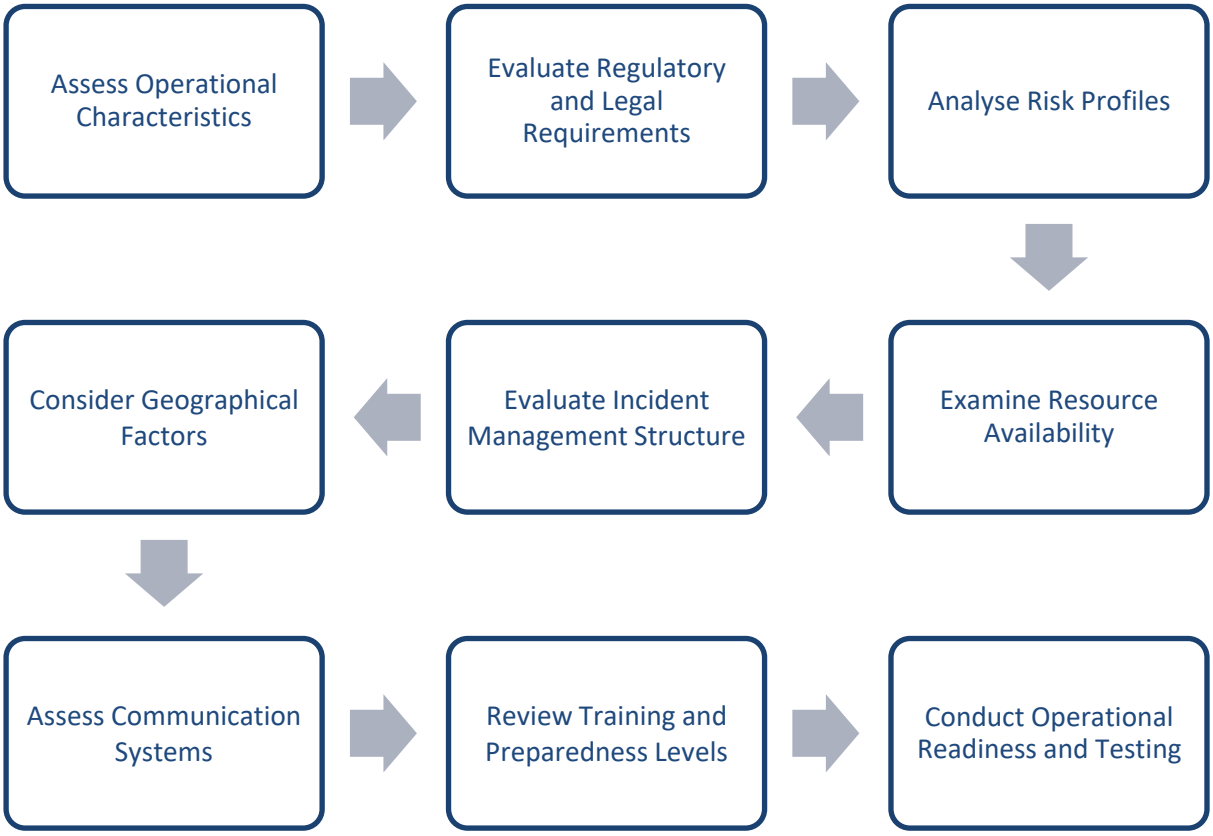


Figure-20: Unified airport emergency planning assessment process flow

AMC1 ACM.OPS.CERT.D.020(a) Emergency planning

ASSESSING A UNIFIED AERODROME EMERGENCY PLAN APPROACH

(a) Assessment on the suitability of a unified emergency plan should include:

(1) a comprehensive safety assessment, standardised emergency response procedures, coordination mechanisms, communication protocols, resource management strategies, and training and emergency exercise programmes;

(2) all relevant emergency scenarios applicable to the aerodromes under the operator's control and ensure consistency in emergency response protocols across all locations;

(3) localised annex/s within the unified aerodrome emergency plan that addresses site-specific risks, resources, and operational nuances;

(4) a unified incident management system covering all aerodromes;

(5) strategic oversight and direction of emergencies occurring at one or more aerodromes;

(6) periodic review of the unified emergency plan or following any significant operational changes or an accident/incident; and

AMC2 ACM.OPS.CERT.D.020(a) Emergency planning

DEVELOPING UNIFIED AERODROME EMERGENCY PLAN

(a) Developing the unified emergency plan should include:

(1) consideration of a modular approach, with a central core document applicable to all aerodromes and individual annexes for each aerodrome;

(2) a comprehensive risk assessment using a recognized methodology to identify and mitigate risks effectively;

(3) a unified incident management system with clear definitions of roles, responsibilities, and reporting lines;

(4) a centralised resource inventory system that tracks all emergency response resources, including personnel, equipment, and supplies, across the network;

(5) mutual aid agreements with local emergency services and other aerodrome stakeholders within the operator's network to ensure resource availability during major emergencies; and

(6) a comprehensive management of change programme, in accordance with the operator's safety management system.

GM AMC2 ACM.OPS.CERT.D.020(a) Emergency planning

DEVELOPING UNIFIED AERODROME EMERGENCY PLAN

(a) For the Unified Aerodrome Emergency Plan (UAEP) to be coordinated and effective, the plan must be carefully designed to ensure that multiple aerodromes under a single operator with the same jurisdiction can respond efficiently and consistently to emergencies.

(b) To provide an assurance on the efficacy of the plan, it is important that the aerodrome operator should not be too eager to unify too many aerodromes under its control. It is strongly recommended that the aerodrome operator starts with less than 3 aerodromes under its management control. Once the plan reaches an acceptable level of maturity and the emergency preparedness at other aerodromes have demonstrated positive levels, the aerodrome operator can consider adding more aerodromes to the plan.

(c) This guidance provides a structured approach to developing a UAEP, ensuring it is integrated, comprehensive, adaptable, and aligned with regulatory standards (See Figure-21).

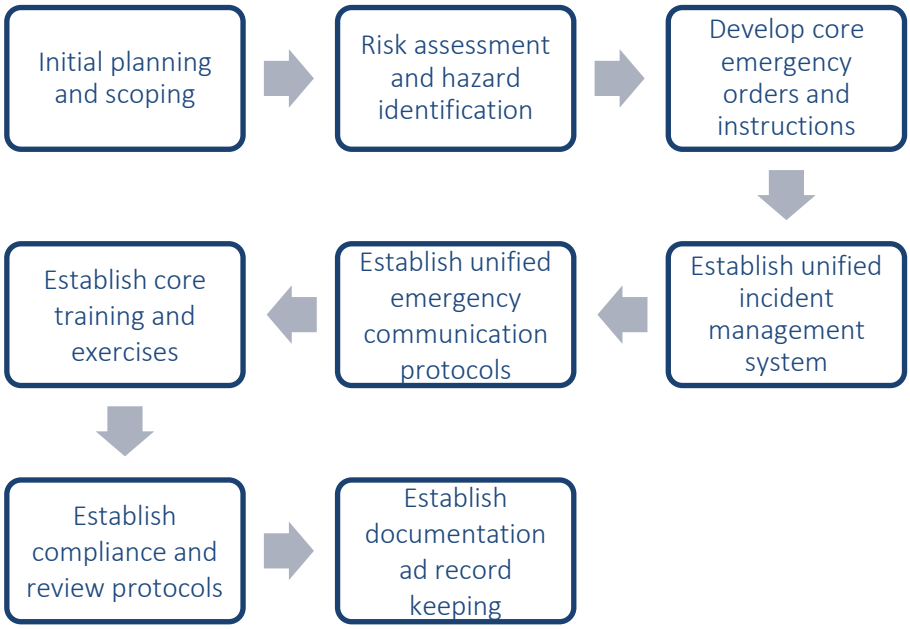


Figure-21: Developing unified aerodrome emergency plan process flow

1. INITIAL PLANNING AND SCOPING

(a) Define the Scope and Objectives

(1) Identify the airports to be covered by the UAEP and outline the specific objectives of the plan, such as enhancing safety, ensuring regulatory compliance, and optimizing resource use across the network.

(2) Establish clear goals, such as reducing response times, improving coordination, and standardizing emergency procedures.

(b) Stakeholder Engagement

(1) Identify key stakeholders, including airport management, emergency services, regulatory authorities, airlines, and local communities.

(2) Engage stakeholders early in the planning process to gather input, build consensus, and ensure that the plan reflects the needs and expectations of all parties involved.

2. RISK ASSESSMENT AND HAZARD IDENTIFICATION

(a) Conduct a Comprehensive Risk Assessment

Identify common risks across all airports (e.g., aircraft accidents, fire, severe weather) and unique risks specific to individual airports (e.g., proximity to hazardous materials, geographic vulnerabilities).

Use risk assessment methodologies like SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis, Hazard and Operability Study (HAZOP), or Failure Modes and Effects Analysis (FMEA) to evaluate potential hazards.

(b) Prioritize Risks

(1) Prioritize risks based on their likelihood and potential impact. Focus on high-priority risks when developing emergency procedures.

3. DEVELOPING CORE EMERGENCY ORDERS AND INSTRUCTIONS

(a) Standardized Procedures

(1) Develop standardized emergency response procedures that apply uniformly across all airports. These procedures should cover key scenarios such as aircraft incidents, security breaches, natural disasters, and medical emergencies.

(2) Ensure that procedures are aligned with national and international regulations.

(b) Local Adaptations

(1) Create localized annexes within the UAEP that address site-specific risks and operational nuances at each airport. These annexes should be flexible enough to accommodate local conditions while maintaining overall consistency.

(c) Resource Management

(1) Outline procedures for the efficient allocation and sharing of resources, including personnel, equipment, and facilities. Establish protocols for mutual aid between airports within the network.

4. UNIFIED COMMAND AND CONTROL STRUCTURE

(a) Unified Incident Management System (IMS)

(1) Implement an IMS that provides a clear chain of command and defines roles and responsibilities during an emergency. Ensure that the ICS is compatible across all airports within the network.

(2) Design the IMS to be scalable, allowing it to adapt to incidents of varying magnitude, from minor disruptions to large-scale crises.

(b) Centralized Coordination

(1) Establish a central emergency coordination centre that can provide strategic oversight and support during emergencies. This centre should facilitate communication, resource allocation, and decision-making across all airports.

5. UNIFIED COMMUNICATION PROTOCOLS

(a) Unified Communication Systems

(1) Develop standardized communication protocols that ensure seamless information flow between airports, emergency services, and other stakeholders. Include provisions for real-time data sharing and collaboration.

(2) Ensure that communication systems are compatible across all airports and that backup systems are in place in case of primary system failures.

(b) Public and Stakeholder Communication

(1) Develop a public communication strategy to provide timely and accurate information to passengers, staff, and the community during emergencies. Ensure that messages are consistent across all airports.

(2) Engage with external stakeholders, including local governments and emergency services, to coordinate communication and response efforts.

6. TRAINING AND EXERCISES

(a) Unified Training and Proficiency Checks Programmes

(1) Develop training programs that ensure all personnel across the airport network are familiar with the UAEP and their specific roles within it. Standardize training to maintain consistency while allowing for local adaptations.

(2) Include training on the ICS, communication protocols, and emergency procedures.

(b) Joint Emergency Exercises

(1) Plan and conduct joint emergency exercises involving multiple airports to test the effectiveness of the UAEP. These exercises should simulate a range of scenarios, including those that require inter-airport coordination.

(2) Use the exercises to identify gaps in the plan and areas for improvement.

7. COMPLIANCE AND REVIEW

(a) Regulatory Compliance

(1) Ensure that the UAEP meets all relevant regulatory requirements, both national and international. Regularly review the plan to ensure ongoing compliance with updated regulations.

(b) Continuous Improvement

(1) Establish a process for regularly reviewing and updating the UAEP based on lessons learned from incidents, exercises, and feedback from stakeholders.

(2) Conduct post-incident reviews after real emergencies to assess the effectiveness of the plan and make necessary adjustments.

8. DOCUMENTATION AND RECORD-KEEPING

(a) Comprehensive Documentation

(1) Maintain detailed documentation of the UAEP, including the core plan, local annexes, training records, and exercise reports. Ensure that all documents are accessible to relevant personnel.

(2) Use version control to track updates and changes to the plan, ensuring that all stakeholders are working from the most current version.

(b) Accessibility

(1) Ensure that the UAEP is easily accessible to all relevant personnel at each airport. Consider digital platforms or secure cloud storage to facilitate quick access during emergencies.

AMC1 ACM.OPS.CERT.D.020(b) Emergency planning

MANAGING THE UNIFIED AERODROME EMERGENCY PLAN

(a) The aerodrome operator should ensure that the unified aerodrome emergency plan (UAEP) is implemented in agreement with the GCAA and all AEP stakeholders identified in the aerodrome emergency planning framework. This agreement must be documented, traceable, and approved through a collaborative process that ensures the plan's operational feasibility, regulatory compliance, and interoperability across all response agencies.

(b) The UAEP should reflect a consolidated response structure, with clearly defined roles, responsibilities, communication protocols, and resource commitments agreed upon by the relevant stakeholders, including but not limited to:

(1) Rescue and Firefighting Services (RFFS);

(2) Air Traffic Services (ATS);

(3) Airport Police or Security Services;

(4) Emergency Medical Services;

(5) Law Enforcement Authorities;

(6) Airlines and Ground Handlers;

(7) Airport Tenants and Terminal Operators;

(8) Civil Defense Authority;

(9) Public Health Authority; and

(10) Local agencies, etc.

(c) The plan should be approved by the Accountable Manager or a delegated senior executive.

(d) Any updates, changes, or revisions to the unified aerodrome emergency plan that affect the roles, responsibilities, or response coordination should be communicated in advance to the AEP stakeholders for revalidation and re-endorsement, as appropriate.

(e) The UAEP should be fully integrated into the aerodrome operator's Safety Management System (SMS), ensuring that its maintenance, testing, and improvement are subject to continuous safety assurance mechanisms, including hazard identification, safety risk assessment, and emergency exercise feedback.

GM AMC2 ACM.OPS.CERT.D.020(b) Emergency planning

MANAGING THE UNIFIED AERODROME EMERGENCY PLAN

(a) The concept of a unified aerodrome emergency plan refers to a singular, harmonised emergency response framework that aligns the objectives, procedures, and resource mobilisation of all agencies and entities involved in emergency response at the aerodrome. Unlike fragmented or agency-specific response plans, the UEP ensures interoperability, clarity of command, and efficient coordination.

(b) The process of agreeing to and implementing the UAEP should begin with a collaborative planning cycle, typically conducted through a structured Emergency Planning Committee (EPC) or equivalent multi-agency coordination group. This committee should:

(1) Identify risks and operational scenarios that require joint response;

(2) Review existing protocols and align them with ICAO, EASA, and national regulatory standards;

(3) Develop integrated procedures, communication flows, and staging logistics;

(4) Conduct a joint validation review before submission to the GCAA for agreement.

(c) It is good practice to maintain a Stakeholder Agreement Register, which tracks the date, scope, and signatory for each stakeholder involved in the emergency plan. Where feasible, this should be digitised and incorporated into the aerodrome's documentation management system.

(d) In addition to documentation, joint emergency exercises are a critical method for reinforcing and evaluating the effectiveness of the UEP. Exercise feedback should be formally recorded and actioned through the SMS process. The results of such exercises may trigger updates to the UEP, which would in turn require re-engagement with the GCAA and affected stakeholders.

(e) Stakeholders should be given access to the current version of the UEP via a secure platform, and awareness sessions should be conducted to ensure their personnel understand their roles. These sessions should be documented and monitored for effectiveness.

(f) The UEP must also account for non-aviation emergencies (e.g., pandemics, natural disasters, hazardous material spills), reflecting the full scope of potential emergencies that could affect operations at the aerodrome.

2. RECORD KEEPING AND OVERSIGHT

(a) All correspondence, approvals, versions, and stakeholder engagement activities related to the UEP should be retained by the aerodrome operator for a minimum of five years or as prescribed by national regulation.

(b) These records should be made available during audits, certification reviews, or investigations.

(c) The aerodrome operator should assign responsibility for UEP document control and stakeholder communication to the designated AEP Competent Person.

SECTION E – RESCUE AND FIREFIGHTING

ACM.OPS.CERT.E.005 Rescue and firefighting

PROVISION OF SERVICES AND/ACTIVITIES

(a) An aerodrome operator shall:

(1) ensure rescue and firefighting services, facilities and equipment are provided at an aerodrome;

(2) where an aerodrome is located close to water, swampy areas, or difficult terrain, and where a significant portion of approach or departure operations takes place over these areas, ensure specialist rescue services and firefighting equipment appropriate to the hazard and risk are available; and

(3) establish and implement policies and procedures relating to the administration and management of a rescue and firefighting service at an aerodrome.

GM ACM.OPS.CERT.E.005(a) Rescue and firefighting

PROVISION OF RESCUE AND FIREFIGHTING SERVICES AND/OR ACTIVITIES

1. INTRODUCTION

(a) The requirements under this Section places an obligation on the aerodrome operator to ensure that aerodrome operator complies with all relevant requirements in this regulation.

(b) This guidance provides to the aerodrome operator on this issue, since ARFFS provision can take one of two forms.

(c) The ARFFS is an integral part of the aerodrome operator ’s own organisation. However, there may be instances where the ARFFS is provided by an organisation external to the aerodrome operator ’s own organisation, for example by other fire service or a private contractor. Guidance for these two circumstances is set out below.

3. WHERE THE ARFFS IS AN INTEGRAL PART OF THE AERODROME OPERATOR

(a) In this case the ARFFS is an integral part of the aerodrome operator’s organisation. Thus, the ARFFS is covered by the aerodrome operator ’s Safety management system (SMS).

(b) In this case the ARFFS manual forms a natural part of the aerodrome manual system. Some of the information required in ARFFS manual relating to organisational structure would naturally be placed in the part of the aerodrome manual dealing with such matters.

4. WHERE THE ARFFS IS NOT PART OF THE AERODROME OPERATOR

(a) In this case the ARFFS is basically a contractor to the aerodrome operator, and consequently there should be a written agreement either a contract or Service Level Agreement (SLA) between the two parties.

(b) Even if the ARFFS is provided by a contractor, the requirement to comply with Sub Part D requirements, and to support the aerodrome operator appropriately, is a mandatory element of the aerodrome certificate. It is recommended that the ARFFS service provider includes a statement of compliance as part of the agreement.

Note. - The contract or SLA should be included in the Aerodrome Manual. Where confidentiality clauses exist, essential details of the agreement must be included.

(c) Since the responsibility for ensuring that the ARFFS complies with the requirements in this Regulation rests with the aerodrome operator, all issues related to the ARFFS will be handled through the aerodrome certificate holder.

(d) Apart from any business-related material, the agreement should at least include provisions for the following issues:

(1) The level of service provided

(2) In terms of the promulgated level of aerodrome category and hours of service. This is a important issue and is stated in the aerodrome manual.

(3) Procedures for changes in the level of service

(4) This should cover any need to increase the level of service and arrangements in case of depletion of the ARFFS available. Changes of a permanent character affect the aerodrome manual.

(5) The organisational structure of the ARFFS service provider

(6) As it pertains to the service provided for the aerodrome. Include names and responsibilities of the senior persons.

(7) Minimum staffing levels

(8) For the RFF categories covered by the agreement as determined by a task resource analysis.

(9) Arrangements for the integration of ARFFS SMS and Aerodrome SMS

(e) Unless the ARFFS is covered by the aerodrome operator's SMS, there is a need to ensure appropriate integration between the two systems. Some elements that should be in place include, but are not limited to:

(1) ARFFS representation in the aerodrome safety committee, local runway safety team and other relevant safety groups.

(2) Sharing of deviation reports and findings, including any follow-up actions.

(3) Arrangements for auditing the ARFFS

(4) As part of its safety management system, the aerodrome operator has an obligation to perform audits of the ARFFS in accordance with its quality assurance requirements. This is also one of the means by which the aerodrome operator can be assured that the ARFFS complies with the requirements of this Section.

(5) The aerodrome operator should make available all relevant manuals documents and records, including personal training records for the staff concerned. Similarly, the aerodrome operator will need to make arrangements for these documents and records to be made available to the GCAA by the Aerodrome operator during regulatory audits and as otherwise required by the GCAA.

(6) Arrangements for dealing with audit findings

(7) Arrangements to ensure that any findings identified by the aerodrome operator or raised by the GCAA will be sufficiently dealt with through the aerodrome certificate holder. This is to ensure that follow-up actions resulting from the audits referred to above will be implemented, complied with and can be monitored.

(8) Arrangements for supplying the ARFFS manuals and other documentations to the GCAA

(9) Arrangements should be made to provide ARFFS manual and other documents, through the aerodrome operator, to the GCAA as required.

(10) Participation in Emergency Planning Arrangements

(i) The aerodrome operator should make available all suitable resources to engage with emergency planning arrangements including the emergency planning

committee, specialist rescue services where it has been determined and to take a lead in emergency exercises.

AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

PROVISION OF RESCUE AND FIREFIGHTING SERVICE

(a) Rescue and firefighting service should come under the administrative control of the aerodrome operator, that is responsible for ensuring that the service provided is organised, equipped, staffed, trained and operated in such a manner as to fulfil its proper function and achieve compliance with this regulation.

(b) Requirements for a rescue and firefighting service to deal with incidents involving building, fuel storage facility and other non-aircraft related emergencies at an aerodrome are not included in this Section. Where rescue and firefighting service is required to response to such incidents at the aerodrome, additional quantities of extinguishing agents, personnel, vehicles and equipment should be determined.

(c) Policies and procedures relating to the administration and management of the rescue and firefighting service should be established and implemented at an aerodrome.

(d) Key information on the provision of ARFFS should be documented in the Aerodrome Manual.

GM1 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

PROVISION OF RESCUE AND FIREFIGHTING SERVICE

(a) Public or private organizations, suitably located and sufficiently equipped, may be designated to provide the rescue and firefighting service at an aerodrome.

(b) The principal objective of a rescue and firefighting service (ARFFS) is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The main purposes of an RFF service are:

(1) to create and maintain survivable conditions,

(2) to provide egress routes for occupants; and

(3) to initiate the rescue of those occupants unable to make their escape without direct aid.

(c) The RFF service should assume at all times the possibility of and need for extinguishing a fire which may:

(1) exist at the time an aircraft is landing, taking off, taxiing, parked, etc.; or

(2) occur immediately following an aircraft accident or incident; or

(3) occur at any time during rescue operations.

(d) The rupture of fuel tanks in an aircraft crash and the consequent spillage of highly volatile fuels, and other flammable liquids used by aircraft, present a high degree of probability of ignition if these liquids come into contact with hot metal parts of the aircraft or because of sparks caused by the movement of wreckage or disturbance of the electrical circuit. Fires may also occur through the discharge of accumulated electrostatic charges at the time of ground contact or during fuelling operations. A distinctive characteristic of aircraft fires is their tendency to reach lethal intensity within a very short time. This presents a severe hazard to the lives of those directly involved and can hamper rescue or evacuation efforts.

(e) For this reason, the provision of sufficient and special means of dealing promptly with an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome assumes primary importance because it is within this time frame that there are the greatest opportunities of saving lives.

(f) The extent of aircraft fires which may affect rescue is influenced largely by the quantity and disposition of fuel carried by the aircraft and the location of any fuel released as a result of the accident or incident.

(g) Emergency exits and their ability to be opened from the inside and outside of an aircraft is of primary importance in rescue and evacuation operations. The provision of special tools for rescue crews in order to gain access to the interior of a fuselage is essential. However, their use can only be regarded as an extreme measure to be taken whenever normal means of access (including emergency exits) are unavailable or unsuitable for use.

(h) The most important factors bearing on effective rescue in a survivable aircraft accident is:

(1) the training received;

(2) the effectiveness of the equipment; and

(3) the speed with which personnel and equipment, designated for RFF purposes, can be deployed.

(i) The proposals set out hereunder concerning these services are intended as a general guide, to be applied to the fullest extent practicable.

GM2 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

ADMINISTRATION OF RESCUE AND FIREFIGHTING SERVICE

(a) To ensure safe and effective administration of the ARFFS, a clearly defined organizational structure is essential to support the mission of ARFFS, which is to save lives. A well-structured organization should be able to define:

(1) how things will be done in the organization;

(2) who does what and who answers to whom (operational – firefighters, drivers & watchroom operators, supervisors – crew, watch & station commanders & managers – unit commanders & deputy/chief fire officers);

(3) how everyone interacts and what they do within the organization to support the mission; and

(4) clear chain of command during an incident.

(b) The organizational structure also defines the span of control of managers and supervisors at incidents, identifying a direct relationship between organizational structure and incident command.

(c) This guidance provides examples of organizational structures and roles and responsibilities within both simple and complex management structures in the ARFFS arena. A structure is necessary to clearly define the roles of everyone involved so that they understand their responsibilities and how they contribute to achieving the organization's goals.

(d) The formal organisational structure of the ARFFS should be depicted in an organizational chart to:

(1) show the relationships between all ranks;

(2) define their roles;

(3) show lines of authority; and

(4) clearly indicate the path of communication in terms of information flow and reporting relationships.

(e) The ARFFS will generally have a hierarchical structure that can be simple or complex. Every organization has different manning levels to suit their operational needs; however, the hierarchical lines of authority, communication paths, flow of control, management and supervisory tiers are similar. See Table 9 showing different ARFFS rank-based organisational structure for the different aerodrome categories. See Table 10 on guidance on minimum duty personnel for aerodrome categories.

Table 9: ARFFS rank-based roles and responsibilities

Rank	Roles and Responsibilities	Identification Markings
ARFFS Chief Officer (ACO) 	• An ARFFS Chief Officer (ACO) is overall responsible in all aspects of the ARFFS management and operations • ACO takes command of aircraft accident or major incident at	• A white helmet with 1 thick (38mm) and 2 thin (19mm) black bands • A rank marking of 1 Falcon and 2 Stars.

	operational level or acts as command support at tactical level.	
ARFFS Assistant / Deputy Chief Officer (ADO) 	• An Airport Assistant / Deputy ARFFS Chief Officer (ADO) is responsible for operational service delivery, training, administration and deputies for the ACO • ADO takes command of major incidents at operational level, acts as command support at tactical level or as assigned by ACO. • Based on size and complexity of ARFFS management and operations, more than 1 ADO maybe required.	• A white helmet with 1 thick (38mm) and 1 thin (19mm) black bands • A rank marking of 1 Falcon and 1 Star.
ARFFS Unit Commander (AUC) 	• An ARFFS Unit Commander (AUC) is responsible for managing a group of fire stations or day-to-day work in a specific policy area. • AUC will take charge of major incidents or undertake specialist tasks such as command, forward support at an incident, or as assigned by ACO/ADO. • Based on size and complexity of ARFFS operations, more than 1 AUC may be required.	• A white helmet with 1 thick (38mm) black band • A rank marking of 1 Falcon.
ARFFS Station Commander (ASC) 	• An ARFFS Station Commander (ASC) is responsible for managing a fire station/s or day-to-day work in a specific policy area. • ASC will take charge of large-scale operational incidents or undertake specialist tasks such as command or forward support at an incident, or as assigned by ACO/ADO/AUC.	• A yellow helmet with 3 thin (19mm) black bands • A rank marking of 3 Stars. • Where an ASC is deemed competent to perform the role of an AUC, he will wear a white helmet with no band.
ARFFS Watch Commander (AWC) 	• An ARFFS Watch Commander (AWC) is responsible of a watch at a fire station/s, carries out rescue, firefighting, fire safety work or junior work in policy areas and may undertake specialist duties. • AWC takes charge as officer in-charge at small operational incidents, or as assigned by AUC/ASC.	• A white helmet with 2 thin (19mm) black bands. A rank marking of 2 Stars. • ARFFS Sub-Watch Commander: A white helmet with 1 thin (19mm) black band and a rank marking of 1 Star.
ARFFS Crew Commander (ACC)	• An ARFFS Crew Commander (ACC) is responsible of a section, in-charge of	• A yellow helmet with 1 thick (38mm) band

	a fire appliance, carries out rescue, firefighting and fire safety work. • ACC attends operational incidents as officer in charge of an appliance and will also take command of small-scale incidents. • ACC also undertake specialist duties such as fire prevention work, etc.	• A rank marking of 3 chevrons.
ARFFS Senior Firefighter (ASF) 	• An ARFFS Senior Firefighter (ASF) is responsible for driving fire appliances, operating specialized vehicle/equipment (HRET, aerial ladder, rescue stair, hose layer, rescue boat, etc and carries out firefighting • ASF undertakes specialist duties such as fire prevention work, etc.	• A yellow helmet with 2 thin (19mm) black bands • A rank marking of 2 chvrons.
ARFFS Fire Fighter (AFF) 	• An ARFFS Firefighter (AFF) is responsible for performing rescue, firefighting and specialized operations • AFF undertakes specialist duties such as fire prevention work, etc.	• A yellow helmet with 1 thin (19mm) band • A rank marking of 1 chevron.
ARFFS Probationary Fire Fighter (APF) 	• An Airport ARFFS Probationary firefighter (APF) is a new firefighter under probationary period spends this role in three phases which can last up to 3 years - Trainee, Development and Competent. • APF may be deploy for operational duties under direct supervision and work at non-high-risk areas only.	• A yellow helmet with a diamond marking • No rank marking.

Table 10: Minimum RFF personnel for different aerodrome categories

Rank	**Aerodrome RFF Category**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Chief Fire Officer							1	1	1	1

Dy Chief Fire Officer									1	1
Unit Commander						1		1		1/duty
Station Commander				1	1	1	1	1/duty	1/duty	1/duty
Watch Commander					1/duty	1/duty	1/duty	1/duty	1/duty	1/duty
Crew Commander	1/duty	1/duty	1/duty	1/duty	1/duty	2/duty	2/duty	1/duty	2/duty	2/duty
Senior Firefighter			1/duty	1/duty	2/duty	2/duty	2/duty	3/duty	3/duty	4/duty
Firefighter	1/duty	1/duty	1/duty	2/duty	2/duty	4/duty	6/duty	6/duty	6/duty	7/duty
Total	2/duty	2/duty	3/duty	4/duty	6/duty	9/duty	11/duty	12/duty	13/duty	16/duty

GM3 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

CONTENTS OF RFFS MANUAL

1. REQUIREMENTS

(a) The ARFFS should provide, for compliance by its personnel, an ARFFS Manual for the services listed in its description and which complies with this regulation.

(b) A guidance in developing an ARFFS manual is provided below.

INTRODUCTION

This document provides guidance to Aerodrome operator developing an aerodrome ARFFS manual in achieving compliance with Part E of this regulation.

(a) An aerodrome ARFFS manual should describe the policy, organisation, capability, facilities, equipment and operational procedures of the ARFFS, that include:

(1) a statement signed by the Accountable Manager or an appropriate delegated person on behalf of the organisation confirming that the manual:

a. defines the organisation and demonstrates its means and methods for ensuring continuing compliance with this and any other applicable Part; and

b. is required to be complied with by its personnel at all times; and

(2) a rank-based organisation chart showing lines of authority and responsibility; and

(3) in the case of withdrawal or transfer of service, the transitional arrangements, and

(4) the establishment of ARFFS and any transitional arrangements; and

(5) where a higher category is available by prior arrangement the procedure necessary to upgrade the facility including, where necessary, actions to be taken by other departments; and

(6) a policy and procedures indicating how depletion of the ARFFS is to be managed including the extent to which operations are to be restricted, how pilots are to be notified and the maximum duration of any depletion; and

(7) objectives for each RFF category provided, including a description of:

a. amounts and type of extinguishing media provided; and

b. discharge rates; and

c. number of foam-producing appliances;

d. number of supporting appliances;

e. number of specialised appliances; and

f. staffing levels (minimum and optimum); and

g. numbers and levels of managers and supervisors; and

(8) a statement describing the process of recruitment and selection of RFF personnel; and

(9) policies and procedures by which RFF personnel selected for operational duties are initially and continually assessed as fit and capable of their duties; and

(10) the processes by which the initial and continued maintenance of competence of RFF personnel according to the assigned tasks, including occupational first aid training; and

(11) details of the training facilities available for initial and recurrent maintenance of competence on the aerodrome or sourced externally; and

(12) details of the specific requirements and assessment to determine the provision of personal and respiratory protective equipment; and

(13) the safety accountabilities of all personnel to be promulgated or referred to in the Aerodrome Manual; and

(14) details of the type and operational capability of the fire vehicles employed for each RFF category required; and

(15) details of specialist equipment such as rescue craft, emergency appliances, hose layers, appliances with aerial capability, etc, where the ARFFS provides these, and procedures to be followed if these facilities are temporarily unavailable; and

(16) policies or letters of agreement, where the ARFFS is reliant upon other organisations to provide equipment, which is essential for ensuring safe operation of the aerodrome (such as water rescue) and contingency plans in the event of non-availability are described; and

(17) details of the rescue and medical equipment stowed on the fire vehicles and where rescue and medical equipment is held other than on the RFF vehicles a statement indicating its location and how it is to be transported to an incident site; and

(18) details of both the principal and complementary extinguishing agent to be provided; and

(19) the availability of additional water supplies following an aircraft accident and details of the policy and procedures to be followed in the event of circumstances that requires isolation or depletion of supplies; and.

(20) details of the radio communication system to be provided; and

(21) a statement describing the process for the testing, inspecting and maintenance of extinguishing media, rescue and medical equipment, specialist equipment, vehicles and radio communication systems; and

(22) details of the fire station(s) facilities and location; and

(23) details of the crash maps to be used by the ARFFS, external emergency services and ATS in the event of an aircraft accident or incident on or in the vicinity of the aerodrome; and

(24) procedures for monitoring the aircraft movement areas for the purpose of alerting RFF personnel including:

a. how RFF personnel are alerted throughout the range of functions (training, extraneous duties, etc.) and geographical locations from where they may be expected to respond; and

b. how the adequacy of the response time capability throughout their functions and locations is tested, monitored and maintained; and

c. how RFF personnel engaged in extraneous duties are managed to ensure that response capability is not affected; and

(25) where a ARFFS is expected to respond to incident on landside, the policy and procedures include management of the effects on continued aircraft operations; and

(26) procedures indicating how accidents within 1,000 metres of the threshold of each runway, and other difficult environs where they exist, are to be accessed; and

(27) where a ARFFS is expected to respond to domestic fires or special services, procedures for managing the impact of this upon the normal aircraft RFF response; and

(28) where an aerodrome accepts freight aircraft, medical flights or movements not required to use a certificated aerodrome, company objectives regarding RFF category; and

(29) arrangements for ensuring the adequacy of responses in non-optimum conditions i.e. low visibility procedures; and

(30) procedures to notify changes in operational status with the aeronautical information services responsible for the AIP and the aerodrome operator or operator; and

(31) the procedures regarding the keeping of a watchroom log; and

(32) details of the emergency access roads and gates provided; and

(33) details of the systems and procedures regarding the quality management system; and

(34) details of the systems, procedures, and programmes regarding the safety management system; and

(35) details of procedures for managing aircraft and non-aircraft incidents within aerodrome and its vicinity.

(a) The ARFFS should make available enough copies of the ARFFS Manual for one to be readily accessible by all personnel who may need to refer to it.

(b) The ARFFS should take all reasonable steps to ensure that each member of the ARFFS personnel:

(1) is aware of the contents of every part of the ARFFS Manual which is relevant to his/her duties as such; and

(2) undertakes his/her duties in conformity with the relevant provisions of the Manual.

(c) If any prescribed subject is not included in the ARFFS Manual because it is not applicable to the ARFFS at an aerodrome, the ARFFS should state in the Manual the reason for non-applicability of that subject.

(d) The ARFFS should alter or amend the ARFFS Manual, whenever necessary, to maintain the accuracy of the information in it.

(e) The ARFFS should notify the aerodrome operator or operator as soon as practical of any significant changes that the ARFFS wishes to make to the ARFFS Manual.

(f) The ARFFS should comply with any directive issued by the GCAA to the aerodrome operator or operator requiring alteration or amendment of the ARFFS Manual.

2. DOCUMENTATION

(a) The ARFFS should have immediate access to current copies of the relevant technical manuals and any other document necessary for the provision and operation of the services listed in its ARFFS Manual.

Note. - Documents may be in hardcopy or electronic and accessible to all personnel requiring access. Full unrestricted access should be provided to the GCAA when requested.

(b) The ARFFS should establish a procedure to control all the documentation required by paragraph (a) which ensure that:

(1) all incoming documentation, including amendments, are reviewed and actioned as required by authorised personnel;

(2) all documentation is reviewed and authorised before issue;

(3) current issues of all relevant documentation are available to personnel at all locations where they need access to such documentation for the provision and operation of ARFFS;

(4) all obsolete documentation is removed promptly from all points of issue or use;

(5) any obsolete documents retained as archives are suitably identified as obsolete;

(6) changes to documentation are reviewed and accepted by authorised personnel who should have access to pertinent background information upon which to base their review and acceptance;

(7) safety-significant changes are assessed in accordance with the safety management system; and

(8) the current version of each item of documentation can be identified to preclude the use of out-of-date editions.

3. WATCHROOM LOG

(a) The ARFFS should ensure that a logbook, with sequentially numbered pages, is kept at each ARFFS station.

(b) The procedure should ensure that:

(1) the logbook is maintained by the senior person on duty, or the person on watch at a nominated operating position;

(2) the logbook is maintained throughout the hours of watch of the station;

(3) all entries include the time of entry;

(4) the person responsible for maintaining the logbook signs On Watch, and effects transfer of responsibility by successive On Watch entries; and

(5) logbook entries are:

(i) in chronological sequence and in ink;

(ii) without erasure, defacement, or obliteration; and

(iii) corrected by drawing a single line through the erroneous information and initialling the correction.

(6) actual times of opening and closing watch are recorded in the logbook, together with the reason for every variation from published hours of service;

(7) the operational category is stated at the beginning of each watch and any changes in the operational status recorded and that the operational status and any changes to it is confirmed by the senior officer in-charge of the watch signing the log; and

(8) logbooks are retained for a period of 5 years from the date of final entry.

4. RECORDS

(a) The ARFFS should establish systems and procedures to identify, collect, file, store securely, maintain for at least 5 years, access and dispose of records necessary for:

(1) the operational provision of ARFFS; and

(2) the purpose of assisting with any accident or incident investigation.

(b) The ARFFS should compile, maintain and retain records in the following areas, but not limited to:

(1) ARFFS personnel:

(i) training received; and

(ii) competency and performance evaluations.

(2) ARFFS vehicle(s):

(i) commissioning/initial performance testing; and

(ii) initial certification and recurrent foam system testing; and

(iii) initial certification and recurrent complementary agent system testing; and

(iv) regular inspection; and

(v) maintenance; and

(3) Ancillary equipment:

(i) maintenance; and

(ii) inspections; and

(iii) tests; and

(4) Extinguishing agents:

(i) foam certification of conformity to ICAO; and

(ii) complementary agent conformity to ISO; and

(5) Watchroom log; and

(6) Incidents/accidents reports; and

(7) Safety management reports/assessments;

(8) Internal quality assurance reports/assessments; and

(9) Any other record required by the aerodrome operator and/or the GCAA.

GM4 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

1. FEATURES COMMON TO ALL AIRCRAFT EMERGENCIES

(a) Upon notification from air traffic control announcing an aircraft emergency, the required equipment is dispatched to the scene of the accident or to the predetermined standby positions. Once the call has been received, all subsequent RFF action will be the responsibility of the aerodrome RFF service officer-in-charge.

(b) Runway standby positions for RFF vehicles in anticipation of an emergency may be predetermined, and documented to provide the best possible coverage.

(c) For emergencies involving gear malfunction or tire difficulty, there is always a possibility of the aircraft veering off the runway and possibly hitting emergency equipment. In such cases, it is preferable for the emergency equipment to be located near the point of touchdown and then to follow the aircraft down the runway after ground contact.

(d) Response by RFF equipment to off-aerodrome accident(s) should be done in accordance with off aerodrome response procedures and existing mutual aid agreement(s). Communication should be maintained between RFF vehicles, the fire station and air traffic control. Wherever possible, mutual aid resources should monitor predetermined frequencies.

(e) Additional resources should be dispatched when the accident site is known to be beyond normal fire protected zones (underground water mains and hydrants) or where water relays may be required. Prearrangements should be made to assure that additional supplies of extinguishing agents are brought to the accident scene.

(f) Pre-incident planning of off-aerodrome conditions should be made to prevent delays at time of emergency. Significant factors should be charted on the grid maps carried in RFF vehicles.

(g) All personnel operating directly in the involved area of the crash should be provided with sufficient protective clothing. The training of rescue personnel should stress the value and the limitations of their protective equipment to avoid a false sense of security and to recognize that they could unwittingly lead the occupants of the aircraft through a dangerous atmosphere.

(h) Lines to be used in fire attack should be charged after equipment is properly positioned. If no fire is visible, all equipment should be staged for immediate response if necessary.

(i) Should spill of a flammable liquid occur without fire breaking out, it is important to eliminate as many ignition sources as possible while the spill is being neutralized or covered with foam. Engine ignition sources should be made inert or cooled. There may be enough residual heat in turbine aircraft engines to ignite fuel vapours up to 30 minutes after shutdown or 10 minutes on piston engines.

(j) A continuous water supply is essential and is usually not available at all points. Provisions should be in place to ensure that the required fire flow be maintained. It is important that pre-arrangements also include additional emergency resources.

(k) Rescue operations should be accomplished through regular doors and hatches wherever possible but RFF personnel should be trained in forcible entry procedures and be provided with the necessary tools.

Note. — In a number of cases, misuse of forcible entry tools has resulted in unnecessary fuel spills increasing the fire hazard.

(l) Rescue of aircraft occupants is a priority and should proceed with the greatest possible speed. Evacuation of injured occupants from a dangerous environment in the fire-threatened area should be done with care so as not to aggravate their injuries.

(m) Broken fuel, hydraulic fluid (flammable type), alcohol and oil lines should be plugged or crimped, when possible, to reduce the amount of spill and extent of fire.

(n) If the source of heat and fire cannot be controlled, fuel tanks exposed but not involved should be protected by appropriate agents to prevent involvement or explosion.

(o) Aircraft windows maybe used for rescue or for ventilation. Some are designed to be used as emergency exits. On all aircraft these exits are identified and have latch release facilities on both the outside and inside of the cabin.

(p) Cabin doors may be used as emergency exits except when they are not operationally available. With some exceptions these doors open outwards. When exits are used for ventilation they should be opened on the downwind side.

(q) The “No Smoking” rule should be rigidly enforced at the scene of the accident and in the immediate vicinity.

2. FIGHTING AIRCRAFT FIRES

(a) The primary mission of the RFF service is to control the fire in the critical area to be protected in any post-accident fire situation with a view to permitting the evacuation of the aircraft occupants. Equipment and techniques recommended are generally directed toward this goal.

(b) The ARFFS officer-in-charge when responding to aircraft accident/incident is expected to deal with the following fires:

(1) Combustible material fires.

(2) Fuel spill fires.

(3) Hot brakes and wheel fires.

(4) Rocket engine fires.

(5) Confined engine fires (piston).

(6) Confined turbine engine fires (jet).

(7) Titanium fire control.

(8) Magnesium fire control.

(9) Fire situations involving rear mounted aircraft engines.

(10) Fire situations involving avionics compartment or flight deck.

(11) Fire situations involving galley or overhead compartment.

(12) Fire situations involving aircraft battery fires including lithium-ion batteries.

(c) External fires

(1) The priority is to create a survivable condition inside the aircraft, for passengers and crew who have not been able to evacuate safely.

(2) On arrival, appliance positioning is critical, there are no specific instructions regarding this matter, however the following points should be considered:

- so that personnel can clearly see the aircraft and evacuating passengers
- so that appliances do not obstruct escape slides either in use, or slides that may be required later
- in a manner which ensures they are unlikely to be unaffected by any sudden movement or collapse of the aircraft (aircraft swing – caused by the collapse of an undercarriage or weather conditions)
- clear of known hazard areas such as rim/tyre disintegration zones, engine intakes and exhausts, propellers, aircraft weapon systems etc
- upwind and uphill
- RFFS drivers should be aware of pooling or running fuel.

(3) It is essential that the integrity of the fuselage is maintained; therefore, firefighting activities should be directed towards sweeping fire away from fuselage and protecting the escape chutes/routes that are likely to be used. By sweeping fire away from the fuselage the risk of fire penetration is greatly reduced and the fuselage will cool.

(4) External fires can penetrate the fuselage within a minute of starting, depending upon the intensity and the location of the fire in relation to the fuselage. Therefore, external fires need to be controlled rapidly and entry into the fuselage made as quickly as is reasonably practical.

(5) In a fire and/or life risk situation, fuel spillages should be covered by an aspirated foam blanket and maintained until there is no further possibility of accidental ignition. Once all

firefighting and rescue operations are complete, a decision will need to be made to stop re-applying foam and maintaining the foam blanket, for the following reasons:

- it covers hazards such as ruts in the ground and sharp debris, creating
- additional hazards for emergency responders
- it covers body parts and makes disaster victim identification difficult
- it creates an additional environmental impact
- it makes post-crash investigation difficult.

(6) Escape slides and exits should be protected throughout the incident by hose lines.

(7) As soon as the major fire is under control/out, at least one charged line should be maintained on each side of the aircraft ready for immediate use in case the fire suddenly escalates or reignite.

(8) At any time during the incident, it is possible that the aircraft or part of the aircraft may collapse. Therefore, it is essential that personnel are vigilant throughout the incident and safety officers are designated as per the incident command system.

(9) During the incident all personnel within the inner cordon, will wear full personal protective equipment, and the appropriate level of respiratory protective equipment as instructed by the Incident Commander.

(d) Internal fires

(1) Fires involving the interior of modern passenger aircraft are hazardous and complex. Large passenger carrying aircraft will have the capacity to carry more than four hundred passengers (more with the introduction of the A380). Within the cabin area of the aircraft there will be a substantial fire loading. Fires can develop very rapidly if not dealt with, filling the cabin with dense toxic smoke and hampering any escape from the aircraft.

(2) The conditions likely to be encountered on the inside of an aircraft with an internal fire include dense toxic smoke, extreme levels of heat and humidity. Personnel are likely to experience difficulty in advancing through the cabin due to debris, casualties and the collapse of the aircraft interior fittings.

(3) Internal fires pose numerous potential hazards for firefighters.

Aircraft structural collapse

(4) In serious internal fire situations, there is an ever-present risk from the fuselage collapsing. Generally, the collapse will occur at the rear of the mainplane, where large portions of the fuselage are unsupported. Personnel working on the exterior of the aircraft must be conscious of where appliances and equipment are positioned. Personnel

inside the aircraft must advance with care and ensure their means of egress is maintained.

(5) The floor of the aircraft fuselage may also be weakened and collapse with no warning, therefore caution must be exercised when moving through the fuselage.

Evacuating passengers and crews

(6) If not controlled, evacuating passengers and crew may hamper firefighting and rescue operations. Evacuated passengers may attempt to re-enter the aircraft if they discover that their family or friends have not yet escaped. The exercise of firm control over those who have evacuated safely is therefore of paramount importance. The use of aircraft passenger management systems (PEMS) is recommended.

Dense toxic smoke and flammable vapours

(7) Fires involving the furnishing of an aircraft will produce large quantities of toxic smoke and flammable vapours. The expedient location and extinguishment of any fire is essential if passengers are to survive. The fuselage must be ventilated without delay. This will allow hot toxic gases and smoke to be replaced by fresh air and therefore greatly improve the chance of survival.

(8) The application of foam to the fuselage (internal fires only) is to be avoided as the foam blanket acts as a heat insulator and prevents the internal fire from burning through the fuselage and ventilating the aircraft.

Pressurised and live electrical systems

(9) ARFF Service personnel working inside may be exposed to pressurised systems and live electrical circuits. Therefore, personnel will be required to wear full personal protective equipment and breathing apparatus and correct search procedure must be adhered to at all times.

Rapid development of fire

(10) Because of the rapid build-up of heat, large volumes of explosive flammable vapours will be released. This has the potential for a flashover and backdraft, therefore tactics for the reduction of a flashover and backdraft should be adopted.

Hazardous materials

(11) At all incidents involving aircraft there is a danger of aviation fuel, hydraulic fluid, cargo (possibility of numerous hazardous materials) and polymer composite, alloys etc. These all pose a potential hazard and a comprehensive assessment of risk will be required and

personnel exposure kept as low as reasonably practicable. ARFF Service personnel must be provided with the appropriate personal protective equipment and respiratory protective equipment.

(e) Internal firefighting and search procedures

(1) ARFF Service should be familiar with the interior of an aircraft. It is vital to personnel working inside the aircraft that firefighting, search and rescue operations are methodical.

(2) ARFF Service personnel entering an aircraft for firefighting operations must, as a minimum, be wearing full personal protective equipment including breathing apparatus. They should also have with them a charged line (45mm) with a hand-controlled branch.

(3) Entry into the aircraft may be difficult and escape slides may need to be removed prior to the firefighting teams entering the fuselage. The use of aircraft stairs, fire service ladders or a stable platform is necessary.

(4) ARFF Service personnel tasked with firefighting should use a water spray to cool and drive the smoke towards a venting point further along the fuselage (opened by external crews if not already opened by passengers).

(5) It is important to vent the fuselage of toxic fumes and smoke as personnel proceed along the fuselage, thus creating a survivable atmosphere. It may not be physically possible to remove all survivors to fresh air, because of the potentially large numbers of passengers involved.

(6) Therefore, ARFF Service personnel should not be distracted from their task by passengers that require rescuing, extinguishing the fire and ventilating the fire gases will potentially save more lives. Before venting takes place, guard branches should be strategically positioned at the ventilation points.

(7) Ventilating an aircraft fuselage can be achieved in a number of ways:

- utilising prevailing wind conditions
- utilising hose lines and coned spray water jets to forcibly push fire gases towards ventilation points
- use of positive pressure ventilation fans as per ARFF Service standard operating procedures, this is not always possible due to the height of the aircraft from the ground
- internal fires – being allowed to burn through the fuselage, this will self-ventilate the aircraft.

(8) Hose management will be challenging for teams entering the aircraft due to the confined space, internal layout and post-crash debris.

(9) Subsequent breathing apparatus teams may be tasked to carry out rescue operations. These teams will need to risk assess the requirements for firefighting media, as hose management and cramped conditions will play a major part of the efficiency of this task.

(10) On wide bodied aircraft it will be necessary to use at least one team in each aisle. On some aircraft firefighting/rescue operations may need to be carried out on upper and lower decks. The use of thermal imaging cameras may assist in the location of casualties (thermal imaging cameras do not replace the need for correct search procedures).

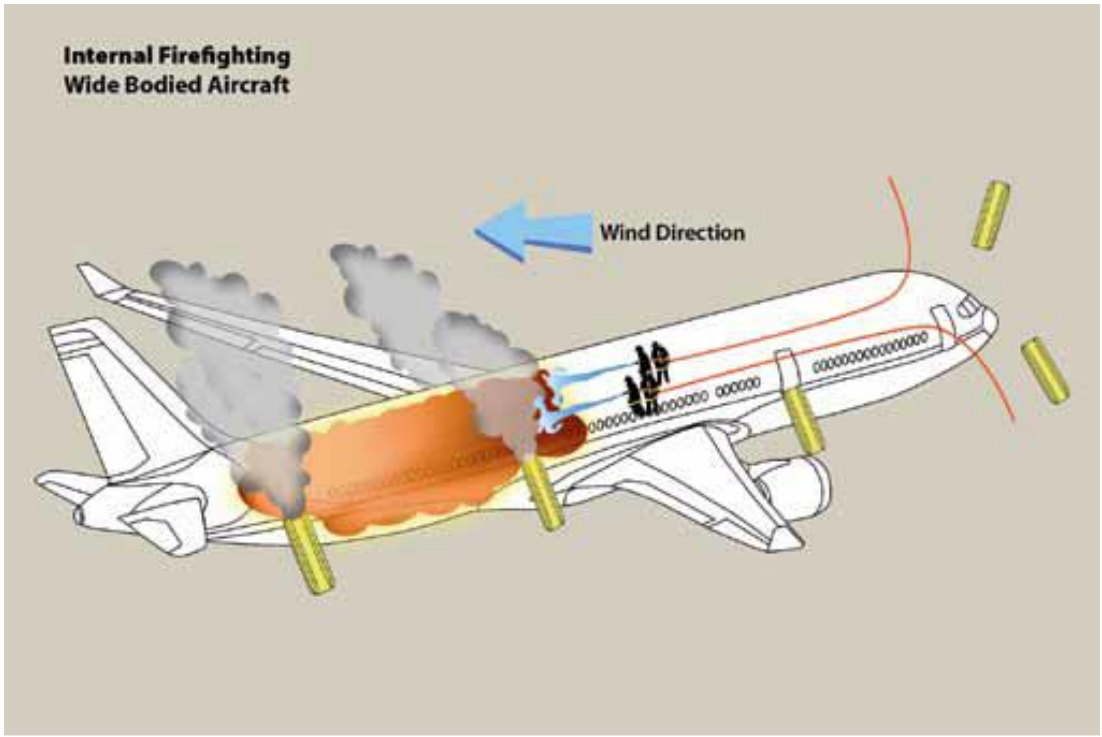
(11) The searching of the aircraft should be done in a methodical manner and in a way that subsequent teams can assist or re-enter and continue with the search.

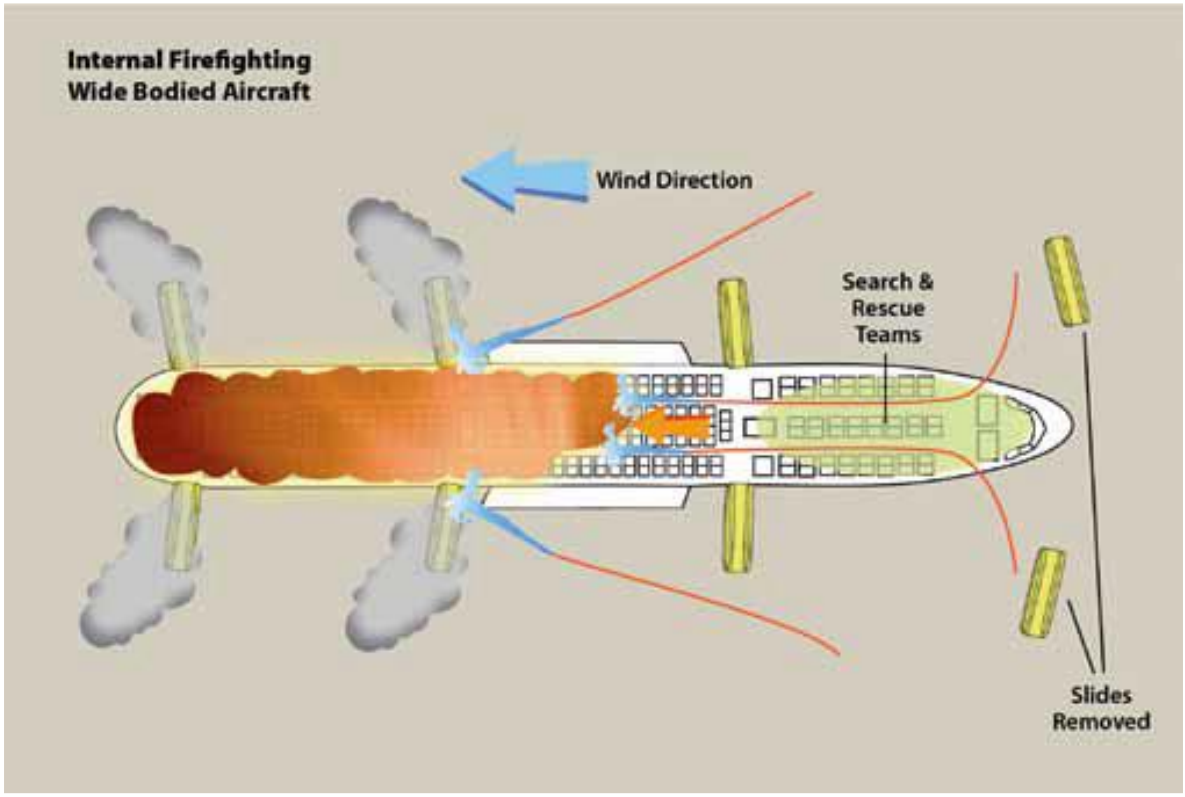
(12) The use of seat counting and simple laminated charts depicting seat layouts can be useful in identifying casualties and as a reference point for subsequent rescue teams.

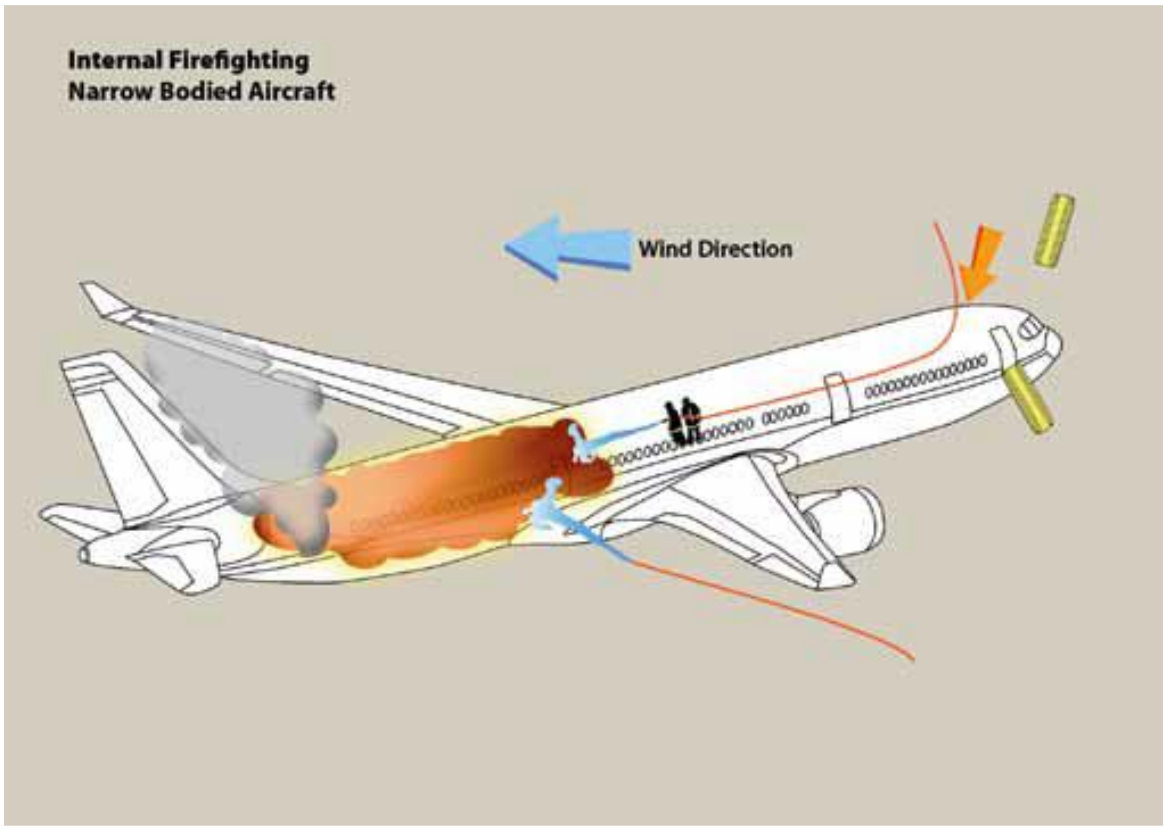
(13) The water supply to personnel working inside the aircraft must be maintained at all times. Should any team working inside lose their water supply they would be seriously at risk. Therefore, during the incident, it is vital to monitor the availability of water supplies.

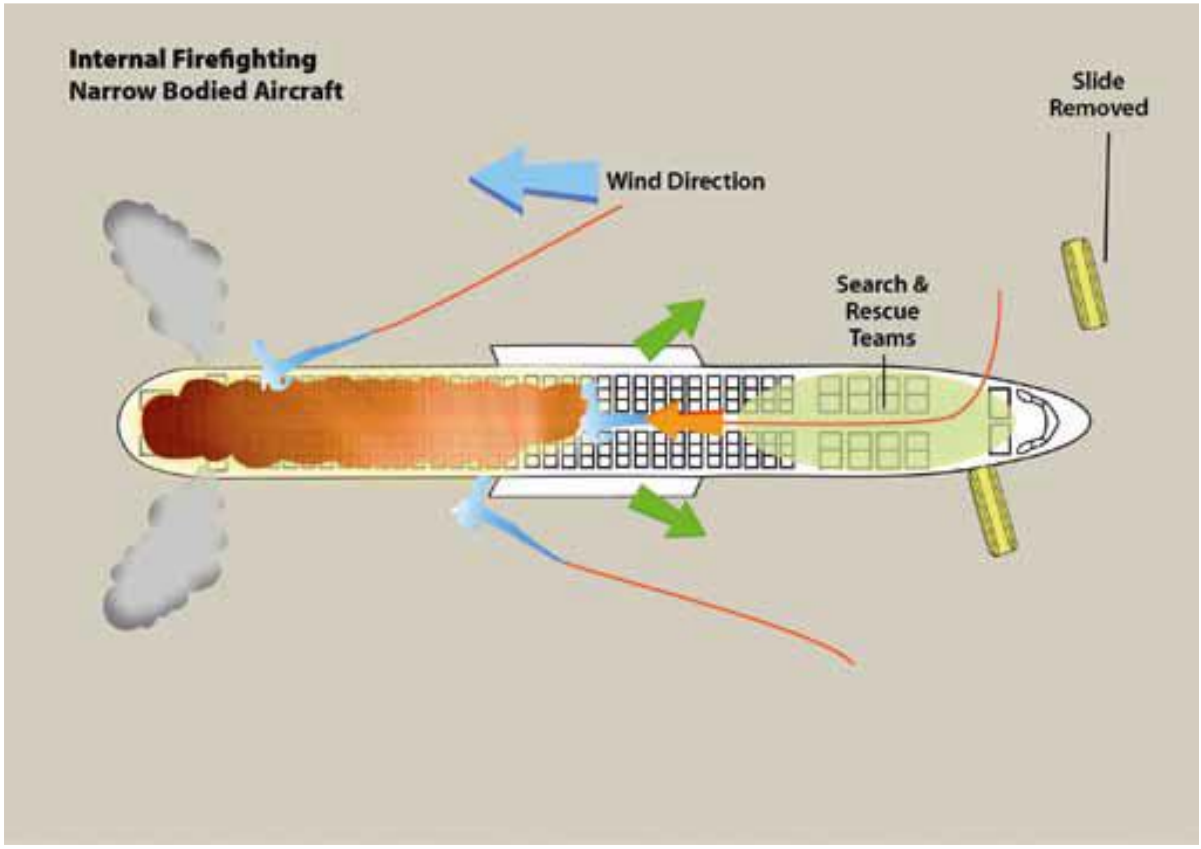
(14) As in all fire ground operations good communication between personnel is essential.

(15) Below are some examples of possible internal firefighting scenarios for narrow bodied and wide-bodied aircraft.




Internal Firefighting
Wide Bodied Aircraft
Wind Direction
Search &
Rescue
Teams
Slides
Removed


Internal Firefighting
Narrow Bodied Aircraft
Wind Direction



3. RESCUE TACTICS AND ASSOCIATED EQUIPMENT REQUIREMENTS

(a) Before attempting to specify the tactics and equipment to be used in rescue operations following an aircraft accident, it will be necessary to identify the tasks to be performed. First, the term rescue should be taken to include protection of the routes followed by occupants of the aircraft who are able to escape from the aircraft.

(b) The activities external to the aircraft may include firefighting, the blanketing of fuel wetted areas adjacent to the aircraft, the assistance in the effective use of the emergency escape equipment deployed from the aircraft and the provision of lighting where this would expedite the evacuation of the aircraft and the assembly of its occupants in a safe area. It will be obvious that entry to the aircraft at this time should not be attempted by any of the routes which are in use by escaping occupants. It will also be obvious that evacuation from the aircraft and any operations within the fuselage cannot be conducted effectively if a fire situation exists which imperils the occupants or the rescue forces.

(c) While the rescue of all occupants may be considered as the primary objective, the overall requirement is to create conditions in which survival is possible and in which rescue operations may be conducted. For this reason, it may be essential to commence firefighting operations

before attempting to rescue any one of the occupants, as failure to suppress the fire or render a fuel wetted area safe from fire may preclude the survival of everyone aboard.

4. ACCIDENTS INVOLVING DANGEROUS GOODS

(a) Dangerous goods are articles or substances which are capable of posing significant risk to health, safety or property when transported by air. For the purposes of air transport, they are divided into nine classes (in the ICAO Technical Instructions (Doc 9284) reflecting the type of hazard they present to transport workers and emergency response personnel.

(b) The nine classes of dangerous goods are:

(1) Class 1 Explosives

(2) Class 2 Gases: compressed, liquefied, dissolved under pressure or deeply refrigerated

(3) Class 3 Flammable liquid

(4) Class 4 Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases

(5) Class 5 Oxidizing substances; organic peroxides

(6) Class 6 Toxic and infectious substances

(7) Class 7 Radioactive materials

(8) Class 8 Corrosive

(9) Class 9 Miscellaneous dangerous articles or substances which, during air transport, present a danger not covered by other classes. Examples: magnetized material; acetaldehyde ammonia; expandable polystyrene beads and lithium batteries.

Note. — The order in which these classes are listed does not imply a relative degree of hazard.

(c) In some classes, dangerous goods are further divided into divisions. The division is expressed by placing a decimal point after the class number and reflecting the number of the division, i.e. Division 6.1. In these cases, reference is made only to the division and not to the class, e.g. Division 5.2, not Class 5, Division 2.

(d) As a condition for transporting dangerous goods by air, the ICAO Technical Instructions prescribe certain actions that should be taken to advise transport workers and emergency response personnel of the hazards presented by the dangerous goods transported. These hazards are communicated principally through markings and labels applied to the package of dangerous goods and through the provision of certain information in transport documents that accompany a shipment.

(e) Package markings and labels.

(f) Transport documentation.

(g) Information by pilot-in-command in case of in-flight emergency

(h) Many types of dangerous goods (e.g. flammable liquids) would be consumed in large aircraft fires and consideration of the possible types and amount of cargo aboard an aircraft suggests a potential for an even greater hazard. RFF personnel should use proper procedures and operations in response, (i.e. scene size-up/assess the situation), to ensure they are protected from the effects of dangerous goods. As with any fire, however, personal protective clothing, including breathing apparatus (as a minimum), should always be worn. As far as possible, RFF personnel should stay position upwind and out of smoke, fumes and dust.

(i) On cargo-carrying aircraft, hazardous freight is usually placed in unit load devices, which are aircraft containers, aircraft pallets, and which may be secured with a net. These containers are then loaded aboard the aircraft. Some air carriers use specially modified unit load devices for transporting certain dangerous goods on the main deck of freighter aircraft. These containers may have special colours and include an integral fire suppression capability. Unit load devices containing dangerous goods will have a small tag wired to the outside or placed in a plastic window, indicating which of the nine hazard classes, previously listed, are shipped inside. The tag will usually have a “red striped” border. Special discharge nozzles located inside the container are coupled to a portable extinguisher by a connection on the exterior of the unit. Flight personnel can manually discharge extinguishing agent into the container without having to open it. Certain dangerous goods should be accessible to the crew in flight in case of a leak or fire. As a general rule, most dangerous goods on the main deck of cargo aircraft are loaded in the most forward location.

5. ACTS OF UNLAWFUL INTERFERENCE

(a) An aircraft which is subjected to a threat of sabotage or unlawful seizure should be parked at an isolated aircraft parking position located on an area at least 100 m away from other aircraft parking positions, buildings or public areas until the act of unlawful interference is terminated. In such cases, it may be necessary to evacuate passengers without the use of loading ramps provided at the passenger terminal. Motorized loading ramps may be available which could be driven to the site, or emergency evacuation stairs or the aircraft’s slides could be used. Detailed information on procedures for dealing with unlawful interference is given in the ICAO Air Traffic Management Security Manual (Doc 9985 — Restricted).

(b) Chemical, biological and radioactive (CBR) threats. Although all dangerous goods are required to be clearly labelled and packed, there could be scenarios where substances are unknown and that they may be unlawfully released in an aircraft or within the aerodrome premises. CBR

threats, considered as security-related incidents, should be handled by specialised emergency response agency and may be out of the capability of RFF services. Where RFF service is also assigned to handle CBR threats, RFF personnel should be trained and equipped with the basic equipment to detect the nature of such substances. These include any chemical, biological or radioactive personal protective equipment and detectors.

6. POST-ACCIDENT PROCEDURES

(a) Rescue units should familiarize themselves with all regulations, national and local, regarding movements of wreckage and disposal of human remains and the preservation of evidence. It is also important to understand the techniques and procedures used in aircraft accident investigation. After fire suppression and survivor rescue have been completed, the following procedures should be observed.

(b) Removal of bodies of fatality injured occupants remaining in the wreckage after the fire has been extinguished or controlled should be accomplished only by or under the direction of responsible medical authorities. Premature body removal has, in many cases, interfered with identification and destroyed pathological evidence required by the medical examiner, coroner or air accident investigation authority.

(c) If extrication of casualties from aircraft wreckage is necessary, the position and seat number in which the survivors were located in the aircraft should be recorded at the earliest opportunity. Where casualties are located at positions away from the wreckage, the positions should be marked by a stake with a label identifying the victim and the seat. In all cases, the casualties should have an identifying label attached to them stating where they were found and in which seat. Similarly, personal belongings should remain attached. Apart from gaining information which may assist in the accident investigation, the careful recording of all these data may assist in the identification of casualties.

(d) If circumstances permit, the area should be photographed for future reference prior to any body removal activity. Photographs are advantageous tools to aid investigators and should be given as soon as practicable to the appropriate agency having responsibility for the accident investigation. To this end, it may be desirable to appoint an RFF photographer so that the scene can be photographed for future accident investigation purposes.

(e) The wreckage of an aircraft involved in an accident, including controls, shall not be disturbed (moved) until released for removal by the investigational authority having jurisdiction. If the aircraft, parts, or controls should be moved because they directly present a hazard to human life, efforts should be made to record their original condition, positions, and locations, and due

care should be afforded to preserve all physical evidence. If circumstances permit, photographs should be taken showing the location and position of all major components marked on the ground. Details on removal of disabled aircraft can be found in the ICAO Airport Services Manual (Doc 9137), Part 5 — Removal of Disabled Aircraft.

(f) On completion of the initial rescue operation, it is important that the RFF personnel exercise as much care as possible to ensure their movements do not destroy evidence which may be of value in the investigation. For example, movement of ambulance and RFF vehicles should not be made along the wreckage trail if alternative access is possible.

(g) The location of mail sacks and pouches should be observed and this information given to postal authorities. If necessary, the mail should be protected from further damage.

(h) Aviation fuels and hydraulic fluids may cause dermatitis by contact with the skin. RFF personnel who have had these fluids spilled on them should be washed thoroughly with soap and water as soon as possible. Wet clothing and uniforms should be changed and decontaminated promptly.

GM5 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting

OPERATIONAL ARFFS COMMUNICATIONS

1. INTRODUCTION

(a) This guidance document outlines the recommended radio communication phraseology for Aircraft Rescue and Firefighting (ARFFS) operations during various aircraft emergencies. The guidance is developed based on ICAO requirements and international best practices. Effective and clear communication is critical for ensuring the safety of both the emergency response teams and the affected passengers and crew during an aircraft emergency. The phraseology provided will assist ARFFS personnel in managing incidents with precision, coordination, and clarity.

(b) In ARFFS operations, the Airport Bronze Commander / Incident Commander (ABC / AIC) holds responsibility for overall command and control of the incident. Callsigns should be assigned clearly to ensure all ARFFS personnel are aware of the command structure.

(c) These callsigns should remain consistent throughout the incident to avoid confusion and to facilitate proper coordination between teams.

(d) The examples provided in this guidance is non-exhaustive and ARFFS commanders need to adapt where required.

2. STANDARD CALLSIGNS FOR ARFFS

(a) In aircraft emergency situations, the use of standardised callsigns is crucial for ensuring clear and efficient communication among all units involved in the response. These callsigns allow for precise identification of the role and location of each ARFFS (Aerodrome Rescue and Firefighting Services) team member, vehicle, or command structure. This document outlines the standard callsigns used by ARFF personnel during emergency operations, based on ICAO recommendations and best practices in the aviation emergency response domain.

(1) **Hierarchy of Command:** The "Command" or "Bronze Command" callsigns refer to the highest levels of control, usually the Incident Commander or the Mobile Command Unit. All sectors and units report directly to these command posts.

(2) **Sector Callsigns:** The incident may be divided into sectors (Alpha, Bravo, etc.), and sector leaders take on the responsibility for coordinating all actions within their assigned area of the incident. All units operating in a sector must report to the Sector Commander.

(3) **Vehicle-Specific Callsigns:** Vehicles such as fire appliances, foam tenders, and water tenders are identified by their vehicle type followed by a number (Fire One, Foam Tender Two, etc.) to distinguish them.

(4) **Specialised Teams:** Specialised teams, such as Breathing Apparatus (BA) teams, Rapid Intervention Teams (RIT), and Hazardous Materials (Hazmat) teams, are also assigned callsigns that correspond to their role in the emergency response.

(5) **Medical and Evacuation Teams:** Medical and evacuation teams are given specific callsigns to differentiate them from firefighting units, ensuring that medical support is prioritised and evacuation efforts are well-coordinated.

(b) The use of standardised callsigns is critical for maintaining clarity and coordination during an aircraft emergency. Each callsign clearly identifies the role, vehicle, or team function, allowing the Incident Commander to efficiently manage resources and personnel. Ensuring familiarity with these callsigns through regular training and exercises is essential for smooth and effective ARFF operations during real-world emergencies. (See Table 11: Examples of Standard Callsigns for ARFF Personnel During Aircraft Emergencies)

Table 11: Examples of Standard Callsigns for ARFF Personnel During Aircraft Emergencies

Callsign	Role / Function	Description / Usage
Fire Command or Command	Incident Commander (IC)	Refers to the ARFFS Commander regardless of rank responsible for managing the entire emergency

		operation. All major decisions and directions are issued from this callsign.
Bronze Command	Mobile Command Post (Operational Command)	Designated for the Operational Commander assuming command at the mobile command post regardless of rank, that handles on-the-ground operations, communicating with the IC, Silver / Gold Commands and coordinating with sector leaders.
Bronze Command Support Functions	Bronze Operations (Operations Officer)	Assists the Bronze Commander by overseeing the deployment and coordination of ARFF resources within the incident sectors, ensuring that firefighting and rescue operations are conducted efficiently.
	Bronze Logistics (Logistic Officer)	Responsible for coordinating logistical support, including resource allocation, equipment, and supplies required for the ongoing response. All requests for logistical support are routed through this callsign.
	Bronze Safety (Safety Officer)	Oversees the health and safety of personnel, monitors compliance with safety protocols, and identifies potential hazards. Communicates safety alerts and ensures PPE usage.
	Bronze Medical (Medical Officer)	Coordinates medical response, triage, and treatment of injured personnel or passengers. This callsign is used for directing medical teams and providing updates on casualty management.

	Bronze Communications (Communications Officer)	Manages communication systems and ensures effective radio and data transmission between all responding units. This officer resolves any communication issues that may arise during the incident.
	Bronze Liaison (Liaison Officer)	Serves as the link between Bronze Command and external agencies, including airport authorities, police, and medical services, ensuring smooth multi-agency coordination.
	Bronze Staging (Staging Officer)	Manages the staging area where incoming resources, vehicles, and personnel are positioned before deployment to the incident. Coordinates with the RVP Officer and updates Bronze Command on resource availability.
	Bronze Transport (Ground Transport Officer)	Responsible for overseeing and managing the transportation and movement of personnel, equipment, and resources during an aircraft emergency.
Safety One, Safety Two, etc	Airport Safety Officer/s	Identify the officer responsible for safety management during an emergency
Fire One, Two, etc.	Primary ARFFs Appliances	Assigned to specific ARFF vehicles responding to the emergency. The numbering (Fire One, Rescue Two, etc.) helps differentiate between multiple fire appliances.
Rescue One, Rescue Two, etc.	Secondary ARFFS Appliances – rescue stair, aerial ladder,	Assigned to specific ARFF vehicles responding to the emergency. The

	supply vehicle, supporting vehicles, etc	numbering (Rescue One, Rescue Two, etc.) helps differentiate between multiple fire appliances.
Firefighter One, Firefighter Two, etc.	Individual ARFF Personnel	Assigned to individual firefighters responding to the incident. Numbers are used to differentiate between responders when direct communication is necessary.
Sector Alpha, Bravo, etc.	Sector Commanders (Sector Leaders)	Refers to the sector commanders responsible for managing specific sections of the incident, such as different parts of the aircraft (e.g., forward section, rear section).
BACO One, Two, etc	Breathing Apparatus Entry Control Officer (BAECO)	The officer responsible for managing teams using breathing apparatus during internal operations. BA Entry Control monitors personnel and air supply within hazardous areas.
BA Team [Number]	Breathing Apparatus (BA) Teams	Identifies specific teams using breathing apparatus for search, rescue, or fire suppression inside hazardous environments. Team numbers are used to distinguish between multiple BA teams.
BA Rescue One, BA Rescue Two, etc.	Emergency BA Rescue Teams / Rapid Intervention Teams	Callsigns for BA emergency / rapid intervention teams designated for immediate action in case of ARFF personnel distress or deteriorating conditions.
Medical One, Medical Two, etc. or Medic One, Medic Two, etc	Airport Medical Teams or Personnel	Callsigns assigned to medical response units providing emergency medical services to injured personnel or passengers.

Hazmat One, Hazmat Two, etc.	Airport Hazardous Materials Response Teams	Designates units responsible for managing hazardous materials (e.g., fuel, chemical leaks) during the incident.
RVP One, RVP Two, etc	Airport officer managing Rendezvous Point (RVP)	Callsign identifies the officer responsible for overseeing operations at the rendezvous point.

3. INCIDENT SECTORISATION

(a) For effective management of large-scale aircraft incidents, the incident site should be divided into sectors. This approach is especially important for wide-body and multi-deck aircraft emergencies. Typical sector names may include:

(1) Forward Sector: Front of the aircraft

(2) Rear Sector: Rear of the aircraft

(3) Left Sector (Port side): Left side of the aircraft

(4) Right Sector (Starboard side): Right side of the aircraft

(5) Main deck: Single deck or lower deck (for multi-deck aircraft)

(6) Upper deck: for multi-deck aircraft

(7) Aisle: middle, left or right

(8) Under-wing Sector: Area beneath the aircraft wings

(9) Cargo compartment: Forward, mid or aft section

(10) Engines: Use number starting from port side of aircraft i.e. 1, 2. 3, 3 or tail mounted

(11) APU: auxiliary power unit

(12) Avionics: Avionic, battery compartment, etc

(b) Communications should consistently use these sector names when referring to specific areas of the aircraft. For example, "Sector Alpha to Command, conducting internal search operations on the upper deck."

(c) Table 12 provides examples of a structured approach to radio communication for the sectorisation of an aircraft emergency. Incident sectorisation is crucial for the effective management of ARFFS operations, and clear, precise communication ensures that all teams remain coordinated and informed. By following these standardised communication protocols, ARFFS personnel can safely and efficiently manage the various tasks associated with an emergency response. Regular drills and training on sectorisation communication are essential for maintaining proficiency and preparedness.

Table 12: Example of Standard ARFFS Radio Communication Phraseology for Incident Sectorisation of an Aircraft Emergency

Command / Situation	**Phraseology**	**Meaning**
Establishing Incident Sectors	"Command to all units, sectorisation initiated. Establish Sector Alpha at [location] and Sector Bravo at [location]."	The Incident Commander initiates the sectorisation of the incident, assigning specific locations or areas of the aircraft to designated sectors.
Sector Leader Appointment	"Command to [Unit/Leader Name], assume command of Sector [Alpha/Bravo/Charlie]."	The IC assigns a specific unit leader or senior officer to take command of the designated sector.
Acknowledging Sector Command	"Sector Alpha to Command, established and assuming command of [location/area]."	The sector leader acknowledges their assigned sector and confirms that they have taken command of the specified area.
Confirming Sector Boundaries	"Command to Sector Alpha, boundaries confirmed as [specific area/coordinates], covering [front/rear/left/right] of the aircraft."	The IC confirms the exact boundaries of the sector to the sector leader to ensure clarity on the area of responsibility.
Sector Update Request	"Command to all sectors, provide status update on operations within your sector."	The IC requests a status update from all sector leaders regarding ongoing operations, such as firefighting, rescue, or hazard control.
Sector Status Update	"Sector Bravo to Command, fire suppression in progress on left wing, no further spread at this time."	Sector Bravo provides an update on the current status of operations within their sector, detailing specific activities and any changes in the situation.

Sector Progress Report	"Sector Charlie to Command, evacuation complete in rear cabin section, proceeding with search operations."	Sector Charlie reports the completion of a task (e.g., evacuation) and informs Command of the next steps in the sector's operations.
Resource Allocation to Sectors	"Command to Sector Alpha, additional resources en route to support fire suppression efforts."	The IC informs Sector Alpha that additional resources, such as firefighting units or personnel, are being allocated to assist with ongoing operations.
Sector Resource Request	"Sector Bravo to Command, requesting additional personnel and equipment to reinforce fire suppression at the rear of the aircraft."	Sector Bravo requests additional resources from Command to manage a specific hazard or task within their sector.
Communication Between Sectors	"Sector Alpha to Sector Bravo, coordinating operations to prevent fire spread between sectors. Maintain communication for updates."	Sector Alpha informs Sector Bravo of coordinated operations to prevent hazards from spreading between sectors and establishes ongoing communication for updates.
Sector Handover of Command	"Sector Bravo to Command, handing over command of sector to [new leader name/unit], standing by for confirmation."	The sector leader informs Command that the sector command is being transferred to a new leader and awaits confirmation from Command.
Sector Confirmation of Safe Conditions	"Sector Alpha to Command, fire under control, hazard contained. All personnel accounted for in my sector."	Sector Alpha confirms that the fire or other hazards are under control and that all personnel in the sector are accounted for and safe.

Sector Termination Request	"Sector Charlie to Command, operations complete, requesting permission to terminate sector operations."	Sector Charlie requests permission from Command to stand down and terminate operations in the sector, once tasks are complete and hazards are mitigated.
Sector Termination Confirmation	"Command to Sector Alpha, permission granted to terminate operations, stand down and return to base."	The IC confirms that operations in Sector Alpha can be terminated and that personnel can stand down and return to base.
Final Sector Status Report	"Sector Bravo to Command, final report: fire fully extinguished, no injuries, all personnel clear and returning to base."	Sector Bravo provides a final status report to Command, confirming that all operations in the sector are complete and that personnel are safe and accounted for.

4. STANDARD ARFFS RADIO COMMUNICATION PHRASEOLOGY FOR EMERGENCY SCENARIOS

(a) Tables 13 to 16 serve as guidance for ARFFS on standardised radio communication phraseology during various aircraft emergency scenarios. Adhering to these communication protocols will ensure smooth coordination, safety, and efficiency in ARFFS operations. Regular training on these communication standards, as well as periodic drills, is strongly recommended to ensure proficiency and readiness among ARFFS personnel.

Table 13: Example of Standard ARFFS Phraseology during Aircraft Emergencies

Command / Situation	Phraseology	Meaning
Establishing command	"Fire 1 to Fire Control, arrive on scene, assuming Incident Command."	Informing that Fire 1 is taking over as Incident Commander.
Confirm situation	"Fire Command to Fire Control, fire on aircraft main landing gear. Conducting dynamic risk assessment.	Informing that Fire Command is conducting dynamic risk assessment after initial assessment.

Transferring command	"Fire 1 to Fire Control, transferring command to Fire 2."	Handing over command to another unit.
Confirming situation assessment	"Fire Command to all units, fire at [location], initiating suppression. Monitor for re-ignition."	Fire command provides a summary of the situation and action plan.
Requesting status updates	"Fire Command to Fire 1, confirm fire status at [location]."	Fire command requests an update on firefighting progress or situation.
Coordinating resources	"Fire Command to all units, medical team en route, Fire 3 provide support."	Command coordinates ARFFS units and resources.

Table 14: Example of Bronze / Forward Command and Sector Command communications

Command / Situation	**Phraseology**	**Meaning**
Bronze Command (Operational Command)	"Bronze Command to Forward Command, deploy team to sector [number], foam operations to start in 5 minutes."	Bronze Command gives specific operational instructions to Forward Command.
Bronze Command to Silver Command	"Bronze Command to Silver Command, fire suppression ongoing, two sectors under control."	Bronze Command provides updates on operational progress to Silver Command.
Forward Command (On-Scene Control)	"Forward Command to Sector 1, foam operations commenced, report status in 10 minutes."	Forward Command manages on-scene operations and coordinates sectors.
Forward Command to Sector Command	"Forward Command to Sector 2, monitor ventilation progress and advise on smoke levels."	Forward Command instructs Sector Command to monitor the ventilation status and report back.
Sector Command (Area Control)	"Sector Command to Forward Command, fire contained in my sector, smoke levels moderate."	Sector Command reports the status of their area of responsibility to Forward Command.

Sector Command to Bronze Command	"Sector Command to Bronze Command, fire suppression complete in sector [number], requesting overhaul."	Sector Command provides updates on fire suppression and requests authorization to begin overhaul.

Table 15: Example of Aircraft Firefighting Communications

Command / Situation	Phraseology	Meaning
Fire suppression	"Fire 1 to Fire Command, commencing foam application on port [number] engine."	Starting fire suppression on the left engine with foam.
Confirming fire status	"Fire 2 to Fire Command, fire suppression in progress, smoke levels reducing."	Fire suppression is ongoing, and smoke is dissipating.
Reporting fuel spill	"Fire 2 to Command, large fuel spill detected under the aircraft starboard side, deploying foam."	Fuel spill identified and action taken to prevent ignition.
Fire contained	"Fire 3 to Fire Command, fire contained in forward cabin. Continuing with overhaul."	Fire is under control, and the team is conducting overhaul to check for hot spots.
Requesting additional resources	"Fire 1 to Fire Command, fire escalating, request additional hose lines."	Requesting additional firefighting equipment for a growing fire.

Table 16: Example of Triage and Medical Communications

Command / Situation	Phraseology	Meaning
Setting triage	"Medical 1 to Bronze Command, triage area is ready 100 metres upwind.	Medical team informing Bronze Command that triage is set up and ready to receive casualties.
Conducting triage	"Medical 1 to Bronze Command, conducting triage, identifying	Medical team performing triage and identifying the number of injured passengers.

	casualties, requesting additional support."	
Triage tag reporting	"Medical 1 to Bronze Command. Triage complete, three red tag casualties requiring immediate transport."	Reporting the outcome of triage with the number of severely injured casualties needing urgent transport.
Administering medical aid	"Medical 1 to Bronze Command., administering oxygen to red tag casualty. Requesting immediate transport."	Medical team providing oxygen and requesting transport for a critical patient.
Reporting critical casualty status	"Medical 1 to Bronze Command., one critical red tag casualty, requesting airlift for medevac."	Reporting the condition of a critically injured casualty and requesting air evacuation.
Reporting deceased casualty status	"Medical 1 to Bronze Command., two black tag casualties received. Advise further action"	Reporting the condition of a deceased casualty and requesting further action.
Confirming transport complete	"Medical 1 to Bronze Command. All uninured passengers are transported to survivor reception centre."	Confirming that all uninjured passengers are transported to survivor reception centre.

5. BREATHING APPARATUS (BA) OPERATIONS

(a) ARFFS personnel involved in internal firefighting or rescue operations will often need to operate in confined and smoke-filled spaces, requiring the use of breathing apparatus (BA). Effective communication during these operations is critical for maintaining safety and situational awareness (see Table 17: Example of BA operations communications)

(1) Entering a Hazardous Area: "BA Team [Number] entering Sector [Name] for search and rescue."

(2) Location Updates: "BA Team [Number], located in [area], conducting search."

(3) Air Supply Status**: "BA Team [Number], air supply at [percentage]."

(4) Exiting Hazardous Area: "BA Team [Number] exiting, all clear."

(b) The BAECO should communicate regularly with BA teams and the IC to track the progress of internal operations, air supply levels, and team statuses.

Table 17: Example of breathing apparatus operations communications

Command / Situations	Phraseology	Meaning
BA Command (Breathing Apparatus Control)	"BA Command to BA Team 1, confirm pre-entry checks completed, report air supply status."	BA Command is confirming readiness before entry and ensuring sufficient air supply.
BA Command to Bronze Command	"BA Command to Bronze Command, BA teams entering sector 1 for search and rescue."	BA Command informs Bronze Command of BA team deployment to a specific sector.
BA Command to BA Team 1	"BA Command to BA Team 1, low air reported, exit immediately and standby for relief."	BA Command instructs the BA team to exit the area due to low air supply.
BA Command to Forward Command	"BA Command to Forward Command, BA operations successful, all teams accounted for, air supply sufficient."	BA Command reports that all teams are accounted for, and air supply is stable for further operations.

6. AIRCRAFT INTERNAL SEARCH AND RESCUE OPERATIONS

(a) Internal search and rescue operations are vital for locating and evacuating trapped passengers and crew. Communications during these operations should be precise to avoid confusion. (See Table 18: Example of Aircraft Internal Search and Rescue Communications)

(1) Narrow-Body Aircraft: "BA Team [Number] entering forward section, initiating cabin search."

(2) Wide-Body Aircraft: "BA Team [Number] entering lower deck, commencing search in business class section."

(3) Multi-Deck Aircraft: "BA Team [Number] proceeding to upper deck, searching for trapped occupants."

(b) Clear communication regarding the specific area of the aircraft being searched is necessary to ensure comprehensive coverage and coordination between teams.

Table 18: Example of Aircraft Internal Search and Rescue Communications

Command / Situation	Phraseology	Meaning

Single Deck Aircraft	"Bronze Command. Fire 1 entering single deck aircraft from door [number], advancing toward cockpit."	ARFFS team entering the single deck aircraft and moving towards the front.
Multi-Deck Aircraft	"Bronze Command. Fire 1 entering lower deck, moving to upper deck via stairway."	ARFFS team progressing to the upper deck of a multi-deck aircraft.
Single Aisle Aircraft	"Bronze Command. Fire 2 conducting search along aisle towards aft of aircraft, smoke moderate, no casualties found."	Search and rescue operation in the single aisle cabin.
Wide-Body (Two Aisle) Aircraft	"Bronze Command. Fire 3 advancing down starboard aisle towards aft of aircraft, assessing fire between aisles in mid-cabin."	ARFFS team advancing down the starboard aisle and checking the centre section.
Passenger evacuation	"Bronze Command. Fire 1 assisting with evacuation from the port side, door [number], forward exits clear."	Helping with passenger evacuation from specified exits.
Starting ventilation	"Bronze Command. Fire 1 commencing ventilation operations on the port side of the aircraft, door [number]."	Initiating ventilation operations on a specified side of the aircraft.
Ventilation setup	"Bronze Command. Fire 2. Ventilation fans in position at door [number], initiating air movement."	Ventilation fans are set up and operational.
Monitoring smoke levels	"Bronze Command. Fire 2. Smoke levels reducing, ventilation effective."	Ventilation is working, and the amount of smoke is decreasing.
Completing ventilation	"Bronze Command. Fire 1. Ventilation complete, smoke cleared, monitoring air quality for re-entry."	Ventilation operations are finished, and air quality is being monitored.
Requesting additional equipment	"Bronze Command. Fire 1. Ventilation progress slow, requesting additional fans for rear cabin."	The ventilation team is requesting more equipment to improve the effectiveness of smoke removal.

7. PILOT COMMUNICATION USING DISCRETE EMERGENCY FREQUENCY 121.6 MHZ

(a) During an emergency, it may be necessary for the ARFFS IC to communicate directly with the flight crew using the discrete emergency frequency 121.6 MHz. The IC should request clearance from Air Traffic Control (ATC) before using this frequency to avoid interference. (See Table 19: Example of ARFFS Communication with Aircraft Pilot Using Discrete Emergency Frequency 121.6 MHz)

(1) Request for Clearance: "Command to Tower, requesting clearance to communicate on emergency frequency 121.6 MHz."

(2) Establishing Contact: "Command to [Flight Number], this is ARFFS Command. Please confirm current status."

(3) Instructions to Flight Crew: "ARFFS Command to [Flight Number], we are initiating an emergency evacuation; confirm passenger status and cockpit conditions."

(b) Coordination between ARFFS command and the flight crew is critical for understanding the internal situation and guiding the response.

Table 19: Example of ARFFS Communication with Aircraft Pilot Using Discrete Emergency Frequency 121.6 MHz

Command / Situation	Phraseology	Meaning
Establishing contact	"Aircraft [Call Sign], this is [Airport Name] Incident Commander on Emergency Frequency 121.6 MHz, how do you read?"	ARFFS commander establishes communication with the aircraft on emergency frequency.
Requesting emergency information	"Aircraft [Call Sign], Airport Incident Commander, confirm nature of emergency, number of passengers and crew onboard and fuel load."	Requesting details on the emergency situation and fuel levels.
Confirming evacuation status	"Aircraft [Call Sign], Airport Incident Commander, confirm if evacuation is required."	Asking whether passenger evacuation is necessary.
Confirming evacuation route	"Aircraft [Call Sign], Airport Incident Commander, major engine fire on our starboard side. Clear to evacuate on port side."	Advising Pilot that passenger evacuation is safe on port side of the airside.

Reporting fire visibility	"Aircraft [Call Sign], Airport Incident Commander, fire visible on right engine, suppression in progress."	Reporting the visibility of fire and actions taken by ARFFS.
Updating on fire status	"Aircraft [Call Sign], Airport Incident Commander, fire extinguished, monitoring for re-ignition."	Informing the pilot that the fire has been extinguished and ARFFS is monitoring the situation.
Situation safe or normal	"Aircraft [Call Sign], Airport Incident Commander, All Clear. Situation is safe."	Informing the pilot all clear message and situation is safe for normal operations.

8. EVACUATION COMMUNICATION

(a) In the event of an evacuation, ARFFS personnel must provide clear instructions to passengers and ensure safe evacuation routes are established. Communication should be concise and authoritative to manage the evacuation effectively.

(1) Initiating Evacuation: "Command to all sectors, initiating passenger evacuation. Direct passengers to assembly points via safe exits."

(2) Sector-Specific Instructions: "Sector Bravo, passengers evacuating via right-side exits, confirm status."

(3) Evacuation Progress Updates: "Sector Alpha, all passengers clear from forward section."

(b) Continuous updates on evacuation progress should be provided to the IC to track the situation.

(c) Table 20 provides example of standard ARFFS phraseology during aircraft evacuation procedures. By following these communication protocols, ARFFS teams can ensure the safe and efficient evacuation of passengers in an organised manner. These standardised phrases are essential for maintaining situational awareness and ensuring that the incident command team receives real-time updates from all sectors, allowing them to make informed decisions during an emergency evacuation.

Table 20: Example of Standard ARFFS Radio Communication Phraseology for Evacuation Communication

Command / Situation	Phraseology	Meaning
Initiating Evacuation	"Command to all sectors, initiate evacuation. Direct passengers to	Instructs all sectors to commence passenger evacuation procedures,

	designated exits and assembly points."	ensuring passengers are directed to safe exit routes and assembly points.
Sector-Specific Evacuation Instruction	"Sector Bravo to Command, commencing evacuation through right-side exits."	The sector leader confirms to the Incident Commander that they are initiating the evacuation process through the specified exits, in this case, the right side of the aircraft.
Sector Status Update During Evacuation	"Sector Alpha to Command, evacuation in progress, passengers exiting via left-side doors."	Sector Alpha provides a status update to Command, indicating that the evacuation is proceeding through the left-side doors.
Progress Report	"Sector Charlie to Command, approximately [number] passengers evacuated, no injuries reported."	A sector leader reports the number of passengers evacuated and provides any pertinent details, such as injuries or additional concerns.
Evacuation Delays or Obstructions	"Sector Alpha to Command, obstruction at rear left exit, requiring additional assistance."	Used to report any delays or obstructions that may hinder the evacuation process, and request additional resources or assistance as needed.
Emergency Exit Clearance	"Command to all sectors, confirm when passengers are clear of exits."	The Incident Commander requests confirmation from each sector to ensure all passengers have safely exited through the designated exits.
Emergency Exit Clearance	"Command to all sectors, confirm when passengers are clear of exits."	The Incident Commander requests confirmation from each sector to ensure all

		passengers have safely exited through the designated exits.
Completion of Evacuation in Specific Sectors	"Sector Bravo to Command, evacuation complete, all passengers clear from the right-side exits."	Sector Bravo confirms that the evacuation has been completed and all passengers have safely exited through the right-side doors.
Final Evacuation Status	"Command to all sectors, confirm total number of passengers evacuated and report any injuries."	The Incident Commander requests final confirmation of the total number of passengers evacuated and any medical or safety-related concerns that need attention.
Emergency Evacuation Assistance	"Sector Alpha to Command, need medical assistance for injured passenger at left-side exit."	Sector Alpha reports that medical assistance is required for a passenger who was injured during the evacuation process.
Clearance Confirmation	"Sector Charlie to Command, all passengers clear, sector standing by for further instructions."	Sector Charlie confirms that all passengers have safely exited, and the sector is awaiting further instructions from the Incident Commander.
Evacuation Completion Confirmation	"Command to all sectors, evacuation complete, confirm all personnel and passengers are clear."	The Incident Commander confirms with all sectors that the evacuation is complete, and all personnel and passengers are safely clear of the hazard zone.

9. EMERGENCY WITHDRAWAL

(a) In situations where an emergency withdrawal of ARFFS personnel is required (e.g., imminent danger of explosion), clear communication is crucial to ensure the safety of all responders.

(1) Initiating Withdrawal: "Command to all units, emergency withdrawal. Repeat, emergency withdrawal. Clear the area immediately."

(2) Sector Confirmation: "Sector Alpha to Command, all personnel clear from forward section."

(3) Final Withdrawal Confirmation: "Command to all sectors, confirm all personnel clear."

(b) The IC should only give the "all clear" signal once confirmation is received that all personnel have withdrawn to a safe location.

(c) Table 21 provides examples of standardised radio communication phraseology for the emergency withdrawal of ARFFS personnel. Adhering to these protocols ensures the safe and orderly evacuation of responders from hazardous environments, while also maintaining clear lines of communication with the Incident Commander. Accountability, coordination, and real-time updates are critical during such operations to ensure the safety of all ARFFS personnel and prevent unnecessary risks. Regular training and drills are recommended to ensure ARFFS teams are proficient in emergency withdrawal communication procedures.

Table 21: Example of Standard ARFFS Radio Communication Phraseology for Emergency Withdrawal of ARFFS Personnel

Command / Situation	Phraseology	Meaning
Initiating Emergency Withdrawal	"Command to all units, emergency withdrawal initiated. Withdraw immediately from [sector/area]."	The Incident Commander orders the immediate withdrawal of all ARFFS personnel from a specific area or sector due to an escalating hazard (e.g., risk of explosion).
Sector-Specific Withdrawal Order	"Command to Sector Alpha, emergency withdrawal. Withdraw all personnel immediately."	The Incident Commander directs Sector Alpha to begin withdrawing personnel from their area of operations.
Acknowledging Emergency Withdrawal Order	"Sector Alpha to Command, withdrawing personnel now, confirmation pending."	Sector Alpha acknowledges the order and indicates that withdrawal is in progress, with confirmation to follow once all personnel have evacuated.

Sector Withdrawal Progress Report	"Sector Bravo to Command, withdrawal in progress, [number] personnel remaining."	Sector Bravo provides an update on the progress of the withdrawal, indicating how many personnel remain in the sector.
Confirming Full Withdrawal from Sector	"Sector Alpha to Command, all personnel clear from [sector/area]."	Sector Alpha confirms that all personnel have safely withdrawn from their assigned area or sector.
Requesting Withdrawal Status from Sectors	"Command to all sectors, confirm when personnel are clear."	The Incident Commander requests status updates from all sector leaders, ensuring full accountability for all personnel.
Reporting Delays or Issues in Withdrawal	"Sector Charlie to Command, obstruction at rear access point, personnel delayed, request assistance."	Sector Charlie reports an obstruction or delay that is preventing personnel from withdrawing and requests additional support if necessary.
Emergency Support Request During Withdrawal	"Sector Bravo to Command, fire condition worsening, immediate support needed for safe withdrawal from [area]."	Sector Bravo reports deteriorating conditions requiring urgent additional support to facilitate the withdrawal of personnel.
Command Withdrawal Status Update	"Command to all sectors, confirm personnel clearance from hazard zone."	The Incident Commander reiterates the importance of confirming that all personnel have cleared the hazardous zone during the emergency withdrawal.
Sector Final Clearance Confirmation	"Sector Charlie to Command, all personnel clear, no injuries reported."	Sector Charlie confirms that the withdrawal is complete and that no personnel remain in the

		area, along with a status report on personnel safety.
All-Clear Signal for Entire Incident	"Command to all units, emergency withdrawal complete, all sectors clear."	The Incident Commander gives the all-clear signal to confirm that the emergency withdrawal has been successfully completed for all units and sectors.

10. ESCALATION AND DE-ESCALATION OF EMERGENCIES

(a) Managing the escalation or de-escalation of an emergency is a dynamic process, and communication must reflect the changing circumstances of the incident.

(1) Escalation: "Command to all units, emergency status elevated to major. Request additional resources and standby teams."

(2) De-escalation: "Command to all units, de-escalating to recovery operations. Stand down non-essential teams."

(b) Changes in emergency status should be communicated immediately to ensure all responding units adjust their actions accordingly.

(c) Table 22 provides examples of standardised radio communication phraseology for managing the escalation, de-escalation, and termination of an emergency during ARFFS operations. These structured communication protocols are vital for maintaining situational awareness, ensuring proper resource management, and confirming personnel safety throughout the different phases of emergency response. Regular training on these communication practices is essential for maintaining proficiency and readiness among ARFFS personnel.

Table 22: Example of Standard ARFFS Radio Communication Phraseology for Escalation, De-escalation, and Termination of an Emergency

Command / Situation	Phraseology	Meaning
Escalation of Emergency	"Command to all units, escalating emergency to [major/full-scale]. Request additional resources and support teams."	The Incident Commander announces the escalation of the emergency, specifying the level (e.g., major emergency) and requesting additional

		resources, support teams, or equipment.
Sector-Specific Request During Escalation	"Sector Bravo to Command, fire intensifying, request additional fire suppression units."	Sector Bravo reports worsening conditions and requests additional resources, such as more fire suppression units, to manage the escalated situation.
Announcement of Emergency Status Change	"Command to all units, emergency status elevated to [level], implement escalation procedures. Additional resources en route."	The Incident Commander confirms the elevation of the emergency status and informs all units to implement escalation procedures, including the arrival of additional resources.
Resource Allocation Confirmation	"Command to Sector Alpha, additional resources allocated to your sector. Confirm receipt."	The Incident Commander informs a sector leader of newly assigned resources, requesting confirmation of their availability and readiness for deployment.
De-escalation of Emergency	"Command to all units, de-escalating emergency status to [recovery/containment phase]. Stand down non-essential units."	The Incident Commander announces the de-escalation of the emergency, instructing non-essential units to stand down and begin transitioning to the recovery or containment phase.
Sector Status Update During De-escalation	"Sector Charlie to Command, fire under control, de-escalating to recovery operations in [specific area]."	Sector Charlie reports that the fire or hazard is under control and that operations in the sector are moving into the recovery phase.

Resource Reallocation During De-escalation	"Command to Sector Bravo, reallocate resources to [Sector Alpha], confirm status of de-escalation in your area."	The Incident Commander reallocates resources from a de-escalated sector to one still requiring attention and requests confirmation that Sector Bravo is de-escalating.
Termination of Emergency	"Command to all units, emergency terminated. Stand down and return to station."	The Incident Commander formally terminates the emergency response, instructing all units to stand down and return to their base or station.
Sector Confirmation of Termination	"Sector Alpha to Command, all operations complete, standing down and returning to station."	Sector Alpha confirms that all emergency operations in their area are complete and that personnel are returning to the station.
Final Status Update Before Termination	"Command to all units, confirm status and personnel clearance before final termination of emergency."	The Incident Commander requests confirmation from all units on their current status and the clearance of personnel before officially declaring the end of the emergency response.

11. CONCLUSION

(a) This guidance document has provided a standardised approach to ARFFS incident command radio communication phraseology during aircraft emergencies. Adhering to these communication protocols based on ICAO standards will enhance the coordination, safety, and efficiency of ARFFS operations during critical incidents. Continuous training and regular review of these communication practices are recommended to ensure all personnel are proficient and familiar with their roles during aircraft emergencies.

AMC2 ACM.OPS.CERT.E.005(a) Rescue and firefighting

RESCUE OPERATIONS IN DIFFICULT ENVIRONMENTS

(a) Suitable rescue equipment and services should be provided at the aerodrome where the area to be covered by the service includes water, swampy areas, desert or other difficult environment that cannot be fully served by conventional wheeled rescue and firefighting vehicles. This is particularly important where a significant portion of approach/departure operations takes place over these areas.

(b) Adequate rescue equipment should be carried on vessels or other vehicles such as helicopters and amphibious or air cushion vehicles, capable of operating in the area concerned. The vehicles should be so located that they can be brought into action quickly to respond to the areas covered by the service.

(c) At an aerodrome bordering the water, vessels or other vehicles are located on the aerodrome and convenient launching or docking sites should be provided. If these vehicles are located off the aerodrome, they should preferably be under the control of the aerodrome rescue and firefighting service or, if this is not practicable, under the control of another competent public or private organization working in close coordination with the aerodrome rescue and firefighting service (such as police, military services, harbour patrol or coast guard).

(d) Rescue vessels or other vehicles should have as high a speed as practicable so as to reach an accident site in minimum time. To reduce the possibility of injury during rescue operations, water jet-driven vessels are preferred to water propeller driven vessels unless the propellers of the latter vessels are ducted. Vehicles used in this service should be equipped with life rafts and life preservers related to the requirements of the larger aircraft normally using the aerodrome, with two-way radio communication, and with floodlights for night operations. If aircraft operations during periods of low visibility are expected, it may be necessary to provide guidance for the responding emergency vehicles.

(e) Rescue personnel designated to operate the equipment should be trained and competent in providing rescue services in the appropriate environment.

(f) When drawing up the detailed plan for the conduct of search and rescue operations in accordance with national or local search and rescue authority, emergency plan should coordinate with the relevant rescue coordination centres to ensure that the respective limits of their responsibilities for an aircraft accident within the vicinity of an aerodrome are clearly delineated.

(g) Coordination between the rescue and firefighting service at an aerodrome and public protective agencies, such as local fire brigade, police force, coast guard and hospitals, should be achieved by prior agreement for assistance in dealing with an aircraft accident.

GM AMC2 ACM.OPS.CERT.E.005(a) Rescue and firefighting

RESCUE OPERATIONS IN DIFFICULT ENVIRONMENTS

(a) At aerodromes where a significant proportion of aircraft arrivals and departures takes place over water, swampy areas or other forms of difficult terrain in the immediate vicinity of the aerodrome and where conventional RFF vehicles may not be capable of an effective response, the aerodrome operator or an appropriate rescue agency should ensure the availability of special procedures and equipment to deal with accidents which may occur in these areas. These facilities need not be located on, or be provided by, the aerodrome if they can be made immediately available by off-aerodrome agencies as part of the aerodrome emergency plan. In all cases, the aerodrome operator or an appropriate rescue agency should determine and specify in advance the response area for which it undertakes to provide a rescue service.

(b) In producing its detailed plan, the aerodrome operator or an appropriate rescue agency should have regard to the services and facilities already provided by the search and rescue organization in accordance with National Search and Rescue Plan, to ensure that the separate responsibilities for an aircraft accident in the vicinity of the aerodrome are clearly delineated. All operations, and any exercises conducted to test operational efficiency, should involve the relevant rescue coordination centre, to ensure the effective mobilization of all resources. Matters dealing with services and facilities necessary to provide practical and economical search and rescue coverage of a given area are described in the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual (Doc 9731), Volume I — Organization and Management.

(c) The objectives of each operation should be to create conditions in which survival is possible and from which the total rescue operation can succeed. This concept anticipates that the initial, rapid response attendance may have to provide a preliminary level of succour while awaiting the arrival of a larger rescue force. The first stage would have as its objective the removal of immediate hazards to survivors, their protection, including the first-aid treatment of injuries, and the use of communications equipment to identify the locations to which additional rescue forces should respond. The emphasis will be on rescue and need not include any firefighting capability.

(d) If a fire situation has occurred in the impact stage of an accident, the inevitably extended response times of the first vehicles are likely to preclude effective firefighting operations. The scale of provision of rescue equipment should be related to the capacities of the larger aircraft using the aerodrome.

(e) The types of difficult terrain for which special rescue facilities may be required include:

(1) the sea or other large bodies of water adjacent to the aerodrome;

(2) swamps or other similar surfaces, including the estuaries of tidal rivers;

(3) mountainous areas; and

(4) desert areas.

(f) The equipment to be deployed in effecting a rescue operation will vary with the environment in which the operation is to be conducted. The training required by the personnel delegated to these duties will similarly reflect the terrain conditions. In all situations the basic equipment may include:

(1) communications equipment, which may include equipment for visual signals. Ideally the use of a transmitter on the distress frequency will provide a link with air traffic control and the emergency operations centre;

(2) navigation aids;

(3) medical first-aid equipment;

(4) life-support equipment, including life-jackets in marine situations, shelter, foil blankets and drinking water;

(5) lighting equipment; and

(6) lines, boat hooks, megaphones and tools, e.g. wire cutters and harness knives.

(g) The types of vehicle available for rescue operations in difficult terrain may include:

(1) helicopters;

(2) hovercraft;

(3) boats, of a number of types and capacities;

(4) amphibious vehicles;

(5) tracked vehicles; and

(6) all-terrain vehicles, including those employing ground-effect to minimize wheel-loadings.

(h) Guidance on the capabilities of these types of vehicles is detailed under ICAO Doc 9137 Airport Services Manual Part 1, Chapter 13.

ACM.OPS.CERT.E.010 Rescue and firefighting

LEVEL OF PROTECTION

(a) An aerodrome operator shall:

(1) provide level of protection at an aerodrome for rescue and firefighting commensurate with the level of aerodrome category irrespective of the number of aeroplane movements;

(2) determine the aerodrome category from Table-23 and shall be based on the longest aeroplanes normally using the aerodrome and their fuselage width;

(3) after selecting the category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is greater than the maximum width in Table 23, column 3, for that category, ensure the category for that aeroplane is actually be one category higher;

(4) during anticipated periods of reduced activity, ensure level of protection available is no less than that needed for the highest category of passenger aircraft planned to use the aerodrome during that time irrespective of the number of movements; and

(5) for changes in the level of protection normally available at an aerodrome for rescue and firefighting, notify the appropriate air traffic services units and aeronautical information services units to enable those units to provide the necessary information to arriving and departing aircraft; and

(6) in addition to (e), when such change in the level of protection has been corrected, the appropriate air traffic services units and aeronautical information services units are notified accordingly.

Table 23: Level of rescue and firefighting protection

Aerodrome category (1)	**Aircraft overall length (2)**	**Maximum fuselage width (3)**
1	0 m up to but not including 9 m	2 m
2	9 m up to but not including 12 m	2 m
3	12 m up to but not including 18 m	3 m
4	18 m up to but not including 24 m	4 m
5	24 m up to but not including 28 m	4 m
6	28 m up to but not including 39 m	5 m
7	39 m up to but not including 49 m	5 m
8	49 m up to but not including 61 m	7 m
9	61 m up to but not including 76 m	7 m
10	76 m up to but not including 90 m	8 m

AMC1 ACM.OPS.CERT.E.010(a) Rescue and firefighting

DETERMINING LEVEL OF PROTECTION

(a) The level of protection provided at an aerodrome for rescue and firefighting should be equal to the largest aircraft using the aerodrome irrespective of the number of movements, as determined at Table-23.

(b) The aerodrome category for rescue and firefighting should be based on the overall length of the longest aircrafts normally using the aerodrome and their maximum fuselage width.

(c) The aerodrome category specified in Table-23 should be determined by categorizing the aircrafts using the aerodrome, by first evaluating their overall length and second, their fuselage width

(d) If after selecting the category appropriate to an aircraft's overall length that aircraft's fuselage width is greater than the maximum width in column (3) for that category, the category for that aircraft should be one category higher.

GM AMC1 ACM.OPS.CERT.E.010(a) Rescue and firefighting

DETERMINING LEVEL OF PROTECTION

(a) The level of protection to be provided at an aerodrome should be based on the dimensions of the aircrafts normally using the aerodrome regardless of their frequency of operations.

(b) The aerodrome category for RFF should be based on the overall length of the longest aircrafts normally using the aerodrome and their maximum fuselage width. The aerodrome category should be determined using Table-23 by categorizing the aircrafts using the aerodrome, by first evaluating their overall length and second, their fuselage width. If after selecting the category appropriate to an aircraft's overall length that aircraft's fuselage width is greater than the maximum width in column (3) for that category, then the category for that aircraft is actually one category higher. For examples in determining the appropriate level of aerodrome category refer to ICAO Doc 9137 Airport Services Manual Part 1, Chapter 2.

(c) Aerodromes that additionally serve other types of operations (for example, general aviation and/or aerial work) may consider providing information in the aeronautical information publication (AIP) regarding the level of protection to be provided for these types of operations.

(d) Either a take-off or a landing constitutes a movement. Movements of scheduled, non-scheduled and general aviation operations should be counted in determining the aerodrome category.

(e) The level of protection at aerodromes used for all-cargo, training, testing and out of service aircraft operations may be reduced in accordance with Table 24. This is based on the need to protect only the area around the cockpit of the aircraft in the critical area concept. Using this rationale, the aerodrome category for all-cargo, training, testing and out of service aircraft operations may be reduced by providing enough water quantity Q1 for the control of fire.

Information on the critical area concept and the method by which the scale of extinguishing agents has been related to the critical area may be found in ICAO Doc 9137 Airport Services Manual Part 1, Chapter 2.4.

AMC2 ACM.OPS.CERT.E.010(a) Rescue and firefighting

LEVEL OF PROTECTION FOR MULTI-RUNWAY OPERATIONS

When determining the appropriate level of rescue and firefighting protection required at aerodromes with multi-runway operations, rescue and firefighting services, facilities and equipment should commensurate with the specific operational demands of each runway are provided, whilst maintaining overall safety and efficiency.

GM AMC2 ACM.OPS.CERT.E.010(a) Rescue and firefighting

DETERMINING LEVEL OF PROTECTION FOR MULTI-RUNWAY OPERATIONS

This guidance outlines a methodology for aerodromes that operate two or more runways for assessing and deploying rescue and firefighting resources based on runway-specific requirements, traffic patterns, and potential risks. This guidance provides a comprehensive framework for determining the level of rescue and firefighting protection required for aerodromes with multi-runway operations. By following this guidance, aerodrome operators are able to ensure that each runway is adequately protected, that resources are allocated efficiently, and that response times meet regulatory standards. Regular risk assessments, training, and compliance audits will help maintain high levels of safety and operational effectiveness in the complex environment of multi-runway airports (see Figure-22).

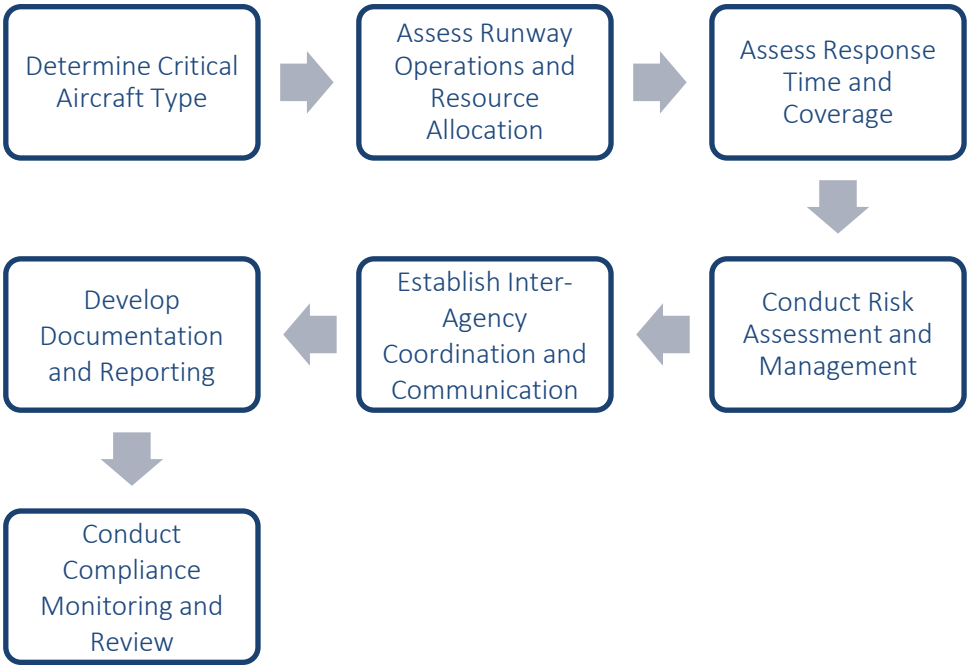


Figure-22: A methodology for determining level of protection for multi-runway operations

(a) Critical Aircraft Determination

(1) The aerodrome operator should identify the critical aircraft type for each runway, based on the largest aircraft (in terms of fuselage length and width) that regularly uses that runway.

(2) The identified critical aircraft should be used to determine the appropriate RFF category for each runway, as per the requirements set forth in these regulations. The RFF category will guide the minimum requirements for the number and type of firefighting vehicles, agents, and personnel necessary for adequate protection.

(b) Runway Operations and Resource Allocation

(1) The aerodrome operator should conduct a thorough assessment of the operational characteristics of each runway. This assessment should consider factors such as:

(i) The type and volume of aircraft operations on each runway.

(ii) The potential for simultaneous operations on multiple runways.

(iii) The distance between runways and the feasibility of sharing RFF resources.

(2) Based on the operational assessment, the aerodrome operator should allocate RFF resources to each runway as follows:

(i) Dedicated Resources: Each runway should have dedicated RFF resources that can respond within the required timeframes within the response time of two minutes.

(ii) Shared Resources: In cases where runways are in close proximity and simultaneous operations are unlikely, shared resources may be deployed. However, these resources must be able to meet the response time requirements for any of the runways they cover.

(3) Supplemental Resources: Additional resources should be allocated to runways with higher traffic volumes, larger aircraft, or increased risk factors, as determined by the risk assessment.

(c) Response Time and Coverage

(1) The aerodrome operator should ensure that ARFFS resources can reach any point on each runway within three minutes from the time of alarm. This applies to the first responding vehicle as well as the full complement of ARFFS resources.

(2) During all operational hours, every runway should be covered by the designated RFF resources. If a runway is temporarily closed or has reduced operations, resource

allocation may be adjusted accordingly, provided full protection is restored prior to the runway's return to full operational status.

(d) Risk Assessment and Management

(1) As part of the task resource analysis, the aerodrome operator should conduct a comprehensive risk assessment to evaluate the specific risks associated with each runway. This assessment should consider:

(i) The frequency and type of aircraft movements on each runway.

(ii) The likelihood and impact of simultaneous operations on different runways.

(iii) Environmental conditions, such as weather patterns and visibility.

(iv) Any unique hazards associated with the airport's layout or surrounding area.

(2) The results of the risk assessment should inform the allocation of RFF resources and the development of operational procedures. The aerodrome operator should regularly review and update the risk assessment, particularly following significant changes in runway operations, traffic patterns, or infrastructure.

(e) Inter-Agency Coordination and Communication

(1) The aerodrome operator should establish clear and effective communication protocols between RFF services, air traffic control (ATC), airside operations, and other relevant emergency services. These protocols should ensure coordinated responses to incidents and effective resource deployment across all runways.

(2) Regular training sessions and emergency drills should be conducted to ensure that all stakeholders are familiar with the ARFFS procedures and response protocols. These exercises should simulate various incident scenarios, including simultaneous runway operations, to test the effectiveness of the coordination and communication strategies.

(f) Documentation and Reporting

(1) The aerodrome operator should develop and maintain an ARFFS plan that details the allocation, positioning, and operational procedures for all ARFFS resources across the airport's runways. This plan should be regularly reviewed and updated to reflect any changes in operations or risk factors.

(2) The aerodrome operator should maintain detailed records of all RFF responses, including response times, the resources deployed, and the outcomes of each incident. This data should be used to evaluate the effectiveness of the RFF plan and to identify areas for improvement.

(g) Compliance Monitoring and Review

(1) The aerodrome operator should conduct regular audits to ensure that ARFFS resource allocation, response times, and operational procedures comply with these regulations. These audits should be coordinated with the relevant national regulatory authorities.

(2) Feedback from audits, incident reports, and training exercises should be used to continuously improve the RFF protection strategy. The aerodrome operator should implement changes as needed to ensure ongoing compliance these requirements and to enhance overall safety.

AMC3 ACM.OPS.CERT.E.010(a) Rescue and firefighting

RE-CATEGORISATION OF PROTECTION LEVEL

During anticipated periods of reduced activity, highest category of aircraft planned to use the aerodrome should be predicated when considering reduction of the aerodrome category during that time, irrespective of the number of movements.

GM AMC3 ACM.OPS.CERT.E.010(a) Rescue and firefighting

RE-CATEGORISATION OF PROTECTION LEVEL

(a) Notwithstanding **GM AMC1 ACM.OPS.CERT.E.010(a) Rescue and firefighting**, during anticipated periods of reduced activity, the airport category may be reduced to that of the highest category of commercial air transport aircraft planned to use the airport during that time irrespective of the number of movements.

(b) The level of protection at aerodromes used for all-cargo aircraft operations may be reduced in accordance with Table 24 below. This is based on the need to protect only the area around the cockpit of an all-cargo aircraft in the critical area concept. Using this rationale, the aerodrome category for an all-cargo aircraft may be reduced by providing enough water quantity Q1 for the control of fire. Information on the critical area concept and the method by which the scale of extinguishing agents has been related to the critical area may be found in ICAO Doc 9137-AN/898 Airport Services Manual Part I — Rescue and Firefighting.

(c) The level of protection at aerodromes for aircrafts operating on non-commercial flights without fare-paying passengers e.g flight crew training, flight testing, non-static display and out of service operations may be reduced in accordance with Table 24.

(d) Where an aerodrome caters to different aircraft operations, the highest level of protection is determined by largest passenger aircraft using the aerodrome irrespective of number of movements specified in **AMC1 ACM.OPS.CERT.E.010 Rescue and firefighting**.

Table 24: Re-categorisation of protection level for all-cargo, training, testing and out of service aircraft operations

Aerodrome category	Re-categorisation on level of protection
1	1
2	2
3	3
4	4
5	5
6	5
7	6
8	6
9	7
10	8

AMC4 ACM.OPS.CERT.E.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION

(a) A change in level of protection should be expressed in terms of the new category of the rescue and firefighting service available at an aerodrome;

(b) Where there is a permanent change in the level of protection, the aerodrome operator should:

(1) notify the GCAA in writing;

(2) conduct a management of change;

(3) revise the task resource analysis; and

(4) update the aerodrome emergency plan.

GM AMC4 ACM.OPS.CERT.E.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION

Changes in the level of protection from that normally available at an aerodrome could result from a change in the availability of extinguishing agents, equipment to deliver the agents or personnel to operate the equipment, etc.

AMC5 ACM.OPS.CERT.E.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION

(a) Contingency plans should be established to limit the need for changes to the promulgated level of protection.

(b) Provisions of reserve vehicle, personnel and facilities should be available to limit the need for temporary reduction on the level of protection.

GM1 AMC5 ACM.OPS.CERT.E.010(a) Rescue and firefighting

CONTINGENCY PLANS TO LIMIT CHANGES TO LEVEL OF PROTECTION

(a) Contingency plans may include, but not limited:

(1) a preventative maintenance plan to ensure the mechanical efficiency of ARFFS vehicles and equipment; and

(2) arrangements to cover unplanned leave and absence of its minimum level of duty RFF personnel.

GM2 AMC5 ACM.OPS.CERT.E.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION FOR DIFFERENT AIRCRAFT SITUATIONS

1. INTRODUCTION

(a) This guidance is to assist aerodrome certificate holders in assessing the appropriate level of protection as part of their safety management system, deemed acceptable by aircraft operators using the aerodromes for differing purposes. This guidance, however, does not relieve the aerodrome operator from the obligation to ensure that an acceptable level of protection is available for the aircraft intended to be used.

2. BASIC CONCEPTS

(a) For flight planning purposes, an aircraft operator should utilise an aerodrome in the United Arab Emirates whose ARFFS category, as required by **ACM.OPS.CERT.E.010 Rescue and firefighting,** matches or exceeds the aircraft's ARFFS category. The current provisions relate to the level of aerodrome protection to be provided for the largest passenger aircraft using an aerodrome, hence this level of protection does not take into account aircrafts for which the aerodrome is selected as an alternate aerodrome.

(b) If an aerodrome is exposed to a temporary reduction of its ARFFS capability, the requirements stated in **ACM.OPS.CERT.E.010 Rescue and firefighting** applies.

3. MINIMUM ACCEPTABLE AERODROME ARFFS CATEGORY

(a) In principle, the published ARFFS category at each aerodrome should be equal to or better than the aircraft's ARFFS category. When establishing acceptable levels of rescue and firefighting

categories to be provided for different aircraft situations, the aerodrome operator may consider the criteria stated in Table 25 below.

Table 25: Acceptable level of rescue and firefighting category for different aircraft situations

Aerodromes	(a) Aerodrome ARFFS category based on published aeronautical information publication, including any information contained in the NOTAM.
Departure, Destination, Take-off Alternate and Destination Alternate Aerodromes for Passenger-carrying Aircrafts	(a) For landing, any aerodrome ARFFS category subject to the suitable risk assessment conducted by the aircraft operator (b) For taking off, aerodrome ARFFS category should be equal to or better than the Aircraft ARFFS category (c) In case of temporary downgrade of aerodrome ARFFS category and where a suitable risk assessment is conducted by the aerodrome operator and/or aircraft operator, an aircraft may take-off: (1) **one category** lower than aircraft ARFFS category is 24 hours or less; or (2) **two categories** lower than aircraft ARFFS category if temporary downgrade is 72 hours or less
Presidential / Ruler / State Aircrafts	(a) For landing and taking off, any aircraft ARFFS category subject to the suitable risk assessments by the aerodrome operator and/or aircraft operator

Note 1. — Alternate aerodrome is an aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at an aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include:

- *A Take-off alternate is an aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.*

- *An en-route alternate is an aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en-route.*
- *A Destination alternate is an aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at an aerodrome of intended landing*
- *The aerodrome from flight departs may also be an en-route or a destination alternate aerodrome for that flight*

(b) Intended operations to aerodromes with ARFFS categories below the promulgated levels specified in **AMC1 ACM.OPS.CERT.E.010 Rescue and firefighting**, should be coordinated between aerodrome operator and aircraft operator.

(c) For departure and destination aerodromes, the acceptable level of ARFFS protection should be equal or exceed the values specified in Table 25.

(d) For flight planning purposes, the acceptable aerodrome ARFFS category at a selected alternate aerodrome may equal or exceed the values specified in Table 25.

(e) Notwithstanding (a), an aerodrome ARFFS category below the protection levels defined in Table 25 may be acceptable if other considerations prevail such as:

(1) achieving ARFFS principal objective,

(2) emergency planning arrangements,

(3) aerodrome conditions,

(4) runway characteristics,

(5) weather conditions,

(6) length of diversion;

(7) non-scheduled / occasional flight, or

(8) temporary downgrades exceeding 72 hours.

(f) In addition to (e), variation to the protection levels defined in Table 25 for the type of aircraft operations may be acceptable based on:

(1) specific risk assessment conducted by the aerodrome operator as part of its safety management system,

(2) used for a group of aerodromes selected for same purpose, for a given aircraft type,

(3) 72-hour threshold for ARFFS temporary downgrades may not be relevant for a single flight to or from the aerodrome concerned, and

(4) is time-limited or within specified duration.

ACM.OPS.CERT.E.015 Rescue and firefighting

EXTINGUISHING AGENTS

(a) An aerodrome operator shall:

(1) provide both principal and complementary extinguishing agents at an aerodrome;

(2) ensure amounts of water for foam production and the complementary agents provided on the rescue and firefighting vehicles are in accordance with the appropriate aerodrome category, except that for aerodrome categories 1 and 2 up to 100 per cent of the water may be substituted with complementary agent;

(3) for the purpose of agent substitution at aerodrome categories 1 and 2 mentioned in (b), 1 kg of complementary agent is taken as equivalent to 1.0 L of water for production of a foam meeting performance level A;

(4) ensure quantity of foam concentrates separately provided on rescue and firefighting vehicles for foam production is in proportion to the quantity of water provided and the type of foam concentrate selected;

(5) ensure discharge rate of the foam solution mentioned in (d) is not less than the rates as determined by the aerodrome category; and

(6) ensure complementary agents comply with the appropriate specifications of the International Organization for Standardization (ISO).

(b) From 1 July 2026, provisions of environmental-sustainable extinguishing agents shall apply to new builds or replacement of existing systems or part thereof.

GM1 ACM.OPS.CERT.E.015(b) Rescue and firefighting

FOAM HEALTH, SAFETY, AND ENVIRONMENTAL ISSUES

1. GENERAL

(a) There has been a significant shift in the emphasis on environmental and health concerns associated with legacy foam products. The purpose of this information is to provide the aerodrome operator with high-level information and information on suggested solutions to the questions being asked about firefighting foam health, safety, and environmental issues.

(b) In general, the chemicals contained in legacy fluorinated foams, such as AFFF, AR-AFFF, FFFP, etc. (i.e., fluorinated surfactants which are classified as PFAS), have come under significant health and environmental scrutiny.

(c) The approach of dilution and release into the environment and/or wastewater treatment systems is obsolete and unacceptable going forward for all fluorinated foams. International, federal, state, and local jurisdictions are limiting the use of legacy AFFF as a result of these concerns.

(d) International civil aviation authorities are also researching and implementing new restrictions on the use of these legacy products.

(e) Current international standards that cover foam fire suppression agents and systems are being revised to address these new trends and to allow for flexibility going forward.

(f) Currently, the criteria for defining an environmentally/toxicologically acceptable alternative is still changing. Once defined, the industry will also need to define the testing and metrics needed to validate the acceptability of such criteria. With that said, there has been a significant shift to the use of synthetic fluorine-free foam (SFFF).

(g) The following are key issues that should be evaluated when using existing legacy fluorinated foams, switching to AFFF C6 foams, or switching to SFFF foams.

(1) Firefighter health and safety. First responder exposure should be minimized using safer work practices and personal protective equipment. In addition, procedures should be developed for rinsing if the foam comes into contact with a person's eyes or skin.

(2) Collection of firefighting foam after use. Industry best practice is that all foams and fire water/foam runoff should be contained, collected, and disposed of based on federal, state, and local requirements and the most current technical information as suggested in the references listed. Foam discharge is more easily handled where there is an in-place collection capability, i.e., primary and secondary containment. This situation might be found in warehouses, tank farms, and firefighting training facilities. Where these facilities are not available, temporary diking is an alternative where time and resources permit. The overall environmental impact of foam discharge requires additional evaluation and development of generally recognized guidance. Until recognized guidance is promulgated, users should rely on manufacturers' data and guidance from national environmental authorities and agencies. In all situations, discussions with the environmental regulatory authorities are appropriate. Work is continuing to identify appropriate policy and criteria to protect facilities that have typically been protected by foam suppression systems. These efforts are focusing on identifying applicable codes and standards, analysing environmental impact, evaluating alternatives, and revisiting containment options.

(3) Disposal of firefighting foams. Currently, high-temperature incineration by an accredited environmental firm should be considered the default for disposing of legacy AFFF products (concentrates, solutions, and effluents).

(4) Procedures for decontaminating legacy equipment and acceptable levels of cleanliness. Trying to determine how clean is clean continues to be an issue and might need to be determined based on regulators' direction or manufacturers' information. Unless equipment is properly

cleaned, it might allow the new foam to continue to contaminate the environment. Clean levels might be in the parts per billion to trillion range. Testing and metrics will also need to be defined to validate the level of cleanliness.

(h) The environmental/health concerns associated with these chemicals are challenging for both toxicologists and regulators, requiring continued research and updated regulatory requirements that are still changing. Any users of firefighting foam should research the latest procedures and precautions for their use and disposal prior to placing them into service. The following are two organizations that have developed technically up-to-date and accurate information on this subject.

2. DISCHARGE SCENARIOS.

(a) The following are examples of scenarios that might include the use of foam, which are presented here to provide the user with ideas on how to handle these types of situations. The examples are not intended to be complete, as the science on how to handle these scenarios is changing very rapidly. The discharge of a foam-water solution is most likely to be the result of one of the four following scenarios:

(1) Manual firefighting or fuel-blanketing operations

(2) Training

(3) Foam equipment system and foam fire apparatus tests

(4) Fixed system releases

(b) These four scenarios include events at such places as aircraft facilities, firefighter training facilities, and special hazards facilities (such as flammable/hazardous warehouses, bulk flammable liquid storage facilities, and hazardous waste storage facilities).

3. FIREFIGHTING OPERATIONS.

(a) Fires occur in many locations and under many different circumstances. In some cases, it is possible to collect the foam solution used to douse a fire after it has been put out; and in others, such as in marine firefighting, it is not. These incidents include aircraft rescue and firefighting operations, vehicular fires (i.e., cars, vessels, train cars), structural fires involving hazardous materials, and flammable liquid fires. A foam-water solution that has been used in firefighting operations will probably be heavily contaminated with the fuel or fuels involved in the fire. It is also likely to have been diluted with water discharged for cooling purposes.

(b) In some cases, the foam solution used during fire department operations can be collected. However, it is not always possible to control or contain the foam; therefore, a non-persistent foam

such as SFFF, should be considered. This could be a result of the location of the incident, size of incident, or the circumstances surrounding the incident.

(c) Event-initiated manual containment measures are usually executed by the responding fire department to contain the flow of a foam-water solution when conditions and manpower permit. Those operations include the following measures:

(1) Blocking sewer drains. This is a common practice used to prevent contaminated foam-water solution from entering the sewer system unchecked. It is then diverted to an area suitable for containment.

(2) Portable dikes. These are generally used for land-based operations. They can be set up by fire department personnel during or after extinguishment to collect runoff.

(3) Portable booms. These are used for marine-based operations in the absence of better techniques and are set up to contain foam in a defined area. These operations generally involve the use of floating booms within a natural body of water. The boom contains the foam bubbles, but as the bubbles drain, the foam solution might not be contained and could spread into the rest of the body of water.

4. TRAINING.

(a) There are specially designed training foams available from most foam manufacturers that simulate firefighting foam during live training but do not contain fluoro-surfactants. These foams are biodegradable, have minimal environmental impact, and can be safely treated at a local wastewater treatment plant. Because they do not contain fluoro-surfactants, training foams also have reduced burn back resistance that allows for more repeat fire training sessions. Firefighters and other foam users should work with the GCAA having jurisdiction (AHJ) to ensure that the use of training foams meet all the local and application-specific live training requirements. In some cases, training foams can also be used as substitutes for legacy fluorinated foams in vehicle and equipment testing.

(b) Training should be conducted under circumstances conducive to the collection of spent foam. Some fire training facilities have elaborate systems designed and constructed to collect foam solution, separate it from the fuel, treat it, and, in some cases, reuse the treated water. At a minimum, most fire training facilities collect the foam solution for discharge to a wastewater treatment facility. Training can include the use of special training foams or actual firefighting foams. Training facility designs should include containment systems.

5. SYSTEM TESTS.

(a) Testing primarily involves engineered, fixed foam fire-extinguishing systems. Two types of tests are generally conducted on foam systems: acceptance tests, which are conducted pursuant to installation of the system, and maintenance tests, which are usually conducted annually to ensure the operability of the system.

(b) In the execution of both acceptance and maintenance tests, only a small amount of foam concentrate should be discharged to ensure the correct concentration of foam in the foam-water solution. Designated foam-water test ports can be designed into the piping system so that the discharge of foam-water solution can be directed to a controlled location. The controlled location can consist of a portable tank that would be transported to an accepted disposal site by a licensed contractor. The remainder of the acceptance test and maintenance test should be conducted using only water.

(c) NFPA 11 explicitly recognizes proportioning test methods that limit or eliminate the need to discharge foam concentrate. These methods are permitted in Chapter 12.6.4 of NFPA 11.

6. FIXED SYSTEM RELEASES.

(a) This type of release is generally uncontrolled, whether it is the result of a fire incident or a malfunction in the system. The foam solution discharge in this type of scenario can be dealt with via event-initiated operations or engineered containment systems. Event-initiated operations encompass the same temporary measures that would be taken during fire department operations: portable dikes, floating booms, and so forth. Engineered containment is based mainly on the location and type of facility and would consist of holding tanks or areas where the contaminated foam-water solution would be collected, treated, and disposed of properly.

7. FIXED SYSTEMS.

(a) Facilities can be divided into those without an engineered containment system and those with an engineered containment system.

8. FACILITIES WITHOUT ENGINEERED CONTAINMENT.

(a) Given the absence of any past requirements for containment, many existing facilities have allowed foam-water solution to flow out of the facility and evaporate into the atmosphere or percolate into the ground. Steps should be taken to avoid this as part of future foam management planning. The choices for containment of foam-water solution at such facilities fall into two categories: event-initiated manual containment measures and installation of engineered containment systems. Selecting the appropriate option depends on the location of the facility, the risk to the

environment, the risk of an automatic system discharge, the frequency of automatic system discharges, and any applicable rules or regulations.

(b) Event-initiated manual containment measures are the most likely option for existing facilities without engineered containment systems. This can fall under the responsibility of the responding fire department and include such measures as blocking storm sewers, constructing temporary dikes, and deploying temporary floating booms. The degree of such measures should be dictated by the facility's location, as well as the available resources and manpower.

(c) The installation of engineered containment systems is an option for existing facilities. There are cases, however, that might warrant the design and installation of such systems.

9. FACILITIES WITH ENGINEERED CONTAINMENT.

(a) Any engineered containment system will usually incorporate an oil/water separator. During normal drainage conditions (i.e., no foam solution runoff), the separator functions to remove any fuel particles from drainage water. However, when foam-water solution is flowing, the oil/water separator should be bypassed so that the solution is diverted directly to storage tanks.

(b) The size of the containment system should be dependent on the duration of the foam-water flow, the flow rate, and the maximum anticipated rainfall. Most new containment systems only accommodate individual facilities. However, some containment systems can accommodate multiple facilities depending on the topography of the land and early identification during the overall site planning process.

(c) The specific type of containment system selected should also depend on the location, desired capacity, and function of the facilities in question. The available systems include earthen retention systems, belowground tanks, open-top inground tanks, and sump and pump designs (i.e., lift stations) piped to aboveground or in-ground tanks. Storing spent foam below ground is not advisable due to the potential for leaks. Regular checks can reduce the risk of leaks, but even a small leak over time could result in contaminated soil.

(d) The earthen retention designs consist of open-top earthen berms, which usually rely on gravity-fed drainage piping from a protected facility. They allow the foam-water solution to be collected in an impermeable liner. Legacy foams should not be contained using earthen retention, as the soil can become contaminated.

(e) Closed-top, belowground storage tanks usually consist of a gravity-fed piping arrangement and can be suction pumped out.

(f) Open-top, belowground storage tanks are usually lined concrete tanks that can rely on gravity-fed drainage piping or a sump and pump arrangement. These can accommodate individual or multiple facilities. They should also accommodate the maximum anticipated rainfall.

(g) Aboveground tanks incorporate a sump and pump arrangement to closed, aboveground tanks. Such designs usually incorporate the use of one or more submersible or vertical shaft, large-capacity pumps. These can accommodate individual or multiple facilities.

10.NEW FACILITIES.

(a) The decision to design and install a fixed foam-water solution containment system is dependent on the location of the facility, the risk to the environment, the possible impairment of facility operations, the design of the fixed foam system (i.e., automatically or manually activated), the ability of the responding fire department to execute event-initiated containment measures, and any pertinent regulations.

(b) Where conditions warrant the installation of engineered containment systems, there are a number of considerations. They include the size of the containment system, the design and type of containment system, and the capability of the containment system to handle individual or multiple facilities. Engineered containment systems can be used where foam extinguishing systems are installed in facilities that are immediately adjacent to a natural body of water. These systems might also be prudent at new facilities, where site conditions permit, to avoid impairment of facility operations.

GM2 ACM.OPS.CERT.E.015(b) Rescue and firefighting

TRANSITION FROM EXISTING FOAMS TO ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS FOR AERODROMES

1. PURPOSE AND SCOPE

(a) This guidance is issued to provide a structured and comprehensive framework for aerodrome operators to transition from the use of traditional firefighting foams, particularly those containing per- and polyfluoroalkyl substances (PFAS), to environmentally sustainable extinguishing agents. The transition is aligned with international regulatory trends and best practices, aimed at reducing environmental impact while maintaining fire safety standards.

(b) The guidance applies to all aerodrome operators and is intended to ensure compliance with updated environmental protection standards.

2. REGULATORY REQUIREMENTS

(a) Compliance with Environmental Standards

(1) Operators are required to transition to foams that are compliant with internationally recognised environmental standards, such as those established by the International Civil Aviation Organization (ICAO) and local environmental agencies. All newly adopted extinguishing agents must be fluorine-free, biodegradable, and demonstrate minimal toxicity to aquatic and terrestrial ecosystems.

(b) Performance Standards

(1) The selected environmentally sustainable extinguishing agents must meet the operational performance requirements set out in ICAO Annex 14, Volume I (Aerodromes). Agents should be certified for their effectiveness in controlling Class A and B fires, particularly those involving aviation fuel.

(c) Transition Timeline

(1) Operators must develop a transition plan with a full transition to environmentally sustainable extinguishing agents.

3. OPERATIONAL CONSIDERATIONS

(a) Risk Assessment and Planning

(1) Prior to the transition, operators must conduct a comprehensive risk assessment to evaluate the potential impacts of switching to new extinguishing agents. This assessment should include:

(i) Firefighting Capability: Testing the new agents for compatibility with existing firefighting infrastructure, including vehicles, discharge systems, and foam delivery mechanisms.

(ii) Environmental Impact: Assessing the local environmental conditions and ensuring that the selected agents pose no harm to nearby ecosystems, water sources, or soil quality.

(iii) Personnel Training: Updating training programmes to ensure that fire and emergency services personnel are proficient in the use of the new extinguishing agents, including safe handling, storage, and application.

(b) Testing and Validation

(1) All environmentally sustainable extinguishing agents must undergo a thorough testing process prior to full deployment. This includes:

(i) Operational Testing: Conduct live fire drills to evaluate the effectiveness of the agents under real-world conditions, ensuring they meet the minimum extinguishing performance for aviation-specific fires.

(ii) Equipment Compatibility: Ensure that the agents are compatible with existing firefighting systems, including nozzles, pumps, and foam proportioning equipment. Any necessary modifications to equipment must be identified and implemented prior to the transition.

(iii) Environmental Monitoring: Establish a monitoring programme to track the environmental impact of the new agents, including potential runoff into water bodies or impact on surrounding flora and fauna.

4. PHASED IMPLEMENTATION

(a) Phase 1: Evaluation and Procurement

(1) Operators should initiate the transition by evaluating available environmentally sustainable extinguishing agents and selecting products that meet both performance and environmental criteria. Procurement contracts should include provisions for long-term supply and warranties on environmental compliance.

(b) Phase 2: Infrastructure and Equipment Modification

(1) Where necessary, modifications to existing firefighting systems should be undertaken to ensure compatibility with the new agents. This may include recalibrating foam proportioning systems, updating discharge nozzles, and ensuring that storage tanks are compliant with the handling requirements of the new agents.

(c) Phase 3: Training and Operational Testing

(1) All personnel involved in fire suppression operations must be retrained in the use of the new agents. This includes fire and emergency services personnel, maintenance crews, and response team supervisors. Operational testing through live drills should be carried out to validate the effectiveness of the new agents in a controlled environment.

(d) Phase 4: Full Deployment

(1) Once all testing, training, and infrastructure adjustments have been completed, operators are required to fully implement the environmentally sustainable extinguishing agents. The date of full implementation must be reported to the CAA, and all stocks of legacy foams containing harmful substances must be appropriately disposed of, following environmental disposal regulations.

5. REPORTING AND DOCUMENTATION

(a) Transition Plan must include:

(1) A timeline for the transition.

(2) A summary of the selected environmentally sustainable extinguishing agents.

(b) Risk assessments and mitigation measures.

(1) Training programmes for personnel.

(2) Infrastructure modifications, if required.

(c) Progress Reporting

(1) Operators must provide bi-annual progress reports to the CAA detailing the status of the transition. These reports must include any challenges encountered and adjustments made to the original plan.

(d) Final Compliance Report

(1) Upon full implementation, operators are required to submit a final compliance report, including certification of the extinguishing agents, records of training completion, and evidence of successful operational testing. This report must also document the proper disposal of legacy foams.

6. CONCLUSION

(a) The transition to environmentally sustainable extinguishing agents represents a critical step in enhancing fire safety while safeguarding the environment. Aerodrome operators are expected to follow this guidance diligently to ensure a smooth transition, minimise environmental impact, and uphold the highest standards of fire and emergency response.

AMC1 ACM.OPS.CERT.E.015(a) Rescue and firefighting

PRINCIPAL AGENTS

(a) Principal agent provided at an aerodrome should either be a foam meeting performance level B or C.

(b) Amounts of water for foam production and the complementary agents provided on the rescue and firefighting vehicles should be in accordance with the aerodrome category as determined at Tables 26 and 27.

(c) For aerodrome categories 1 and 2, up to 100 per cent of the water substituted with a complementary agent should be based on equivalency of a foam meeting performance level A i.e., 1 litre to 1 kg:

(1) replacement of water for category 1 aerodrome – 350 kg of complementary agent; or

(2) replacement of water for category 2 aerodrome – 1 000 kg of complementary agent;

(d) Quantity of foam concentrates separately provided on rescue and firefighting vehicles for foam production should be n proportion to the quantity of water provided and the foam concentrate selected.

(e) Amount of foam concentrate should be sufficient to supply at least two full loads of such quantity of water for a 6 percent induction and four loads for a 3 per cent induction, where sufficient additional water supplies are immediately available to ensure a rapid replenishment of the water content carried.

(f) Discharge rates of the foam solution and complementary agents should not be less than the rates shown in Tables 26 and 27.

(g) Foam solution concentration should be:

(1) for nominal 6 percent concentrates, the concentration is between 5.5 percent and 7.0 percent for turret and ground sweep nozzles and between 5.5 percent and 8.0 percent for hand line and under truck nozzles; or

(2) for nominal 3 percent concentrates, the concentration is between 2.8 percent and 3.5 percent for turret and ground sweep nozzles and between 2.8 percent and 4.0 percent for hand line and under truck nozzles.

(h) When selecting the type of foam concentrate to be used at an aerodrome, considerations should include:

(1) environmental-sustainable type;

(2) firefighting performance meets or exceeds ICAO requirements;

(i) Where non-environmental sustainable type of foam is used at an aerodrome, policies and procedures should be established to contain, mitigate and dispose any run-offs arising from rescue and firefighting operations, testing and training activities in accordance with local environmental laws and regulations.

(j) A foam certificate of conformity should be provided to demonstrate that the foams are manufactured and tested in accordance with ICAO requirements or any other equivalent international standards acceptable to the GCAA.

(k) Where training foams are used at the aerodrome, appropriate actions should include:

(1) segregate training foams away from operational foams to prevent mix-up; and

(2) rescue and firefighting personnel should be adequately informed on the firefighting properties and performance of the training foams.

Table 26: Minimum usable amounts of extinguishing agents based on a foam meeting performance level B

Aerodrome category	**Foam meeting performance level B (Application rate: 5.5 litres/m/m²)**				**Complementary agents**	
	Water (L)	**Discharge rate foam**	***Foam concentrates 3% (L)**	***Foam concentrates 6% (L)**	**Dry chemical**	**Discharge rate (kg/sec)**

(1)	(2)	solution / minute (L) (3)	(4)	(5)	powder (kg) (6)	(7)
1	230	230	14	28	45	2.25
2	670	550	41	82	90	2.25
3	1 200	900	72	144	135	2.25
4	2 400	1 800	144	288	135	2.25
5	5 400	3 000	180	648	180	2.25
6	7 900	4 000	324	948	225	2.25
7	12 100	5 300	726	1 452	225	2.25
8	18 200	7 200	1 092	2 184	450	4.5
9	24 300	9 000	1 458	2 916	450	4.5
10	32 300	11 200	1 938	3 876	450	4.5

*Note. — *Approximate quantities of foam concentrates are calculated for the production of two loads of foam solution.*

Table 27: Minimum usable amounts of extinguishing agents based on a foam meeting performance level C

Aerodrome category	Foam meeting performance level C (Application rate: 3.75 litres/m/m²)				Complementary agents	
	Water (L)	Discharge rate foam solution / minute (L)	*Foam concentrates 2% (L)	*Foam concentrates 3% (L)	Dry chemical powder (kg)	Discharge rate (kg/sec)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	160	160	7	10	45	2.25
2	460	360	19	28	90	2.25
3	820	630	33	49	135	2.25
4	1 700	1 100	68	102	135	2.25
5	3 900	2 200	156	234	180	2.25
6	5 800	2 900	232	348	225	2.25
7	8 800	3 800	352	528	225	2.25
8	12 800	5 100	512	768	450	4.5
9	17 100	6 300	684	1 026	450	4.5

10	22 800	7 900	912	1 368	450	4.5

*Note. — *Approximate quantities of foam concentrates are calculated for the production of two loads of foam solution.*

GM1 AMC1 ACM.OPS.CERT.E.015(a) Rescue and firefighting

1. **TYPES AND AMOUNTS OF EXTINGUISHING AGENTS**

(a) Principal agents (foam) produce a permanent control, i.e., for a period of several minutes or longer. Complementary agents (dry powder or other gaseous agent) have rapid fire suppression capability but offer a "transient" control which is usually only available during application.

(b) The complementary extinguishing agent should be:

(1) dry chemical powders (classes B and C powders); or

(2) other extinguishing agents with at least the same or better firefighting capability.

(c) When selecting dry chemical powder for use with foam, care should be exercised to ensure its compatibility. If in doubt, a full performance testing should be conducted.

(d) Characteristics of the extinguishing agents are available in ICAO Doc 9137 Airport Services Manual Part 1 Chapter 8.

2. AMOUNTS OF EXTINGUISHING AGENTS

(a) The amounts of water for foam production and the complementary agents to be provided on the RFF vehicles should be in accordance with the aerodrome category determined in Tables 26 and 27, except that for aerodrome categories 1 and 2, up to 100 per cent of the water may be substituted with a complementary agent.

(b) The amounts in Tables 26 and 27 are the minimum amounts of extinguishing agents to be provided and are based on the average overall length of aircrafts in a given category. If the aircraft operating at an aerodrome is larger than the median aircraft, the amounts should be recalculated.

(c) The amounts in Tables 26 and 27 have been determined by adding the quantity of extinguishing agents which are required to obtain a one-minute control time in the practical critical area and the quantity of extinguishing agents which are required for continued control of the fire thereafter and/or for possible complete extinguishment of the fire. Control time is the time required to reduce the initial intensity of the fire by 90 per cent. Information on the critical area concept and the method by which the scale of extinguishing agents has been related to the critical area may be found in ICAO Doc 9137 Airport Services Manual Part 1, Chapter 2.4.

(d) The quantity of foam concentrates separately provided on vehicles for foam production should be in proportion to the quantity of water provided and the foam concentrate selected. The amount of foam concentrate should be sufficient to supply at least two full loads of such quantity of water where sufficient additional water supplies are immediately available to ensure a rapid replenishment of the water content carried.

(e) The amounts of water specified for foam production are predicated on an application rate of 5.5 L/min/m2 for a foam meeting performance level B and 3.75 L/min/m2 for a foam meeting performance level C. These application rates are considered to be the minimum rates at which control can be achieved within one minute.

(f) The amounts of foams given in Table 28 have been determined on the assumption that the foams meet minimum specifications accepted by the GCAA. Guidance on basic characteristics of foams is contained in ICAO Doc 9137 Airport Services Manual Part 1, Chapter 8.

(g) At aerodromes where operations by aircrafts larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly.

(h) Table 28 provides guidance on the calculation of the quantities of water and discharge rates based on the largest overall length of aircraft in a given category. The table is based on the use of performance level B foam with an application rate of 5.5 L/min/m2. The formulae indicated in Table 28 are used only for the recalculation of quantities in accordance with paragraph (g) above.

(i) There may be aerodromes that use more than one type of performance level foams, such as a combination of level B and C foams, which could lead to error in quantity calculation or replenishment. Due to these reasons, the use of a combination of different performance level foams at an aerodrome is therefore discouraged.

(j) For the purpose of replacing water for foam production by complementary agents for Categories 1 and 2 aerodromes, 1 kg of a complementary agent should be based foam meeting performance level A equivalency (1 litre to 1 kg). Higher equivalencies for complementary agents may be used if results of tests conducted on the complementary agents used by the aerodromes have indicated higher efficiencies than those recommended. When any other complementary agent is used, the substitution ratios need to be recalculated.

Table 28: Maximum quantities of extinguishing agents based on the aerodrome RFF category using foam meeting performance level B

RFF Category	Largest theoretical length of aircraft, L (m)	Fuselage width, W (m)	Total width of protection area (k1 + W) (m)	Theoretical critical area, A*t* = L x (k1+W)	Practical critical area, A*p* = ⅔ A*t*	Q1 = 5.5 x 1 x A*p*	Q2 =k2 x Q1 (see 2.4.10 for values of k2)	ΣQ = Q1+Q2 (litres)	Discharge rate (L/min) = A*p* x (application rate of 8.2 L/min/m2)
1	9	2	12+2=14	126	84	462	0	462	462
2	12	2	12+2 = 14	168	112	616	166	782	616
3	18	3	14+3 = 17	306	204	1 122	337	1 459	1 122
4	24	4	17+4 = 21	504	336	1 848	1 072	2 920	1 848
5	28	4	30+4 = 34	952	635	3 493	2 620	6 113	3 493
6	39	5	30+5 = 35	1 365	910	5 005	5 005	10 010	5 005
7	49	5	30+5 = 35	1 715	1 144	6 292	8 117	14 409	6 292
8	61	7	30+7 = 37	2 257	1 505	8 278	12 583	20 861	8 278
9	76	7	30+7 = 37	2 812	1 876	10 318	17 541	27 859	10 318
10	90	8	30+8 = 38	3 420	2 281	12 546	23 837	36 383	12 546

3. DISCHARGE RATES

(a) The discharge rates of the foam solution should not be less than the rates shown in Tables 26 or 27. The recommended discharge rates are those required to obtain a one-minute control time on the practical critical area and have therefore been determined for each category by multiplying the practical critical area by the application rate. The discharge rate of the foam solution is thus equal to the water quantity Q1 in a control time of one minute.

(b) The discharge rates of complementary agents should be no less than the rates shown in Tables 26 or 27.

4. TRAINING FOAMS

(a) Where the manufacturer can demonstrate that the training foam produces identical test results to those expected to be obtained by the operational firefighting foam, it may be used to conduct the foam production performance and in-service testing.

(b) Where training foams do not comply with any recognized international standards, they should be quality assured by the manufacturer. They will be formulated to imitate the operational foams, for induction, drainage and expansion properties. However, their firefighting properties may be reduced. RFF personnel should understand this feature of training foams before they are used.

GM2 AMC1 ACM.OPS.CERT.E.015(a) Rescue and firefighting

CRITICAL AREA FOR CALCULATING QUANTITIES OF WATER

(a) The critical area is a concept for rescue of the occupants of an aircraft. It differs from other concepts in that, instead of attempting to control and extinguish the entire fire, it seeks to control only that area of fire adjacent to the fuselage. The objective is to safeguard the integrity of the fuselage and maintain tolerable conditions for its occupants. The size of the controlled area required to achieve this for a specific aircraft has been determined by experimental means.

(b) There is a need to distinguish between the theoretical critical area within which it may be necessary to control the fire and the practical critical area which is representative of actual aircraft accident conditions. The theoretical critical area serves only as a means for categorizing aircraft in terms of the magnitude of the potential fire hazard in which they may become involved. It is not intended to represent the average, maximum or minimum spill fire size associated with a particular aircraft. The theoretical critical area is a rectangle having as one dimension the overall length of the aircraft and as the other dimension a length which varies with the length and width of the fuselage.

(c) From experiments performed it has been established that for an aircraft with a fuselage length equal to or greater than 24 m, in wind conditions of 16 to 19 km/h and at right angles to the fuselage, the theoretical critical area extends from the fuselage to a distance of 24 m upwind and 6 m downwind. For smaller aircraft a distance of 6 m on either side is sufficient. To provide for a progressive increase in the theoretical critical area, however, a transition is used when the fuselage length is between 12 m and 24 m.

(d) The overall length of the aircraft is considered appropriate for the theoretical critical area as the entire length of aircraft should be protected from burning. If not, the fire could burn through the skin and enter the fuselage. Also, other aircraft such as T-tail aircraft often have engines or exit points in this extended portion.

(e) The formula for the theoretical critical area A^T thus becomes:

Overall length	**Theoretical critical area A^T**
L < 12 m	L × (12 m + W)
12 m ≤ L < 18 m	L × (14 m + W)
18 m ≤ L < 24 m	L × (17 m + W)
L ≥ 24 m	L × (30 m + W)

Note: where L = the overall length of the aircraft, and W = the maximum width of the aircraft fuselage.

(f) As mentioned earlier, in practice it is seldom that the entire theoretical critical area is subject to fire and a smaller area, for which it is proposed to provide firefighting capacity, is referred to as the practical critical area. As a result of a statistical analysis of actual aircraft accidents, the practical critical area A^P has been found to be approximately two-thirds of the theoretical critical area, or

$$A^P = 0.667\ A^T$$

(g) The quantity of water for foam production can be calculated from the following formula:

$$Q = Q^1 + Q^2$$

Where: *Q = the total water required*

Q^1 = the water for control of the fire in the practical critical area, and

Q^2 = the water required after control has been established and is needed for such factors as the maintenance of control and/or extinguishment of the remaining fire.

(h) Factor $\mathbf{K^1}$ is the water required for control in the practical critical area (Q1), may be expressed by the following formula:

$$K^1\ (Q^1 = A \times R \times T)$$

Where: *A = the practical critical area*

R = the rate of application, and

T time of application.

(i) The amount of water required for Q2 cannot be calculated exactly as it depends on a number of variables.

(j) The factors considered of primary importance are:

(1) maximum gross mass of the aircraft;

(2) maximum passenger capacity of the aircraft;

(3) maximum fuel load of the aircraft; and

(4) previous experience (analysis of aircraft RFF operations).

(k) Factor **K^2**, when plotted on a graph, are used to calculate the total amount of water required for each aerodrome category. The volume of water for Q2, as a percentage of Q1, varies from about 0 per cent for category 1 aerodromes to about 190 per cent for an aerodrome category 10.

(l) The graph mentioned in the preceding paragraph gives the following approximate values for aircrafts representative of each aerodrome category:

Aerodrome category	**K^2 (Q^2 = percentage of Q^1 percentage)**
1	0
2	27
3	30
4	58
5	75
6	100
7	129
8	152
9	170
10	190

AMC2 ACM.OPS.CERT.E.015(a) Rescue and firefighting

INITIAL FOAM PRODUCTION PERFORMANCE TESTING

(a) Initial foam production performance testing for a rescue and firefighting vehicle should include:

(1) a vehicle is first acquired for operational use at an aerodrome (acquisition may mean new, second-hand purchase, leasing, transfer or hire of a vehicle); or

(2) an operational vehicle after significant maintenance, refurbishment or component replacement that could affect a change in the foam quality or foam production system. This also includes a change of foam-making branches, nozzles or monitors. Only those parts of the system that could have been affected by the work undertaken or the component change should also be tested.

(b) An initial foam production performance testing for a rescue and firefighting vehicle should include:

(1) the induction percentage for all foam-making devices;

(2) the expansion ratio from all foam-making devices;

(3) the quarter drainage time from all foam-making devices;

(4) the jet range of the main monitor/high reach extendible turret; and

(5) the spray pattern of the main monitor/high reach extendible turret.

(c) For rescue and firefighting vehicles equipped with foam monitors capable of producing foam while on the move, the tests should include an assessment of this capability. Where both a high and low discharge capability are provided on larger monitors, this provision is tested based on the OEM instructions.

(d) Foam induction systems should be induced with a tolerance of +/-10% of the desired induction percentage at optimum working conditions. Premixed foam systems, if used, should have foam concentrate introduced to within a tolerance of 1.0 to 1.1 times the manufacturer's desired induction rate.

IN-SERVICE FOAM PERFORMANCE TESTING

(e) For operational rescue and firefighting vehicles, in-service foam performance testing should include:

(1) on-going testing of the capability of the foam production system; and

(2) periodic checks not exceeding 12-months to ensure induction accuracy and monitor discharge distance.

(f) Foam specimen for checking the induction percentage should be collected during normal procedural "spot" tests or training. Premixed foam units, when used at categories 1 and 2 aerodromes, are maintained and hydraulically pressure tested in accordance with the intervals set by the OEMs. Only foam concentrates suitable for use in premixed form should be used in these kinds of pressure vessels.

(g) For optimum foam firefighting and burn-back performance, foam-making test equipment should produce the acceptable performance levels including:

(1) expansion ratio ranges from 6 to 10 for film forming foams and synthetic foams; and

(2) drainage times in excess of 3 minutes for film forming foams and synthetic foams, preferably 5 minutes or more;

(h) In-service testing of the foam performance of rescue and firefighting vehicle should be:

(1) conducted by a competent person or organisation;

(2) where the test is conducted by a third party, the results should be validated against the performance requirements; and

(3) records are maintained for audit and inspection by the GCAA.

GM AMC2 ACM.OPS.CERT.E.015(a) Rescue and firefighting

FOAM PRODUCTION PERFORMANCE TESTING

1. GENERAL

(a) The foam performance test method is based on criteria detailed in ICAO Doc 9137 Airport Services Manual Part 1, Chapter 8.1. Any other test method having equivalent or better criteria to ICAO requirements acceptable to the GCAA can be considered.

2. FIRE TEST METHOD

(a) Objective: To evaluate the ability of a foam concentrate to:

(1) extinguish a fire of: 4.5 m², - performance level B or 7.3 m², - performance level C

(2) resist burn-back due to exposure to fuel and heat.

(b) Equipment required:

(1) A circular fire steel tray of: 4.5 m² – performance Level B or 7.32m² – performance Level C

(2) The vertical wall should be 200 mm;

(3) Equipment or access to facilities to enable accurate recordings of:

a. air temperature;

b. water temperature; and

c. wind velocity;

(4) Fuel: 100 L of Avtur (Jet A1) for performance level B tests or 157 L of Avtur (Jet A1) for performance level C tests.

Note 1. — Avtur Jet A or kerosene with similar specifications may be used if accepted by the appropriate authority.

Note 2. — As some aviation kerosene may contain additives, it is recommended that testing agencies utilize a pure kerosene test fuel in order to maintain and establish repeatable test results.

(5) branch pipe, straight stream, air aspirating nozzle;

(6) suitable stop watch;

(7) circular, burn-back pot, measuring 300 mm (internal diameter), 200 mm high, 2 L of gasoline or kerosene; and

(8) protective screen between tray and equipment, for protection against radiant heat, is acceptable.

(c) Testing conditions:

(1) air temperature (EC) ≥ 15 C;

(2) foam solution temperature (EC) ≥ 15 C;

(3) wind velocity (m/s) ≤ 3;

(4) the test should not be carried out in conditions of high level of precipitation, if performed outdoors.

3. FOAM TESTING PROCEDURE

See Table 29 for a sample of foam production performance testing.

Table 29: Foam production performance testing checklist

AERODROME NAME:	
FIRE STATION/SUB-STATION:	
VEHICLE MODEL, TYPE AND LICENSE NUMBER:	
DATE AND TIME:	
TESTING CONDITIONS:	

TEST PROCEDURES	**RECORD RESULT**
(a) Position the chamber holding the premix foam upwind of the fire with the nozzle horizontal at a height of 1 m above the upper edge of the tray and at a distance that will ensure that the foam will fall into the centre of the tray.	
(b) Test the foam apparatus to ensure: (1) nozzle pressure; and (2) discharge rate.	
(c) When testing: (1) For performance level B foam, place 100 L of water and 100 L of fuel into a 4.5 m2 tray (2) for performance level C foam, place 157 L of water and 157 L of fuel into a 7.32 m2 tray.	
(d) Position the protective screen, if required.	
(e) Test the foam apparatus to ensure a nozzle pressure of approximately 7 bar and a discharge rate of 11.4 L/min.	

(f) Record the air, kerosene, water and foam premix temperature and check it is in the correct range.	
(g) Record the wind velocity and check it is in the correct range.	
(h) Ignite fuel and allow 60 seconds pre-burn from full involvement. *Note 1.— Full involvement shall be obtained in less than 30 seconds after the beginning of ignition.* *Note 2. — Ignition method shall forbid putting a solid or liquid substance into the kerosene, for example, ignition with a gas burner is acceptable.*	
(i) Apply foam continuously while maintaining the nozzle pressure and an application rate of 11.4 L/min for 120 seconds.	
(j) Record extinction time (in seconds).	
(k) Place burn-back pot in centre of fire tray.	
(l) Ignite burn-back pot 120 seconds after the end of the application of foam.	
(m) Record when 25 per cent of the fuel area is re-involved with fire.	
FOAM PERFORMANCE REQUIREMENTS For each performance level, a foam concentrate should be considered acceptable if below minimum requirements are achieved.	
(a) if the time to extinguish the fire from the overall surface of the tray is equal to or less than 60 seconds	
(b) if the reignition of 25 per cent of the tray surface is equal to or longer than 5 minutes. *Note. — for testing person or organisation: At the 60 seconds time, minute flames (flickers) visible between the foam blanket and the inner edge of the tray are acceptable.*	

(c) do not spread in a cumulative length exceeding 25 per cent of the circumference of the inner edge of the tray	
(d) are totally extinguished during the second minute of foam application.	

FINAL RESULT	**PASS ☐ FAIL ☐**
REMEDIAL ACTIONS (IF ANY):	
TESTED BY:	Name, Designation and Signature
VERIFIED BY:	Name, Designation and Signature
ACCEPTED BY:	Name, Designation and Signature

4. OPERATIONAL CONSIDERATIONS.

(a) The quality of foam produced by an RFF vehicle system may be affected by the characteristics of the local water supply. It is important to acquire an sufficient clear water supply. No corrosion inhibitors, freezing point depressants or other additives should be used in the water supply without prior consultation with, and the acceptance of, the foam concentrate manufacturer.

(b) Foam can be applied to fires in two distinct forms. Solid streams are used where the range of application is essential or where the stream may be deflected from a solid object to distribute it in the fire area. Solid streams should be employed with care at an aircraft accident where survivors are evacuating the aircraft and escape slides may be in use. Dispersed patterns may be employed to deliver foam at shorter ranges to a fire area, combining greater coverage with the more effective surface application of the foam. Dispersed patterns are particularly valuable in protecting firefighters from radiated heat. Monitors are directional control devices which deliver larger capacity streams from nozzles. Low level application allows the operator to see the position of the monitor, therefore minimizing the waste of agents. In some vehicles, standard water nozzles are employed to produce “fog foam”, mainly from side-line deliveries. While these nozzles are effective in achieving rapid knockdown, they may not be pre-calibrated to produce foams of the specified qualities and these may not have the degree of performance associated with fully-aspirated foams that normally provide a longer duration and reignition (burn-back) protection.

(c) Equipment such as high reach extendable turrets (HRET) and low-level high-performance monitors can provide the operator with greater flexibility in directing the foam stream. HRET can be defined as a device, permanently mounted with a power-operated boom or booms, designed to supply a large-capacity, mobile, elevated water stream or other fire extinguishing

agents, or both. The extendable turret places the nozzle well forward and below the operator, thus eliminating foam overspray and providing a clearer view of the effectiveness of agent application. The ability to position the nozzle nearer to, or in alignment with, the target allows more precise aiming, reduces disruption from wind and helps to conserve agent.

(d) RFF vehicles equipped with HRET may incorporate penetrating technology that provides the vehicle operator the ability to deliver extinguishment agent through an adjustable nozzle or rigid probe in and around the aircraft and into the passenger or cargo compartments. Such technology provides the ability to pierce through the fuselage or aircraft components, affording the operator greater flexibility when it comes to the strategies and tactics of aircraft interior firefighting. The piercing action of the rigid tip allows agent application to the seat of the fire, which may be inaccessible to hand-line operations such as in the case of cargo aircraft, tail-equipped aircraft engines, and auxiliary power units (APUs).

(e) Other suitable manual or hand-held penetrating technologies may include the following:

(1) manual piercing or hand-held penetrating nozzles, given a safe working platform and proper protection, can deliver many of the same firefighting tactics and strategies described for HRETs;

(2) hand-held skin penetrating agent applicator tool (SPAAT) is one of a variety of manual penetration tools available to firefighters; and

(3) ultra-high pressure water streams have been developed using a narrow-gauge water stream to “cut” a small hole through the aircraft skin to apply agent into the interior of an aircraft. The ultra-high pressure water streams pierce the outer structure with high pressure water and aggregate enabling an exterior attack on the involved structure. Once the outer structure is penetrated, the ultra-high pressure sends a mist into the thermal layer which cools the interior, dropping temperature from 800°C to 100°C in a matter of seconds. This technology allows the operator to attack fire from a safe exterior position without the firefighter entering the interior of a structure.

(f) The use of high reach extendible penetrating technology equipment to suppress aircraft interior and cargo fires should be carefully evaluated as there may be concerns regarding its efficacy and safety, in particular to safety of passengers. Where such equipment is provided, policies and procedures on its safe operations should be established and RFF personnel are trained and competent in the use of such equipment.

(g) Where an RFF vehicle is equipped with an internal self-calibration foam induction system, the frequency of foam performance test may be extended to every three years provided:

(1) an internal self-calibration system accuracy check is conducted bi-annually;

(2) a high-pressure output discharge (splash test) from vehicle monitor, bumper and HRET is conducted quarterly;

(3) a foam sample lab test is conducted annually; and

(4) where an RFF vehicle returns from a major maintenance, repair or de-calibration to the foam induction system, a full foam performance system test should be conducted.

AMC3 ACM.OPS.CERT.E.015(a) Rescue and firefighting

COMPLEMENTARY AGENTS

(a) Discharge rate of complementary agents should be no less than the values shown in Tables 26 or 27.

(b) Complementary extinguishing agent provided at an aerodrome should be a dry chemical powder suitable for extinguishing hydrocarbon fires.

(c) Dry chemical powders should comply with the specifications of the International Organization for Standardization (ISO) or any other equivalent international standard acceptable to the GCAA.

(d) Where alternative complementary agent is considered in replacement of a dry chemical powder, an assessment should be conducted including practical testing, to demonstrate having equal level or better firefighting performance.

GM AMC3 ACM.OPS.CERT.E.015(a) Rescue and firefighting

COMPLEMENTARY AGENTS

(a) Complementary agents do not generally have any substantial cooling effect on liquids or materials involved in fire. In a major fire situation, extinguishment achieved by complementary agents may well only be transient and danger of “flashback” or reignition may occur when foam is not available to secure a fire. They are particularly effective on concealed fires (e.g. engine fires) in aircraft freight holds and beneath wings, where foams may not penetrate and on running fuel fire situations, on which foams are ineffective. They are known as complementary agents because while they may have the capability of rapid-fire suppression (when applied at a sufficient rate), it is generally necessary to apply a principal agent simultaneously or at least before flashback can occur in order to achieve permanent control. Considerably improved complementary agents have become available in recent years, and constant studies are still being made in both the dry chemical and halocarbon fields.

(b) Due regard should be made to the problems which may arise when large quantities of complementary agents are discharged rapidly. A dense cloud of the agent may impede aircraft

evacuation or rescue operations by limiting the visibility and affecting the respiration of those exposed to the effects.

(c) Dry chemical powders.

(1) These are available in a number of formulations, each consisting of finely divided chemical products which are combined with additives to improve their performance. The dry chemical powders normally provided for aircraft RFF applications are not specifically designed or intended for use on flammable metal fires, which require specialized agents. In aircraft RFF operations dry chemical powders are normally of the "BC" type, indicating their effectiveness against fires involving flammable liquids and those of an electrical origin. In addition, dry chemical powders should comply with the specifications of the International Organization for Standardization (ISO 7202). Operational applications are usually in one of the following methods:

(i) they are effective against fires in inaccessible locations and for running fuel fires, where foams are largely ineffective; and

(ii) at a high rate of application in the role of a principal agent, they may well be an acceptable practice at aerodromes with extreme climatic conditions. When large quantities of dry chemical powders are discharged rapidly, limited visibility will also reduce the effective placement of foam in a dual-agent attack to those areas where the dry chemical powder has achieved "knockdown".

(d) It should be noted that dry chemical powder can be highly corrosive when applied to metal surfaces and electrical componentry.

(e) Halogenated hydrocarbons.

(1) In line with the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer, the production of halon 1211, 1301 and 2402 has been banned since 1994.

(2) The United States Environmental Protection Agency has evaluated substitutes for the ozone-depleting chemicals that are being phased out as part of its Significant New Alternatives Policy (SNAP).

(3) Halons are therefore no longer discussed in this document but may still be found in some aircraft fixed installations.

(f) Carbon dioxide (CO2).

(1) Carbon dioxide is traditionally used in aircraft RFF operations in two ways:

(i) as a means of rapid knockdown for small fires or as a flooding agent in reaching concealed fires in areas inaccessible to foam. It should not be used on fires involving flammable metals; and

(ii) CO2, is most effective at high rates of delivery, achieved through "low pressure'' systems.

(2) CO2 gas is only 1.5 times the weight of air and is therefore seriously affected in outdoor applications by the wind and the convection currents associated with a fire.

(3) CO2 should comply with the specifications of the International Organization for Standardization (ISO 5923).

(g) Alternative complementary agents having equivalent performance acceptable to the GCAA can be considered for use at an aerodrome, provided full practical testing is conducted. Alternative complementary agent should comply with the specifications of the International Organization for Standardization.

(h) Further guidance on complementary agents is given in ICAO Doc 9137 Airport Services Manual Part 1, Chapter 8.

AMC4 ACM.OPS.CERT.E.015(a) Rescue and firefighting

RESERVE SUPPLY

(a) Reserve supplies of principal and complementary agents equivalent to 200 per cent of the quantities of these agents identified in Tables 26 or 27 should be provided near or on a fire station/s for rapid replenishment of rescue and firefighting vehicles.

(b) For complementary agent, sufficient propellant gas should be included to utilize this reserve agent.

(c) Where a delay in the supplies of extinguishing agents and increase in training activities are anticipated, additional amount of reserve supplies should be determined and increased accordingly.

GM AMC4 ACM.OPS.CERT.E.015(a) Rescue and firefighting

SUPPLY AND STORAGE OF EXTINGUISHING AGENTS

(a) The quantities of the various extinguishing agents to be provided in the RFF vehicles should be in accordance with the aerodrome category and Tables 26 or 27. This will permit an immediate complete recharge of the vehicles, if necessary, subsequent to an emergency and retention of a second complete recharge should another emergency occur before aerodrome stocks can be replenished. For the purpose of determining quantities of reserve supply, the quantities of foam concentrate carried on fire vehicles in excess of the quantity identified in Tables 26 or 27 can be considered contributing to the reserve.

(b) Additionally, category 1 and 2 aerodromes that have replaced up to 100 per cent of the water with a complementary agent, based on foam meeting performance level A equivalency (1 litre to 1 kg), should hold a reserve supply of a complementary agent of 200 per cent.

(c) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply should be increased as determined by, among others, the following considerations:

(1) location of RFF service (may be remote);

(2) availability of supplies;

(3) training and competency requirements;

(4) vehicle and equipment testing regimes;

(5) delivery times; and

(6) customs considerations.

(d) Rescue and firefighting vehicle foam tanks should be kept full at all times when the vehicle is in operational service because partially filled tanks will create stability problems when the vehicle is cornering at speed. Furthermore, serious sludging problems can occur where protein foam is carried through oxidation and agitation if there is an air space above the surface of the foam.

(e) The conditions of storage are mainly specified by manufacturers or suppliers including the intended shelf lives, but the aim should be:

(1) Foam concentrate should avoid extremes of temperature and be kept in climate-controlled storage environment. Use stocks in order of receipt. Keep concentrate in manufacturers' containers or a suitable on-site bulk storage facility until required for use, where applicable. Where either foam concentrate drums, bladders or large above-ground tanks are used, they should be suitably contained in case of a spill. Where more than one type of foam concentrate is in use, foam concentrate containers should be suitably marked.

(2) Dry chemical powders. Use stocks in order of receipt. Replace and seal the lids of any partly used containers ensuring the powder is kept dry and free from contaminates

ACM.OPS.CERT.E.020 Rescue and firefighting

RESPONSE OBJECTIVES

(a) An aerodrome operator shall ensure:

(1) rescue and firefighting service achieves response times to operational runway and movement areas in optimum visibility and surface conditions;

(2) any vehicles, other than the first rescue and firefighting service responding vehicle(s), required to deliver the amounts of extinguishing agents as determined by the appropriate

aerodrome protection category for continuous agent application, arrive within the determined duration from the initial call;

(3) fire station/s including appropriate facilities to accommodate rescue and firefighting vehicles, equipment and personnel is/are provided at an aerodrome;

(4) communication and alerting systems including a direct communication between the rescue and firefighting service, air traffic service and the aircraft crew during an emergency are provided at an aerodrome; and

(5) minimum number of rescue and firefighting vehicles and vessels are provided at an aerodrome, in accordance with Table 30; and

(6) minimum types and quantities of rescue equipment are provided at an aerodrome.

Table 30: Minimum number of rescue and firefighting vehicles

Aerodrome category	Minimum number of rescue and firefighting vehicles	Minimum number of rescue and firefighting vessels
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	2	2
7	2	2
8	3	3
9	3	3
10	4	3

AMC1 ACM.OPS.CERT.E.020(a) Rescue and firefighting

RESPONSE TIME

(a) For land aerodromes:

(1) the operational objectives of the rescue and firefighting service should be to achieve a response time not exceeding two minutes to any point of each operational runway in optimum visibility and surface conditions;

(2) the operational objectives of the rescue and firefighting service should be to achieve a response time not exceeding three minutes to any other part of the movement area in optimum visibility and surface conditions, and

(3) any vehicles, other than the first responding rescue and firefighting vehicles specified in Table 30, required to deliver the amounts of extinguishing agents specified in Tables 26 or 27, deliver continuous agent application and arrive no more than one minute after the first vehicle/s.

(b) For water aerodromes:

(1) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding three minutes to any point of each operational runway in optimum visibility and surface conditions;

(2) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding four minutes to any other part of the movement area in optimum visibility and surface conditions; and

(3) any vessels, other than the first responding rescue and firefighting vessels specified in Table 30, required to deliver the amounts of extinguishing agents specified in Tables 26 or 27, deliver continuous agent application and arrive no more than one minute after the first vessel/s.

GM1 AMC1 ACM.OPS.CERT.E.020(a) Rescue and firefighting

RESPONSE TIME CONDITIONS

(a) Response time is considered to be the time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) or vessel(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in in Tables 26 or 27.

(b) For land aerodrome, optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response route free of surface traffic and contamination, e.g. water, sand, etc.

(c) For water aerodrome, optimum visibility and surface conditions are defined as daytime, good visibility, normal response route free of surface traffic and not exceeding Beaufort Sea State 2.

Note. — The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea. Beaufort Sea State 2 refers to light breeze, wind speed (6 knots / 6-11 km/h), wave height (0.3–0.6 m) and small wavelets still short but more pronounced with crests have a glassy appearance but do not break.

(d) Additional guidance on response time is available in the ICAO Doc 9137 Airport Services Manual Part 1.

GM2 AMC1 ACM.OPS.CERT.E.020(a) Rescue and firefighting

RESPONSE TIME VERIFICATION

(a) In order for a rescue and firefighting service to maintain its response time objectives, the aerodrome operator may consider conducting verification tests under the following conditions:

(1) where there is new ARFFS personnel or existing personnel returning from long absence;

(2) where there is new ARFFS vehicle or existing vehicles returning from major maintenance that may affect its operational performance;

(3) where there are major changes to aerodrome infrastructures and/or operating environments; and

(4) where there are major changes to operational policies and procedures.

(b) The response location and routes should be selected and agreed in close coordination with Air Traffic Control and should not cause any major disruption to aerodrome operations.

(c) Response time verification should include all RFF vehicles as per aerodrome category and each vehicle discharging short burst of water through the vehicle's monitor at the correct operating pressure, immediately upon arrival at a nominated location (runway, taxiway, aircraft stand, etc).

(d) The response time verification should be initiated, in close coordination with Air Traffic Control, using the normal emergency response activation procedures detailed in the AEP, and the time required from the activation to the production of water at the nominated location should be recorded including the arrivals of first and last vehicles.

(e) The response timing verification should be conducted under strict controlled conditions and safely performed during optimum visibility and surface conditions so that the rescue and firefighting vehicles are not disrupted during the verification and the vehicles can be quickly

AMC2 ACM.OPS.CERT.E.020(a) Rescue and firefighting

SUPPLEMENTARY WATER SUPPLY SYSTEMS, FACILITIES AND EQUIPMENT

(a) Supplementary water supplies, facilities and equipment for the expeditious replenishment of rescue and firefighting vehicles at an aircraft accident should be provided at the aerodrome.

(b) A fire water needs analysis should be conducted to determine additional amounts of water required to replenish rescue and firefighting vehicles within five minutes immediately after an aircraft accident, considering the following factors:

(1) sizes and types of aircraft using the aerodrome;

(2) the capacities and discharge rates of aerodrome fire vehicles;

(3) the provision of strategically located hydrants;

(4) the provision of strategically located static water supplies;

(5) utilization of existing natural water supplies for firefighting purposes;

(6) vehicle response times;

(7) historical data of water used during aircraft accidents;

(8) the need and availability of supplementary pumping capacity;

(9) the provision of additional vehicle-borne supplies;

(10) the level of support provided by local authority emergency services;

(11) the pre-determined response of local authority emergency services;

(12) fixed pumps where these may provide a rapid and less resource-intensive method of replenishment;

(13) additional water supplies adjacent to aerodrome fire service training areas; and

(14) overhead static water supplies.

(c) Supplementary water supply storage and delivery facilities to be provided at an aerodrome should include any of the following:

(1) a fire hydrant system (above, underground or combination);

(2) water supply vehicles; and/or

(3) water tanks.

(d) Supplementary water supply system, facilities and equipment should be suitably designed with sufficient capacity in terms of amount, pressure and flow rate to meet the current and future needs of the aerodrome to support immediate and protracted water flow requirements in the event of an emergency.

(e) A preventive maintenance programme for the supplementary water supply system, facilities and equipment should be established and implemented including:

(1) periodic inspection and testing of the system, facilities and equipment;

(2) a competent person to manage the maintenance programme; and

(3) records are maintained for at least 5 years, for audit and inspection by the GCAA.

GM AMC2 ACM.OPS.CERT.E.020(a) Rescue and firefighting

SUPPLEMENTARY AERODROME WATER SUPPLY SYSTEMS

(a) The guidance on aerodrome water supply systems is intended to support ARFFS operations at any aerodrome. This guidance does not include water supply systems intended to support

aerodrome structural fire protection functions. Guidance for the water requirements for fire protection of aerodrome structural facilities such as aerodrome terminals, aircraft hangers, air cargo terminals, fuel farms, etc., should be refer to the local UAE fire code and/or NFPA 419 - Guide for Master Planning Aerodrome Water Supply Systems for Fire Protection.

(b) Supplementary water supplies, for the expeditious replenishment of RFF vehicles, should be prearranged. The objective of providing additional water supplies at sufficient pressure and flow is to ensure rapid replenishment of aerodrome RFF vehicles. This supports the principle of continuous application of extinguishing media to maintain survivable conditions at the scene of an aircraft accident for far longer than that provided for by the minimum amounts of water set out in Tables 26 or 27.

AERODROME FIRE HYDRANT SYSTEM

(a) All of the components for an aerodrome fire hydrant supply system should meet the requirements of and be installed in accordance with the local UAE fire code or NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances". The valves, hydrants, and pumps should be designed to operate as intended at temperature conditions applicable for the geographic region. The installation should include freeze protection, if necessary.

(b) Piping Layout. A gridded or a looped water distribution system is preferred over a single water main. The emergency capacity of the system should be based on the ARFFS vehicle refill standards and any domestic or industrial service that will have concurrent demands. Avoid installing water lines under future sites for aerodrome buildings, maintenance facilities, embankments, or heavy traffic areas such as runways and taxiways. Provide anti-surge components as needed to protect piping from surge and water hammer damage. When feasible, the aerodrome water distribution system should be fed with water at two or more widely separated and isolatable inlets.

(c) Valves. Locate valves for optimum control and to limit size of the inoperative area during system checks, repairs, modifications, or expansions.

(d) Hydrants.

(1) All hydrants installed in support of an ARFFS water supply system should be accepted by the local UAE fire authority or an accepted testing organisation.

(2) The availability of hydrants in proximity to aprons is necessary. Where hydrants are located close to hangers, terminal buildings, and passenger gates, the location should be identified with a reflective sign at least 4.5 M above their position. Hydrants should be strategically located on loops or grids readily accessible to ARFFS vehicles. Optimum

hydrant spacing is approximately 90 M. Spacing should not be more than 150 M apart along the periphery of aprons which are used for aircraft parking and passenger loading and unloading.

(3) Hydrant station locations should not constitute a hazard to aircraft or ground vehicle movements. This placement should also safeguard hydrants against aircraft or ground service vehicular damage and vandalism.

(4) Hydrants installed along runway shoulders or other strategic locations are intended only as resupply points. They do not replace self-propelled ARFFS equipment. Runway or taxiway hydrant systems should be conspicuously marked, and be of recessed or flush type. Additionally, such systems will need special winter maintenance to insure identification of their positions for inspection, test, maintenance, and emergency use.

(e) Fire Service Pumps. Fire service pumps are needed to boost the normal municipal water system pressure to the levels needed for ARFFS emergencies as well as for multi-story aerodrome structures and aircraft hangers. An effective emergency pumping system has the following characteristics:

(1) Fire pumps are installed to conform to local UAE fire code or NFPA 20, "Standard for the Installation of Centrifugal Fire Pumps."

(2) The number of pumps is sufficient to supply the total water demand at the required pressure with the largest individual pump inoperative.

(3) The pump power source is highly reliable, i.e., each pump is individually driven. Avoid the dependence of all pumps driven by a common source, such as a public electric utility. For electric motor driven pumps, a backup engine generator with an automatic transfer device is available in case of an electrical failure.

(4) The pump arrangement allows either manual or automatic operations.

(5) Pressure reducing components are provided to protect domestic piping from surge pressures or water hammer damage.

(6) A regular inspection schedule and a preventive maintenance programme is in place.

(7) A strategic arrangement of valves and discharge headers is provided to ensure the continuous availability of water during single or group pump maintenance operations.

(8) Suction lines to all fire pumps from reservoirs are sized to permit full water flow requirements.

(9) The pump house is a detached building of fire resistive construction. Site location does not constitute a hazard to aircraft operations. If pumps are housed within another

structure, the pump room is sectioned off by an enclosure having a minimum four-hour fire rating.

(10) Spare pumps are operational and are on-line during emergencies.

WATER SUPPLY VEHICLES

(a) Vehicle Capacity.

(1) The water payload of an ARFFS vehicle is a function of the aerodrome ARFFS category. The latter is based on the longest passenger aircraft serving the aerodrome. The ability of any ARFFS water supply system to efficiently refill these vehicles is a primary consideration in assessing system acceptability.

(2) Aerodrome categories are used to quantify the amount of water and the minimum number of vehicles needed to transport it.

(3) The operational capacity for a given ARFFS vehicle is a function of the total water requirements for that aerodrome category and the required number of vehicles needed to transport and apply that quantity of water.

(b) Vehicle Tank Fill Connections.

(1) The tank fill performance standard for modern ARFFS vehicles specifies that the tank fill connections be sized to permit the filling of the water tank in no more than two minutes when the available water supply provided at the tank intake connection is at a pressure of 5.5 bar.

(c) Fill Supply Flow Rate.

(1) To take full advantage of existing vehicle technology, the water system connections designated as ARFFS vehicle fill stations should, wherever practical, be sized and have the volume capacity to support that standard.

(2) As an illustration, a 7,600 litres capacity vehicle would need a minimum flow of 3,800 litres per minute. Using the individual vehicle fill requirements thus derived, a cost-effective water supply system can be designed for any unique fleet of ARFFS vehicles.

WATER TANKS

(a) Water can be acquired from a public water system, man-made reservoirs, or natural sources. Public water systems are generally a reliable primary source for ARFFS service operations. Man-made reservoirs include a variety of devices such as: gravity tanks, pressure tanks, wells, and in or above ground level reservoirs. Natural sources such as lakes, rivers, and springs may also be accessible to the aerodrome. Whichever water source is chosen, the aerodrome operator should identify the source as being able to support the present and forecasted water

requirements of the ARFFS service as well as the domestic water service demands of the aerodrome. When selecting the water source to support an overall aerodrome fire protection programme, the following should be considered:

(1) Public Water System. Generally, a reliable primary water supply source. The disadvantages of this source include: lack of control over water sharing, physical condition of the system, the scheduling of service interruptions, and system component make-up, such as pressure reducing valves or water meters. Also, booster pumps are often required to overcome restricted flows and/or to increase pressure during fire service operations.

(2) Man-made Reservoirs.

(i) Elevated gravity tanks provide a dependable delivery of water. However, the need for high pressures and flow rates during fire service operations may restrict their use because of the extra cost of fire pumps or other practical considerations. If employed, their height and location should not constitute an aerodrome hazard. If selected, they should be properly sized to support the needed flow rates and shall be installed and maintained in accordance with local UAE fire code or NFPA 22, "Standard on Water Tanks for Private Fire Protection." It should be noted that elevated facilities located on the aerodrome need to be shown on the Aerodrome Layout Plan.

(ii) In- or above ground level water reservoirs intended for ARFFS support can be located on or off the aerodrome, but should be under the aerodrome operator 's control to assure availability. Any reservoir should be divided into approximately equal sections to allow continuous service during routine maintenance, repairs, or expansions to the reservoir. As an additional safeguard, automatic supervision of the water level in the reservoir is recommended. Installation of reservoirs shall also be in accordance with local UAE fire code or NFPA 22. It should be noted that when man-made reservoirs or natural bodies of open water are located on or near aerodrome property, and will remain uncovered, consideration should be given to the design of the reservoir such that attraction to wildlife is minimized. Designs of the water body should be linear to facilitate covering if wildlife begins to use the collected water.

(iii) Wells are subject to recedence. In some areas high volume use results in salt water intrusion. This not only presents increased corrosion problems, it also affects the usefulness of the water for foam production, except for military specification AFFF

or other foam concentrates known to be compatible with either fresh- or saltwater. Before placing reliance on well water supplies, local water table trends should be analysed for potential recedence, contaminants, and saltwater intrusion.

(3) Natural Supply Sources.

(i) These are usually located beyond the physical control of the aerodrome. Other disadvantages include: the effects of seasonal rain fall variations, new land developments which increase water demands, and possible alterations of the source. In addition, industrial pollutants or other contaminants, may affect the usefulness of the water for foam production and/or cause damage to ARFFS vehicles, pumping equipment, and/or the associated water supply distribution network.

WATER SUPPLY SOURCES EVALUATION.

(a) A viable water source is one that has the capacity to support ARFFS water flow requirements. To determine the best water source, analyse the alternatives on the basis of cost-effectiveness and operational requirements. To avoid costly future expansions or corrective measures, the selected source should be able to accommodate current needs as well as projected expansions. The analysis should examine at least the following:

(1) Control. Validation of the aerodrome operator 's authority to maintain control over the water source. The concept of "control" should include reliable "access" both in terms of access rights to use the water and to have both the rights and the means to gain physical access with ARFFS vehicles. The later could involve easements for vehicle traffic. The arrangements for control/access may be critical in case of normal distribution system failure and vehicle shuttle operations are needed as a backup system.

(2) Capacity. Verification of the capacity of the potential source to supply the flow rates and pressures needed to support both normal domestic and industrial obligations and emergency ARFFS service demands. If insufficient, plans and procedures to curtail other users during ARFFS operations should be considered.

(3) Seasonal Moisture Accumulations. An evaluation of the effects of drought and flood on the reliability of potential water sources.

(4) Future Requirements. An assessment of the potable water requirements of any population centres that may share the source. Consider the increases in population on- and around the aerodrome which may expand significantly over time and develop estimates for increased water demand.

(5) Water Quality. Identify any actual and potential water contamination, e.g., chemicals or particulates and assess their effect on ARFFS operations.

(6) Backup Source. Identify any existing backup source or examine the feasibility of providing a secondary water source to be used in the event of an interruption in the main water supply. This is particularly important when hydrants are the primary source of ARFFS vehicle refill. Contingency plans should be developed to provide the necessary water resupply when the hydrant system is inoperative due to scheduled service as well as for unscheduled interruptions.

AERODROME WATER SUPPLY SYSTEM READINESS.

(a) Oversight.

(1) Responsibility for assuring proper operation, maintenance, and testing of an ARFFS vehicle fill source and the associated distribution system should rest with a single agency or authority.

(2) Depending on the actual source, and/or its physical location, that authority could be aerodrome management, a private water company, or the local municipal utilities department.

(b) Operational Checks.

(1) Periodic testing of subsystem components as well as the total water supply system is essential to both prove the operational readiness of the system and to train new personnel or maintain the currency of those responsible for system operation under emergency conditions.

(2) In addition, ARFFS personnel should be fully familiar with the operation of any portion of the water supply system under aerodrome jurisdiction. The following schedule of operational checks is recommended:

(i) Initiate and maintain a leak detection programme to detect and repair leaks that may develop in any portion of the buried water system that lies near the air operations surfaces. Undetected leaks could result in pavement undermining and subsequent collapse.

(ii) Perform a turnover test for both the primary and the spare fire water pumps at least once a week. Conduct full flow tests at least once per year. Run up each internal combustion engine (including any spares) used to drive fire water pumps weekly for at least one-half hour.

(iii) Flush test all hydrants annually. Operate all main and subsystem valves in the water supply system through at least one full cycle (open/close/open or close/open/close) at least once annually.

(iv) Conduct a daily inspection of all subsystem isolation valves to ensure that inadvertent system outages do not go undetected in the event that unauthorized valve closures occur.

(v) Conduct a full flow test immediately after any significant change, modification or repair has been made to the aerodrome ARFFS water supply system; or, to any of the major subsystems. This test is needed to ensure that the original design parameters have not been degraded or that the anticipated improvements have been attained.

(c) System Outage Reporting.

(1) The aerodrome operator should develop and implement an operating procedure that assures ARFFS service notification of any reduction in the ARFFS water supply capability, either in pressure or volume.

(2) In the case of an unscheduled interruption, the notification should be immediate and should include information as to the extent or areas of the aerodrome affected, the estimated time to system restoration, and any emergency procedures instituted by the water supply system operator.

(3) For scheduled interruptions due to maintenance or system modifications, notification should, whenever practical, precede the interruption by 24 hours.

(4) The RFF service should also be notified promptly of system restoration so that appropriate system tests may be conducted.

AMC3 ACM.OPS.CERT.E.020(a) Rescue and firefighting

EMERGENCY ACCESS ROADS AND GATES

(a) Emergency access roads should be provided on an aerodrome where terrain conditions permit their construction so as to facilitate the achievement of minimum response times.

(b) Particular attention should be given to the provision of ready access to approach areas up to 1 000 m from the runway threshold or at least from the threshold to the aerodrome boundary.

(c) Where the aerodrome is fenced, access to outside areas should be facilitated by the provision of emergency gates or frangible barriers.

(d) Emergency access roads and any associated bridges should be capable of supporting the heaviest vehicles, which will use them and be constructed so as to be effectively available in all weather conditions.

(e) Roads within 90 m of a runway should be constructed to prevent surface erosion and the transfer of debris to the runway.

(f) Sufficient vertical clearance should be provided from overhead obstructions for the largest rescue and firefighting vehicles. Wherever possible, roads should permit the passage of vehicles in both directions.

(g) When the surface of the road is indistinguishable from the surrounding area, or in areas where sand or vegetation may obscure the location of the roads, edge markers should be placed at intervals of about 10 m.

(h) Where an emergency access road, normally provided with a gate or frangible barrier, leads emergency vehicles on to a public road, the exterior face of the gate or barrier should be marked to indicate its purpose, with a prohibition of vehicle parking in its immediate vicinity.

(i) Suitably designed corners, with sufficient radii for the manoeuvring of RFF vehicles, should be provided to facilitate the departure of responding vehicles through the aerodrome fence emergency gates or barriers.

(j) Combined facilities of emergency access road and gate or barrier should be subject to regular inspection and physical tests where necessary, to prove the proper functioning of any mechanical element, to ensure their availability in an emergency.

(k) Where access gates are non-frangible and secured by other mechanical means, access through the gate(s) should be readily available, such as, but not limited to, the provision of keys to the gates to be kept in the rescue and firefighting vehicles.

GM AMC3 ACM.OPS.CERT.E.020(a) Rescue and firefighting

EMERGENCY ACCESS ROADS AND GATES

Guidance on assessment of the approach and departure areas within 1 000 m of the runway threshold to determine the options available for rescue, including suitable resources to be provided is detailed under **GM2 AMC1 ACM.OPS.CERT.D.015 Emergency planning**.

AMC4 ACM.OPS.CERT.E.020(a) Rescue and firefighting

MAINTAINING RESPONSE CAPABILITY DURING TRAFFIC CONGESTION OR NON-OPTIMUM CONDITIONS

(a) In meeting the operational objective as nearly as possible in times of traffic/apron congestion or in less than optimum conditions of visibility and conditions, especially during low visibility operations, suitable guidance, equipment and/or procedures should be provided for rescue and firefighting services including:

(1) establish and implement plans and procedures with air traffic control to direct ground vehicle movement in case of accident or incident; and

(2) provide airfield charts, navigational equipment and tracking system for the rescue and firefighting service.

GM AMC4 ACM.OPS.CERT.E.020(a) Rescue and firefighting

MAINTAINING RESPONSE CAPABILITY DURING TRAFFIC CONGESTION, NON-OPTIMUM CONDITIONS OR AERODROME WORKS

(a) In order to meet the operational response objective as nearly as possible during traffic/apron congestion, in less than optimum conditions of visibility, especially during low visibility operations or aerodrome works at airside, suitable guidance, equipment and/or procedures for RFF services should be provided. These may include navigation equipment installed in the RFF vehicles such as:

(1) a driver enhanced vision system (DEVS) with on-board navigation equipment utilizing the global navigation satellite system to provide the driver with the vehicle's location thus serving as an aid in navigating to the accident sites;

(2) tracking using digital radio datalink to assist the vehicle driver in locating and navigating to the accident site, thereby reducing driver communications workload and improving situational awareness; and

(3) low visibility enhanced vision using a forward looking infrared (FLIR) device (or other comparable state-of-the-art low visibility enhanced vision technology) by sensing thermal radiation instead of visible light to improve visual awareness in a smoky, foggy or dark environment.

(b) RFF vehicles should approach any aircraft accident or incident by the quickest route commensurate with safety, although this might not necessarily be the shortest distance to the incident site. Traversing through unimproved areas can take longer than travelling a greater distance on paved surfaces, therefore a thorough knowledge by ARFFS personnel of the topography of the aerodrome and its immediate vicinity for all weather conditions is paramount. The use of grid maps and careful selection of routes is essential for success in meeting the response objectives.

(c) Consideration should be given to the provision and use of technical equipment, e.g. surface movement radar, infrared vision systems, taxiway centreline lighting, vehicle positioning equipment and other navigation aids that could enhance ARFFS response to the location of an accident or incident site in low visibility conditions.

(d) Once low visibility operations have been initiated it may be necessary to restrict the operation of vehicles in the aircraft manoeuvring area. Procedures developed for ATC to assist the ARFFS in case of an accident or incident should be put in place.

(e) ARFFS and associated external emergency response personnel should be made aware of the existence of any areas that may, from time to time, become impassable because of weather or other conditions, and of the location of obstacles both permanent and temporary.

(f) Operational procedures should be developed through which air traffic control (ATC) stop or divert all aircraft and non-essential traffic that conflicts with responding ARFFS vehicles. ARFFS personnel should continuously monitor the minimum visibility operating conditions in order to maintain response capability under such conditions.

(g) In addition, other suitable provisions should be considered such as bypass access roads as well as the provision of ground movement guidance instructions from air traffic control based on surveillance radar, accident site location by air traffic control and a collision avoidance facility either from equipment installed in the vehicles or provided by surveillance radar from air traffic control. For the guidance of the RFF vehicles from their station(s) or standby position(s) to the accident site, rescue and firefighting vehicles should move in a convoy directed by air traffic control.

AMC5 ACM.OPS.CERT.E.020(a) Rescue and firefighting

MAINTAINING RESPONSE CAPABILITY DURING SPECIAL EVENT

(a) Where a rescue and firefighting service is required to support any special event conducted at an aerodrome, participation should be planned and managed in accordance with the aerodrome operator ’s safety management system.

(b) The participation of a rescue and firefighting service at a special event should not affect its capability to respond to any emergencies at an aerodrome.

GM AMC5 ACM.OPS.CERT.E.020(a) Rescue and firefighting

MAINTAINING RESPONSE CAPABILITY DURING SPECIAL EVENT

(a) A special event conducted at an aerodrome may include, but not limited to diplomatic or VVIP visit, water salute commemorative event, testing/opening of a new facility, airside promotional campaigns/celebrations, etc.

(b) Sufficient planning considerations for a special event include establishing procedures or agreements with relevant stakeholders, conducting risk assessments, preparing personnel and equipment, event rehearsal, exercising/testing, etc.

(c) Consult relevant stakeholders on the conduct of a special event. Depending on the nature and scale of the special event, it may be necessary to develop plans and procedures including obtaining the necessary acceptances. Preparatory drills/exercises may be conducted to test the plans and procedures.

AMC6 ACM.OPS.CERT.E.020(a) Rescue and firefighting

FIRE STATION AND FACILITIES

(a) A fire station should be provided to accommodate rescue and firefighting vehicles, personnel and associated equipment including:

(1) satellite fire station, whenever the response time cannot be achieved from a single fire station; and

(2) the fire station/s is strategically located so that the access for rescue and firefighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

(b) A watchroom should be provided at a fire station including:

(1) where there is more than one fire station is provided at an aerodrome, a main fire station including its watchroom should be designated as the master watchroom; and

(2) the watch room is continuously manned by trained and competent person.

(c) A fire station should be a self-contained facility including:

(1) provision of appropriate facilities for the garaging of vehicles and its associated equipment with adequate protection against inclement weather;

(2) availability of administration, domestic and accommodation facilities for rescue and firefighting personnel – operational, supervisors and managers; and

(3) provision of additional operational facilities and services that are necessary to ensure their continuous ability for effective and immediate response in an emergency.

(d) Acceptance of the GCAA should be obtained prior to construction of a new fire station or changes made to existing fire station infrastructure including its operating environment at an aerodrome, in accordance with **CAR AGA PART ADR ADR.OR.H.070** requirements.

GM AMC6 ACM.OPS.CERT.E.020(a) Rescue and firefighting

FIRE STATION AND FACILITIES

1. GENERAL

(a) In the past there has been a tendency to provide only the minimum level of accommodation for the RFF vehicles, little more than garage space, with equally sparse facilities for their crews. Experience has shown that these standards of provision are not conducive to operational efficiency in terms of either the vehicles or the personnel who are to operate them. A study of the operational requirement has emphasized the importance of correctly sited fire stations, supported by efficient communications systems, as a prerequisite for the immediate and effective response by RFF services.

(b) Properly constructed and appointed fire stations can make an important contribution to the morale and efficiency of these services. Further, response times are likely to be reduced by undertaking in the planning stage a study of traffic patterns, procedures, previous accident experience and the probable response paths of RFF vehicles. The following paragraphs discuss some of the design and site factors, which are considered to be significant in this context.

2. LOCATION

(a) The location of the fire station is a primary factor in ensuring that recommended response times can be achieved; that is, two minutes and not more than three minutes to the end of each runway in optimum conditions of visibility and surface conditions. Other considerations, such as the need to deal with structural fires or to undertake other duties, are of secondary importance and should be subordinated to the primary requirement. At some aerodromes it may be necessary to consider the provision of more than one fire station, each located strategically in relation to the runway pattern. Aircraft accident studies have shown that a large proportion of accidents and incidents occur on, or close to the runway/accidents in or beyond runway end safety area locations often produce the more serious consequences in terms of fire situations and casualties.

(b) Where more than one fire station is provided, each may contain one or more vehicles from the total fleet. This divides the overall quantity of extinguishing agents available into units capable of initiating immediate fire suppression activities on arrival at the accident site. It is usual, with more than one fire station, to designate one as the master (or main) station, providing the master watchroom, and the other stations as satellites.

(c) RFF vehicles should have direct and safe access to the movement area that caters to the size of the fire vehicle(s) being deployed and be capable of reaching the extremities of this area within

the recommended response time. When a new station is to be provided, vehicle response trials should be run to determine the optimum location in relation to potential accident sites. Due consideration should be given to the future development plans of the aerodrome as these may increase the distances over which responses should be made.

(d) All fire stations should be located so that access to the runway area is direct, requiring the RFF vehicles to negotiate the minimum number of turns. Additionally, the location should ensure that the vehicle running distances are as short as possible in relation to the runway(s) the fire station is intended primarily to serve. The ability to reach standby positions without delay is important. The placement of the watchroom, if provided, in each fire station should ensure the widest possible view of the movement area including aircraft approaches and departures. The installation of closed-circuit television (CCTV) cameras may be considered in watchrooms to enhance their view.

3. DESIGN AND CONSTRUCTION

(a) Each fire station should be a self-contained RFF service, with appropriate facilities for the garaging of vehicles, accommodation of crew members and the provision of operational services that are necessary to ensure their continuous ability for effective and immediate response in an emergency. Facilities for the major maintenance of fire vehicles need not be included provided that these exist elsewhere, on, or in close proximity to, the aerodrome. The range and extent of facilities may vary between those necessary in the main fire station and those appropriate to a satellite station, but in general should include:

(1) sufficient accommodation for the garaging of fire vehicles, which may include other specialist vehicles such as aerial vehicles or water rescue craft and for the conduct of in-service (minor) maintenance;

(2) domestic and administrative facilities for the personnel required to operate these fire vehicles;

(3) communications and alarm systems which will ensure the immediate and effective deployment of fire vehicles in any emergency; and

(4) appropriate storage and technical support facilities as are necessary to protect and maintain the equipment and reserves of extinguishing agents held at each fire station or nearby facility.

(b) In meeting these basic requirements, it is desirable to consider not only design features, but also constructional details since experience has shown that inadequacies in either respect can add to the time taken to receive a call and respond to an emergency, as well as introducing

problems in the day-to-day use of a fire station. Some features, which are considered to be important in ensuring the functional efficiency of fire stations, are outlined below.

(c) Vehicle housing.

(1) A series of bays providing sufficient space for each vehicle and a surrounding area in which personnel can work conveniently. A minimum clearance of 1.2 m should be provided around each fire vehicle. The minimum clearance area should consider and allow for the way in which fire vehicle cabin doors and locker doors open as well as rear-mounted fire vehicle engine cowlings that may open outwards for engine access. The dimensions of each bay, including the working area, should have regard not only to the vehicles currently in service, but also to future models which may be acquired to meet increases in the aerodrome RFF service category.

(2) The floors of the fire vehicle bays should provide for any increase in fire vehicle weights, lengths and or widths which new equipment may impose. The surface finish of floors should be resistant to oil, grease, foam concentrates, etc. and be easily cleaned. This can be achieved by having a non-slip tiled surface or a hard-top sealed concrete finish. The floors should slope down towards the doors, where a transverse drain, with heavy gauge cover, can receive surface water from the bays and the forecourt.

(3) The doors to the bays should be of the quick action type and of robust design, incorporating, where possible, windows to improve the natural lighting within the bays. Bay doors may be manually operated or equipped with automatic opening devices, which may include remote operation from the watchroom or in association with the operation of the station alarm bells or alerts. Provision should be made for manual operation in the event of the malfunctioning of any automatic device. The size of the door opening should allow sufficient clearance for the vehicles.

(d) Forecourt.

(1) The forecourt should be of sufficient size to permit fire vehicles to manoeuvre and should be provided with floodlighting for night-time activities.

(2) A slope to the bay entrance drain should accommodate fire vehicle cleaning and other surface water.

(3) Within the bays there should be sufficient lighting and, in appropriate cases, heating, to maintain a temperature of at least 13°C. In the UAE, where high ambient temperatures are prevalent some form of climate control should be considered.

(4) Electrical systems of appropriate design will also be required where fire vehicles are fitted with engine heaters, battery charging devices or other protective equipment.

(5) Installations should be provided to convey exhaust fumes from each vehicle to the external atmosphere, thus avoiding contamination within the vehicle bays during periodic engine runs or rapid deployment of fire vehicles from the bays.

(6) All connections of services to fire vehicles should be designed to achieve immediate and safe disconnections without delaying the response of fire vehicles to an emergency.

(e) Domestic and administrative requirements.

(1) Domestic facilities should include accommodation for personnel, consisting of a locker room, mess room, washroom, drying room, with consideration to administrative rooms (offices), training facilities, and fitness facilities.

(2) The locker room should provide sufficient space for the personnel to change and store their clothing as well as other personal items Seating should also be provided.

(3) The mess room should be fitted with chairs and tables and provide facilities for the preparation of meals and food storage. Power to any cooking facilities including gas supplies should be automatically turned off on activation of the alerting systems.

(4) A drying room should allow personnel to dry wet clothing quickly.

(5) The extent of administrative accommodation will depend on the range of technical control and administration duties to be performed in a particular fire station.

(6) Classroom should provide tables (desks) and chairs, a magnetic whiteboard (or blackboard), as well as appropriate library facilities relevant to the functionality. Consideration may be given to electronic resources such as data viewers, screens and computers.

(7) Fitness facilities or equipment should be inside a climate controlled or at least, well ventilated environment. Consideration should be given to providing fitness equipment conducive to the development and maintenance of anaerobic, aerobic flexibility and strength fitness.

(8) Where there are female RFF personnel, separate domestic and administrative facilities should be provided at the fire station.

(f) Supporting facilities requirements.

(1) These are facilities which can contribute to the efficiency of RFF services by preserving equipment and extinguishing media, ensuring its prompt availability and in providing test, inspection, maintenance and training opportunities.

(2) Storage space is required for fire hoses, with suitable racking and ventilation and may include hose repair equipment and the hose record board.

(3) Drying facilities for fire hose is required in certain climates and may be in the form of a drying tower or rack or an enclosed heating installation.

(4) Storage is required for extinguishing media, such as foam concentrate and complementary agents, and particular attention should be given to ensuring that temperatures are kept within the levels specified for each agent.

(5) Suitable facilities for containment should also be provided for stored foam concentrates in the event of spillage or leakage. Advice in respect of appropriate storage temperatures can be obtained from suppliers.

(6) A general workshop, where maintenance and repairs can be performed, will make a valuable contribution towards the efficient and economical operation of the service.

(7) A fire station should be provided with a hydrant capable of delivering water at an appropriate rate for rapid replenishment of vehicles.

(8) Appropriate facilities for the testing of fire hose and vehicles, for the rapid replenishment of vehicles after use and for training purposes should be readily available.

(9) Facilities for transferring foam concentrates from containers and complementary agents to fire vehicles expeditiously should be provided.

(g) Watchrooms.

(1) In all fire stations there should be a central point for the reception of emergency calls, from which fire vehicles may be dispatched for responses of all kinds and resources can be mobilized and directed.

(2) A watchroom should be sited in a position which overlooks as much of the movement area as possible. It may be necessary to elevate the watchroom to provide the maximum degree of surveillance.

(3) Special provisions may be necessary to soundproof the watchroom and to deal with the consequent ventilation and climate control problems which soundproofing may create.

(4) Tinted windows or sunshades may be required in some locations to minimize the effects of direct or indirect exposure to the sun and other external elements such as concrete surfaces and climatic conditions.

(5) Provision will be necessary to vary the intensity of watchroom lighting to permit external vision when the watchroom is in use at night. The communications facilities required in watchrooms are detailed in **GM AMC7 ACM.OPS.CERT.E.020 Rescue and firefighting**, where a distinction is made between the requirements for the master watchroom and watchrooms in satellite fire stations.

(6) Where a watchroom is located at a different facility other than a fire station at an aerodrome, it should be provided with sufficient day/night runway and movement area monitoring system, discrete ARFFS communication system, emergency notification and alerting system and appropriate contingency measures in the event of system failure.

(h) General aspects.

(1) In addition to the particular requirements considered above there are a number of general items, applicable to all fire stations, which can contribute to their efficient operation and the well-being of personnel. Except where it may be necessary to elevate a watchroom for operational reasons, it is desirable to provide all accommodation on one level.

(2) It is important, in preparing the original plan, to make some provision for expansion to correspond with the growth of the aerodrome. If the plan meets this situation by providing the domestic accommodation to one side of the vehicle bays, an additional benefit will be the exclusion of exhaust fumes from this accommodation when the vehicles are running. Fire vehicle bays with access from the rear will aid the movement of fire vehicles by providing a drive-through facility.

(3) The parking of fire vehicles should be such that the failure of any one should not prevent others from making an immediate response. The high noise levels to which some fire stations may be exposed may require some measure of soundproofing in the domestic accommodation in addition to the watchroom.

(4) Additional attention to ventilation and climate control may also become necessary in ensuring the comfort and efficiency of the occupants.

(5) All fire stations should be connected to a secondary (standby) electrical power supply to ensure the continuous availability of essential equipment and facilities.

AMC7 ACM.OPS.CERT.E.020(a) Rescue and firefighting

COMMUNICATION AND ALERTING SYSTEM

(a) A discrete communication system should be provided linking a fire station with the air traffic control tower, any other fire station on the aerodrome and the rescue and firefighting vehicles.

(b) An alerting system for rescue and firefighting personnel, capable of being operated from that station, should be provided at a fire station, any other fire station on the aerodrome and the air traffic control tower.

(c) Provisions of communication and alerting system should be provided to ensure consistent with the individual requirements of each aerodrome including:

(1) a direct communication between air traffic control and the fire station/s to ensure the prompt dispatch of rescue and firefighting vehicles in the event of an aircraft emergency;

(2) a communication between air traffic control and the rescue and firefighting personnel enroute to, or in attendance at, an aircraft accident/incident;

(3) suitable guidance to the rescue and firefighting vehicles during low visibility conditions, navigational equipment and communication assistance;

(4) communication between the fire station, or the main station, where more than one fire station and rescue and firefighting vehicles;

(5) communication between the rescue and firefighting vehicles and its personnel;

(6) emergency alarm systems to alert auxiliary personnel and appropriate organizations located on or off the aerodrome;

(d) At aerodrome with multiple operational runways, a communication needs assessment should be conducted to determine the appropriate communication and alerting systems required to support the possibility of managing multiple emergencies.

(e) A fire station watchroom communication and alerting system should be provided including:

(1) trained and competent personnel at an aerodrome to monitor aircraft movements and facilitate all fire station communications between air traffic control, rescue and firefighting services, on and off aerodrome agencies during an emergency; and

(2) where there is more than one fire station watchroom at an aerodrome, designate a master watchroom linking all fire station communication and alerting systems.

(f) A discrete emergency frequency Channel 121.6 MHz should be provided at an aerodrome for direct communication between rescue and firefighting services with the flight crew of an aircraft in an emergency on the ground.

(g) An officer in-charge of the aerodrome rescue and firefighting service should be designated a callsign of “Airport Incident Commander” when communicating with air traffic control tower and flight crew of aircraft having an emergency on the ground.

(h) Rescue and firefighting vessels or other specialized vehicles intended for use in water, swampy areas or other difficult terrain should be provided with two-way radio equipment.

(i) Special attention should be given to the selection of communication radio units intended for use in marine applications or other difficult environments, particularly to their protective containment systems; and

(j) Policies and procedures should be established and implemented to ensure rescue and firefighting personnel designated to communicate with air traffic control tower, aircraft flight

crew and rescue and firefighting vehicles, are trained and competent in appropriate level of aviation language proficiency and air-ground communications.

GM AMC7 ACM.OPS.CERT.E.020(a) Rescue and firefighting

COMMUNICATION AND ALERTING SYSTEM FACILITIES

(a) The efficiency of an RFF service is significantly dependent on the reliability and effectiveness of its communication and alarm system. In addition, the successful conduct of the total firefighting and related rescue operation will be facilitated by the system for alerting and mobilizing other participating emergency support personnel. The importance of prompt and clear communications cannot be over-emphasized.

(b) Consistent with the individual requirements of each aerodrome there should be provision for:

(1) direct communication between air traffic control (or other activating authority provided by the aerodrome authority) and the aerodrome fire station(s) to ensure the prompt dispatch of RFF vehicles in the event of an aircraft emergency;

(2) communication between air traffic control and the RFF crews en-route to, or in attendance at, an aircraft accident/incident. To provide guidance to the RFF vehicles during low visibility conditions, some form of navigational assistance may be required;

(3) communication between the fire station, or the main station, where more than one is provided, and the RFF vehicles;

(4) communication between the RFF vehicles, including where necessary, a system to provide intercommunication between the crew members of an RFF vehicle; and

(5) emergency alarm systems to alert auxiliary personnel and appropriate organizations located on or off the aerodrome.

(c) Additionally, a direct communication should be provided between the RFF services and the flight crew of an aircraft in an emergency on the ground.

FIRE STATION COMMUNICATIONS

(a) In considering the scope of fire station communications, two important factors need to be considered.

(b) The first is the extent of the workload in the watchroom when an aircraft accident or incident occurs. The range of communication facilities will naturally be related to this workload and if some part of the emergency mobilization can be undertaken elsewhere, at an aerodrome telephone exchange room or emergency operations centre, for example, then the fire station watchroom can be more effectively equipped and operated in its primary role.

(c) The second consideration relates to those aerodromes operating more than one fire station. Where two or more stations are provided it is usual to designate one as the main station and its watchroom as the master watchroom, which is continuously staffed. A satellite station may also have a watchroom with fewer facilities commensurate with its subordinate role and usually staffed only until the satellite's vehicles respond to a call.

(d) In discussing fire station communications, it is essential to differentiate between the minimum requirements in main and satellite fire stations and to identify the systems which can serve both.

(e) Calls to the aerodrome fire station(s) for attendance at an aircraft accident/incident normally originate from air traffic control. Air traffic control should be linked with the main fire station by a direct telephone line not passing through any intermediate switchboard so as to avoid delays. This line is usually provided with a distinctive buzzer in the watchroom and is safeguarded against buzzer defects by a warning light. This line can be linked to the alarm system in the main and satellite fire station(s) so that the initiation of a call by air traffic control simultaneously alerts all personnel. The alarm system may also be used to activate RFF vehicle room doors. A separate switch for activating the alarm system should be provided in each fire station watchroom.

(f) Fire stations should be provided with a public address system so that details of the emergency, giving location, type of aircraft involved, preferential routing for RFF vehicles, can be conveyed to crew members. Control of this system would normally be located in the master watchroom, which would also have a switch for silencing the alarm system to avoid any interference with the effective use of the broadcast facility.

(g) Some calls for emergency services may reach the main fire station from the aerodrome telephone switchboard and it is usual to have a special telephone circuit for these priority calls. As some of these calls will be of lower priority than that associated with an aircraft accident/incident, e.g. response to fuel spills, special services, etc., it is not necessary to link this circuit with the alarm system. The alerting and directing of these responses can be controlled from the master watchroom. A separate telephone circuit, for calls of a non-emergency nature, should also be provided in each watchroom.

(h) Where the master watchroom is required to mobilize off-aerodrome support services for aircraft-related or other emergency situations, direct telephone circuits with appropriate priority indications should be provided to the appropriate control centres.

(i) Satellite fire station watchrooms should be linked to the master watchroom by a direct telephone line. The satellite fire station should be served by the public address and alarm

system operated by the master watchroom as well as having the ability to activate the alarm system and make public address broadcasts within its station. A grid reference map(s) should be displayed.

(j) In many instances, the master fire station watchroom tends to become overloaded with alarms, switches, buzzers, coloured lights, radio equipment, public address system, etc. The watchroom should be designed in such a way as to minimize the workload on the watchroom attendant during an emergency call. The objective should be to set out the watchroom in such a manner that a call can be received and dealt with by a minimum of movement on the part of the watchroom attendant. Grid reference maps, etc., should be placed directly in front of the watchroom attendant's position. Details on the design of the fire station watchroom can be found in **GM AMC6 ACM.OPS.CERT.E.020 Rescue and firefighting**.

(k) All telephone and radio equipment in each watchroom should be regularly monitored for its serviceability and arrangements should exist for emergency repair and maintenance of this equipment. The continuity of electrical supplies to fire stations should be ensured by connection to secondary power supplies.

RFF VEHICLE COMMUNICATIONS

(a) When RFF vehicles leave their fire stations and enter the manoeuvring area, they come under the direction of air traffic control. These vehicles should be equipped with two-way radio communications equipment, through which their movements can at all times be subject to direction by air traffic control. The choice of a direct air traffic control/fire service frequency, monitored in the master watchroom, or a discrete aerodrome fire service frequency, relaying air traffic control instructions and fresh information, will be a matter for the aerodrome or appropriate authority to determine, based on local operational and technical considerations. A discrete frequency minimizes the extent to which fire service activities involve an air traffic control channel at a busy aerodrome. It is important to provide the fire service with the facility to communicate with flight crew members in certain types of incidents, particularly where undercarriage situations are involved or aircraft evacuation may be proposed. Technical solutions are available to permit both a discrete frequency and an aircraft "talk-through" facility, subject to air traffic control acceptance. All transmissions should be recorded once an emergency situation has been declared.

(b) The radio equipment on RFF vehicles should accommodate communication between vehicles, en-route to, and in operation at, an aircraft accident. Within individual vehicles there should be an intercommunication system, particularly between drivers and monitor operators, to

optimize the deployment of the vehicles at an accident. The provision of a communication facility within an appliance should recognize the likelihood of high noise levels and this may require the use of noise-cancelling microphones, headsets and loudspeakers for effective intercommunication.

(c) The RFF vehicles should be provided with communication equipment capable of communicating directly with an aircraft in an emergency situation using an aeronautical radio frequency. The aeronautical radio frequency permits the RFF service and the aircraft to communicate with each other directly allowing the RFF crew to issue critical information regarding the exact nature of, and the hazards associated with, an emergency in progress along with recommendations for actions. Where provided, the aeronautical radio frequency may be selected by air traffic control and notified to the aircraft and the RFF service. The requirements and responsibilities for the utilization of a radio frequency between the RFF service and the flight crew of an aircraft in an emergency situation should be detailed in a procedure agreed to between the air traffic services and the aerodrome operator .

(d) Communications between the flight crew, air traffic control and the RFF service should be maintained throughout the emergency response. Due to the critical and timely nature of the information transmitted on this frequency, transmissions should be limited to air traffic control, the pilot of the aircraft and the officer-in-charge of the RFF operations. The officer-in-charge of the RFF operations should delay transmissions to the aircraft until cleared by air traffic control, unless the nature of the transmission is critical to emergency operations.

(e) One of the prerequisites for effective communication between the RFF service and the flight crew of the aircraft is language proficiency. Steps should be taken to ensure that the rescue and firefighting crew, in particular the officer-in-charge of the RFF operations, demonstrates knowledge of the ICAO language designated for use in air-ground communications and the ability to speak clearly so as not to adversely affect radio communication.

(f) Standard operating procedures (SOP) explaining the use of the dedicated radio frequency should be developed outlining why, when and how it should be used.

(g) At the accident site, the officer-in-charge of RFF operations callsign “INCIDENT COMMANDER” may leave the vehicle and make observations on foot, and can then direct and inform crew members in all aspects of fireground operations using a portable megaphone. This equipment may also serve a subsidiary role in communications with aircraft crew members, the occupants of the aircraft and other persons responding to the accident.

(h) Rescue vessels or other specialized vehicles intended for use in water, swampy areas or other difficult terrain should also be provided with two-way radio equipment. Special attention

should be given to the selection of units intended for use in marine applications, particularly to their protective containment systems.

OTHER COMMUNICATION AND ALERTING FACILITIES

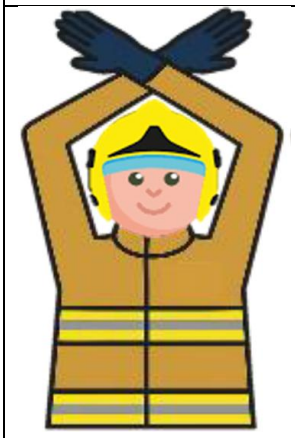
(b) The mobilization of all parties and agencies required to respond to an aircraft emergency on a large aerodrome will require the provision and management of a complex communications system. The requirement is examined in the Aerodrome Services Manual (Doc 9137), Part 7 — Aerodrome Emergency Planning, Chapter 12. Part 7 covers all aspects of aerodrome emergency planning of which communications is a vital element, and which should be subject to individual consideration by aerodrome authorities in relation to local facilities.

(c) Where auxiliary personnel, not on standby duty, are required to respond to an emergency, an audible alarm (siren or air horn) should be provided which can be clearly heard in appropriate areas above normal noise level and all wind conditions. Personnel responding to alarm signals of this nature should have access to a telephone number, from which more precise information as to the nature of the emergency and their response requirement can be acquired and to appropriate transport facilities to achieve this response.

(d) Direct communication between the RFF personnel and the flight crew during an emergency does not necessarily involve speech only as the possible use of hand signals, in particular at smaller aerodromes, may be considered. Table 31 contains standard emergency hand signals for emergency communication between the RFF personnel and the cockpit and/or cabin crews of the incident aircraft.

Table 31: Standard ARFFS emergency hand signals

Hand Signal	Meaning
	FIRE SIGNAL Moving the right-hand or wand in a "fanning" motion from shoulder to knee, while at the same time pointing with the left-hand/wand to the area of fire (which might be an engine, APU, brake, or elsewhere).

	RECOMMEND EVACUATION SIGNAL Signalling that an Evacuation is Recommended. Used when an evacuation is recommended by the person making the signal. The signalling arm or wand is extended horizontally from the body, with the hand upraised at eye level and the palm turned towards the signaller, away from the pilot. Then a beckoning gesture is made angling the arm backward from the elbow. The non-beckoning arm is held against the body.
	**RECOMMEND STOP SIGNAL** Signalling a Recommendation that Activity, or Progress is Stopped (including evacuation if in progress). Used to get pilots to immediately stop any activity that is in progress; this could be aircraft movement or even evacuation, if an evacuation is already in progress. Crossed arms, at the wrists, above and in front of the head
	EMERGENCY CONTAINED SIGNAL Signalling that the Emergency is Contained. Used when there is no outside evidence of dangerous conditions or "All Clear". Start with arms or wand extended outward and down at a 45-degree angle. Then move arms inward below waistline simultaneously until wrists crossed, then extend outward to starting position.

AMC8 ACM.OPS.CERT.E.020(a) Rescue and firefighting

RESCUE AND FIREFIGHTING VEHICLES

(a) Rescue and firefighting vehicles should be:

(1) capable of conveying and delivering, at least, the minimum quantities of extinguishing agents specified in Tables 26 or 27, according to the aerodrome category, taking into account the response time objectives;

(2) capable of carrying full load with maximum traction and mobility on surfaces in optimum weather conditions and able to operate over all types of terrain on or around the aerodrome, at a speed commensurate with safety;

(3) fitted with a monitor capable of a range appropriate to the largest of aircraft operating at an aerodrome, and be measured using aspirated foam;

(4) fitted with monitors that are capable of:

(i) producing foam on the move at slow speed at optimum monitor operating pressure;

(ii) conducting stationary discharge tests to establish the firefighting foam discharge patterns produced and the maximum range attainable by the monitor nozzle under wind conditions of 8 km/h or less with the monitor tilted upward to form a 30-degree angle with the horizontal to determine maximum discharge range;

(iii) discharging foam onto a paved surface at the specified pressure, in both the straight stream and fully dispersed nozzle settings. (*Note. - For purposes of defining the edge of the pattern, any foam less than 12.7 mm in depth is disregarded. The distance from the monitor to the end of the effective foam pattern is measured);*

(5) provided with searchlights or floodlights to illuminate the scene of an aircraft accident at night;

(6) fitted with a bumper monitor/turret as option, and under appliance protection is permitted, if these are of a non-aspirating type, and consideration is given to integrity of the foam blanket;

(7) discouraged manual monitor operations by the driver when vehicle is in motion, other than when side-lines are in operation;

(8) provided with a cabin for the safe conveyance of the crew to an aircraft accident with sufficient space to facilitate the donning of protective clothing and respiratory equipment;

(9) provided safe stowage of equipment and the storage of loose equipment within the vehicle cabin is discouraged; and

(10) clearly marked by a single conspicuous colour, either red or yellowish green.

GM AMC8 ACM.OPS.CERT.E.020(a) Rescue and firefighting

DESIGN AND CHARACTERISTICS OF VEHICLES

1. DESIGN

(a) Guidance on minimum characteristics of rescue and firefighting vehicles is given in the ICAO Doc 9137 Airport Services Manual Part 1 – Rescue and firefighting or NFPA 414 Standard for Aircraft Rescue and Fire-Fighting Vehicles.

(b) Rescue and firefighting vehicles should be sufficiently designed and capable of conveying and delivering at least the minimum quantities of extinguishing agents according to the aerodrome category. The response time requirements should also be taken into account. The vehicles may also carry some of the rescue equipment. The selection of a vehicle of a particular capacity will be dependent on whether it is a replacement for a vehicle which is obsolete or redundant or whether it is a component of a fleet to be deployed at a new aerodrome. In the latter case the consideration of its compatibility with existing vehicles does not arise.

(c) The acquisition of a new rescue and firefighting vehicle provides an opportunity to consider not only its contribution as a replacement, but also the extent to which it may be specified so as to accommodate any future RFF categorization, as may be required by changes in the volume of traffic or the introduction of longer aircraft. The anticipated “operational life” of a vehicle, with reasonable care and maintenance, will be at least ten years, and an assessment of the probable growth of traffic in this period should be a factor in the specification of a vehicle.

(d) When designing rescue and firefighting vehicles with liveries or Battenburg markings, the following requirements should be considered:

(1) liveries are graphic designs on rescue and firefighting vehicles that are intended to identify the vehicle's respective RFF service, improve visual identification, and differentiate emergency vehicles from regular traffic;

(2) Battenburg design uses a regular pattern and the contrast between a light and a dark colour to increase conspicuity for the human eye. The lighter colour is daylight-fluorescent (such as fluorescent-yellow) for better visibility in daytime, dusk and dawn. For night-time visibility, the complete pattern is retroreflective; and

(3) when selecting liveries or Battenburg markings to be used on rescue and firefighting vehicles, sufficient precautions should be taken to ensure patterns and markings do not have camouflage effect i.e. concealing a vehicle's outline, particularly in front of a cluttered background and cause confusion to passengers and crew of incident aircraft, on and off aerodrome emergency responders.

2. COMPATIBILITY OF NEW VEHICLES AND VESSELS WITH EXISTING FLEET

(a) In acquiring a new vehicle, it will be natural to seek the incorporation of all improvements available from current technology. In securing these advantages it is essential to examine the

extent to which they may impose new problems to personnel in the RFF and support services. In most cases, the new problems are capable of resolution by additional training and the provision of appropriate support equipment.

(b) The value of a compatibility study lies in the early recognition of problem areas and the provision of solutions. As an example, at the simplest level, the introduction of firefighting delivery hoses, with jackets composed of synthetic materials rather than natural fibres, demands specialized repair equipment. At a more significant level, the incorporation of power-assisted control systems and electronic devices in automotive or firefighting applications is desirable since they are compact, efficient and reliable, increasing the contribution to be made by individual operatives at an aircraft accident. They will, however, require particular levels of skill in their maintenance and repair.

(c) Training will be essential to acquaint support personnel with appropriate procedures, which may include the provision of specialized tools, instruments or maintenance facilities. Wherever power-assisted controls are provided in foam production and delivery systems, a manual-override facility should also be provided to permit foam production in the event of the failure of any power-assisted function. A system for monitoring the availability of power-assisted functions, to be used as part of the vehicle's daily inspection procedure, is desirable.

AMC9 ACM.OPS.CERT.E.020(a) Rescue and firefighting

RESCUE AND FIREFIGHTING VESSELS

(a) Rescue and firefighting vessels should be:

(1) suitably designed to achieve the response objectives stated in **AMC1 ACM.OPS.CERT.E.020 Rescue and firefighting**; and

(2) capable of carrying the types and quantities of floatation and rescue equipment twice the maximum number of passengers carried by the largest type of aircrafts serving the aerodrome.

GM AMC9 ACM.OPS.CERT.E.020(a) Rescue and firefighting

DESIGN AND CHARACTERISTICS OF VESSELS

Guidance in the design and characteristics of rescue and firefighting vessels can be refer to local UAE maritime regulation or NFPA 1925 Standard on Marine Firefighting Vessels.

AMC10 ACM.OPS.CERT.E.020(a) Rescue and firefighting

PREVENTIVE MAINTENANCE PROGRAMME

(a) A preventive maintenance programme should be established and implemented for rescue and firefighting vehicles or vessels that includes:

(1) periodic performance testing to ensure continued effectiveness of the vehicles or vessels and its associated equipment in meeting the required response objectives throughout the life of the vehicle or vessel;

(2) keeping and maintaining maintenance records throughout the lifespan of the vehicles or vessels;

(3) conducting regular inspections on all vehicles or vessels including every aspect of their structure, systems and operational functions;

(4) availability of reserve vehicles or vessels to maintain the appropriate level of aerodrome protection when any of the regular vehicles or vessels are temporarily unavailable due to maintenance requirements or becoming unserviceable; and

(5) ensuring reserve vehicles or vessels are able to meet the operational response time objectives and operating specification/performance required in respect of the level of service provided.

GM1 AMC10 ACM.OPS.CERT.E.020(a) Rescue and firefighting

PREVENTIVE MAINTENANCE OF RESCUE AND FIREFIGHTING VEHICLES

1. GENERAL

(a) A maintenance programme, including preventive maintenance where appropriate, should be established to maintain facilities in a condition which does not impair the safety, regularity or efficiency of air navigation.

(b) Due to the ever-increasing complexity of specialized aviation fire vehicles, rescue vessels and their associated rescue equipment, a programme of regular and ongoing preventive maintenance is paramount to ensure availability and reliability. A robust maintenance programme would also maximize the lifecycle of both fire vehicles, vessels and rescue equipment.

2. PREVENTIVE MAINTENANCE

(a) To ensure ongoing reliability and peak performance of any fire vehicle/vessel or item of rescue equipment is maintained, and to ensure that rescue and firefighting (RFF) services are provided at the required levels, all RFF vehicles, vessels and rescue equipment need to have regular preventive maintenance conducted on them.

(b) To ensure that the maintenance can be conducted correctly, provision of the following is a necessity:

(1) maintenance personnel;

(2) maintenance procedures;

(3) defect reporting system;

(4) designated maintenance work areas;

(5) tools;

(6) spare parts; and

(7) storage of maintenance records.

(c) A maintenance programme should take into account the following activities:

(1) original equipment manufacturer (OEM) maintenance recommendations;

(2) local environmental conditions, for example tropical heat versus cold winters;

(3) national or local regulatory requirements — for example certification of pressure vessels, hoses,

(4) roadworthiness certificates; and

(5) regular performance testing.

3. MAINTENANCE PROCEDURES

(a) Maintenance procedures should be implemented to ensure a standardized manner in which fire vehicles are maintained. Maintenance procedures should cover:

(1) activities to be undertaken to ensure that disruption to RFF services are minimized. For example; bringing reserve fire vehicles into operational service to maintain category levels, or conducting maintenance during breaks in aircraft movements where a vehicle may be taken out of service without affecting category levels;

(2) the frequency of maintenance services;

(3) activities to be undertaken at each type of maintenance service as recommended by the original equipment manufacturer (OEM). For example, visual check, inspections & measurements;

(4) activities to be undertaken at each type of maintenance service as recommended by national or local regulations;

(5) arrangements for technical support from the OEM or the OEM's local agent;

(6) spare parts that should be held on site to enable regular maintenance to be conducted, for example, filters, belts, drier cartridges, lubricants, coolants, wiper blades; generically

common spare parts should be held on site to minimize downtime, such as switches, light globes, relays, circuit breakers, bolts, nuts, washers, O-rings and seals;

(7) arrangements with OEM and local suppliers for all other parts to ensure downtime is kept to a minimum;

(8) tire replacement requirements;

(9) environmental procedures including appropriate disposal procedures for old parts as well as used lubricants and coolants;

(10) any special measures to ensure safety of maintenance personnel such as procedures for working at heights, confined space entry and working with high pressure liquids/gases; and

(11) the method of reporting and documenting any defects that have been identified with the fire vehicles or rescue equipment by operational and maintenance personnel.

4. PERFORMANCE TESTING — FIRE VEHICLES/VESSELS

(a) While an ARFFS fire vehicle may pass its initial acceptance test for compliance against its specification, there is no guarantee that it will continue to do so throughout its service life. All ARFFS fire vehicles have parts that wear with time and as a result performance is lost. To ensure that the fire vehicle continues to have the ability to respond, and discharge firefighting agents at the required amounts, regular performance testing should be undertaken including quantitative checks of:

(1) acceleration (0 – 80km/h for RFF vehicles);

(2) top speed;

(3) braking distance;

(4) turning radius (man overboard manoeuvre for RFF vessel);

(5) flow rate from high and low flow deliveries;

(6) foam admixing percentages;

(7) monitor/high reach extendible turret throw; and

(8) compressed air foam systems (if any).

(b) Records of any performance tests undertaken should be retained, as it is a record of the fire vehicle continuing to meet the specifications, and allows future review if performance starts to deteriorate. Where multiple fire vehicles of the same type are stationed at the same location or operated by the same organization, it allows prediction of when the same performance deterioration may occur on other fire vehicles.

5. MAINTENANCE DOCUMENTATION

(a) A complete set of maintenance documentation should be delivered with the fire vehicle and rescue equipment during the procurement process. As a minimum this should include:

(1) operating procedures;

(2) maintenance procedures;

(3) fault diagnosis and troubleshooting;

(4) adjustment procedures;

(5) removal/replacement of parts and repairable assemblies;

(6) instructions for disassembly and reassembly of repairable components;

(7) tolerances, specifications and capacities;

(8) illustrations and exploded views;

(9) schematic drawings, for example, electrical wiring circuits, pneumatic circuits, chassis air circuits or hydraulic circuits;

(10) special tools needed for repairing and adjusting; and

(11) spare parts catalogue providing exploded views of the entire fire vehicle.

(b) It is important that the technical documentation is in a format that can be easily read, understood and followed.

(c) Any schematic drawings should be a sufficiently large enough size to enable them to be easily read. This is very important for fault diagnosis whereby any circuits can be traced. As a minimum, all drawings should be of A1 size or similar. It is a good idea to laminate these so that they can be kept clean of grease and still be read at a later time.

6. MAINTENANCE RECORD KEEPING

(a) A comprehensive set of maintenance records should be kept for each fire vehicle.

(b) Keeping individual sets of maintenance records is also beneficial for each of the larger and more complex items of rescue equipment, for example, hoses, can be grouped together, however each item of equipment should be readily identifiable via a unique numbering system.

(c) Keeping such documentation has several benefits:

(1) provides a historical record of the maintenance of the fire vehicle/equipment — which may be an organizational requirement for legal or compliance reasons;

(2) provides evidence for any warranty claim that may be made against the OEM;

(3) can be referred to in the future (if a similar fault occurs); and

(4) provides evidence for any surveillance audit that may be undertaken for regulatory compliance.

(d) Maintenance and calibration certificates should be maintained in a register for all special tools and test equipment.

GM2 AMC10 ACM.OPS.CERT.E.020(a) Rescue and firefighting

PREVENTIVE MAINTENANCE OF RESCUE AND FIREFIGHTING VESSELS

Guidance on preventive maintenance including performance testing of rescue and firefighting vessels can refer to NFPA 1925, Standard on Marine Fire-Fighting Vessels or based on OEM's requirements.

AMC11 ACM.OPS.CERT.E.020(a) Rescue and firefighting

PROCUREMENT PROGRAMME

(a) A procurement programme should be established and implemented for new rescue and firefighting vehicles or vessels that includes:

(1) a detailed assessment of the operational requirements when considering new technology and advancements in the design of rescue and firefighting vehicles or vessels; and

(2) a formal specification process that provides a phased approach and considers the preliminary, preparation of specification, and additional contractual considerations;

(3) operational readiness and testing process of new rescue and firefighting vehicles or vessels prior to operational duties; and

(b) The procurement programme of new rescue and firefighting vehicles or vessels should include the training of rescue and firefighting personnel assigned to drive and operate these vehicles or vessels including its associated equipment.

(c) Rescue and firefighting personnel should be competent in the functions and operations of new vehicles or vessels including all associated equipment, prior to assigning these vehicles or and vessels for operational duties.

GM AMC11 ACM.OPS.CERT.E.020(a) Rescue and firefighting

SPECIFICATION FOR NEW VEHICLES OR VESSELS

(a) Guidance on factors in the specification process for new rescue and firefighting vehicles or vessels can refer to:

(1) Chapter 5, ICAO Airport Services Manual (Doc 9137), Part 1;

(2) NFPA 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles; or

(3) NFPA 1925, Standard on Marine Fire-Fighting Vessels

AMC12 ACM.OPS.CERT.E.005(a) Rescue and firefighting

PROVISION OF RESCUE EQUIPMENT

(a) Minimum rescue equipment commensurate with the level of protection should be provided on the rescue and firefighting vehicles at the aerodrome, in accordance with Table 32 below.

(b) A procurement programme should be implemented to ensure rescue equipment is fit for purpose and designed to be used at an aircraft incident, including a training programme for rescue and firefighting personnel assigned to operate the equipment.

(c) A preventive maintenance programme for rescue equipment including a competent person responsible to manage the programme should be implemented.

Table 32: Minimum rescue equipment to be provided at aerodromes

Equipment scope	**Equipment item**	**Aerodrome RFF Category**			
		1 - 2	**3 - 5**	**6 - 7**	**8 - 10**
Forcible entry tools	Prying tool (hooligan, biel type)	1	1	1	2
	Crowbar 95 cm	1	1	1	2
	Crowbar 1.65 m	1	1	1	2
	Axe, rescue large non-wedge type	1	1	1	2
	Axe, rescue small non-wedge or aircraft type	1	2	2	4
	Cutter bolt 61 cm	1	1	2	2
	Hammer 1.8 kg – lump or club type	1	1	2	2
	Chisel cold 2.5 cm	1	1	2	2
A suitable range of rescue / cut-in equipment including powered rescue tools	Hydraulic/electrical (or combination) portable rescue equipment	1	1	1	2
	Powered rescue saw complete with minimum 406 mm diameter spare blades	1	1	1	2
	Reciprocating/oscillating saw	1	1	1	2
A range of equipment for the delivery of firefighting agent	Delivery hoses 30 m lengths x 50 and 64 mm diameters	6	10	16	22
	Foam branches (nozzles)	1	1	2	3
	Water branches (nozzles)	1	2	4	6
	Coupling adaptors	1	1	2	3
	Portable fire extinguisher - CO^2	1	1	2	3
	Portable fire extinguisher - DCP	1	1	2	3
Self-contained breathing apparatus – sufficient to maintain prolonged internal operations	Full breathing apparatus (BA) set complete with facemask and air cylinder	1 per duty personnel			
	BA spare air cylinder				
	BA spare facemask				
Respirators	Full faced respirators complete with filters	1 per duty personnel			
Ladders	Extension ladder, rescue and suitable for largest aircraft	-	1	2	3

	Ladder general purpose – rescue capable	1	1	2	2
Personal protective clothing	Structural/proximity firefighting suit (2-piece), helmet, boots, gloves and flash hood as a minimum	1 set per duty personnel plus sufficient reserve stock			
Additional items for personal protection	Protective goggles	1	1	2	3
	Surgical gloves	1 box			
	Blanket fire resisting	1	1	2	2
Rope lines	Rope line rescue 45 m	1	1	2	2
	Rope line general use 30 m	1	1	2	2
	Rope line pocket 6 m	1	1	2	2
Communication equipment	Portable transceivers (hand held and intrinsically safe)	1	2	2	3
	Mobile transceivers (vehicle)	1 per vehicle			
A range of handheld/ portable lighting equipment	Hand-held flashlight (intrinsically safe)	1 per duty personnel			
	Portable lighting – spot or flood (intrinsically safe)	1	1	2	3
Rescue tool box and contents	Hammer, claw 0.6 kg Cutters, cable 1.6 cm Socket set Hacksaw, heavy duty complete with spare blades Wrecking bar 30 cm Screwdriver set – slotted and Phillips heads Pliers, insulated Combination 20 cm Side cutting 20 cm Slip joint – multi-grip 25 cm Seat belt/harness cutting tool Wrench, adjustable 30 cm Spanners, combination 10 mm – 21 mm	1	1	2	3
First aid equipment	Medical first-aid kit	1	1	2	3
	Automated External Defibrillator (AED)	1	1	2	3
	Oxygen Resuscitation Equipment (ORE)	1	1	2	3
Miscellaneous equipment	Chocks and wedges – various sizes (set)	1	1	2	3
	Tarpaulin – lightweight	1	1	2	3
	Thermal imaging camera		1	2	3

GM1 AMC12 ACM.OPS.CERT.E.005(a) Rescue and firefighting

TYPES AND QUANTITIES OF RESCUE EQUIPMENT

(a) Due to complex nature of an aircraft incident on land or water, it may be necessary to consider other suitable type and quantity of rescue equipment to be provided at the aerodrome in order to achieve the ARFFS principal objectives.

(b) To establish the scope, types and quantities of rescue equipment applicable to the range of aerodrome categories, a thorough assessment should be conducted at each location to ensure that the equipment levels maintained are commensurate with what is required. Table 32 provides the range of rescue equipment normally applicable to the aerodrome categories. The option exists, where more than one vehicle will attend an aircraft accident, to consider the disposition of the rescue equipment to several vehicles. Further guidance on the types and quantities of rescue equipment to be provided at an aerodrome is given in the ICAO Doc 9137 Airport Services Manual Part 1 – Rescue and firefighting.

GM2 AMC12 ACM.OPS.CERT.E.005(a) Rescue and firefighting

PREVENTIVE MAINTENANCE OF RESCUE EQUIPMENT

1. RESCUE EQUIPMENT REQUIREMENTS

(a) The maintenance requirements for rescue equipment should be in accordance with original equipment manufacturer (OEM) requirements. However, due to the nature of firefighting, equipment can sometimes unknowingly become damaged. Consequently, it can also be beneficial to check the following:

(1) all items — regular daily or weekly checks to ensure functionality;

(2) breathing apparatus sets — maintained after every use and checked regularly when not used for safe operation;

(3) BA air quality — regularly checked (there may be national or local standards that the air quality should meet);

(4) short lines/long lines (rescue lines) — not frayed and are in good repair;

(5) portable fire extinguishers — full and charged with pressure;

(6) fire hoses — inspected and pressure checked on an annual or six-monthly basis to ensure that the hoses do not leak and the couplings are functioning and securely fitted;

(7) nozzles/foam branches — inspected for damage;

(8) rescue tools — inspected to ensure that there is no damage to components. Under high forcing loads, damaged components can be very dangerous if they fail;

(9) general tools — inspected to ensure handles are not broken or damaged;

(10) first-aid kits — inspected at least weekly to ensure that items are maintained at the correct stock levels; and

(11) rescue tool box — checked to ensure all tools are present.

(b) For detailed inspection and testing of rescue and firefighting equipment, should be in accordance with Inspection and Testing of Equipment, UK Fire Service Manual – Volume 1: Fire Service Technology, Equipment and Media.

2. MAINTENANCE DOCUMENTATION

(a) A complete set of maintenance documentation should be delivered with the rescue equipment during the procurement process. As a minimum this should include:

(1) operating procedures;

(2) maintenance procedures;

(3) fault diagnosis and troubleshooting;

(4) adjustment procedures;

(5) removal/replacement of parts and repairable assemblies;

(6) instructions for disassembly and reassembly of repairable components;

(7) tolerances, specifications and capacities;

(8) illustrations and exploded views;

(9) schematic drawings, for example, electrical wiring circuits, pneumatic circuits, chassis air circuits or hydraulic circuits;

(10) special tools needed for repairing and adjusting; and

(11) spare parts catalogue providing exploded views of the entire RFF vehicle.

(b) It is important that the technical documentation is in a format that can be easily read, understood and followed.

ACM.OPS.CERT.E.025 Rescue and firefighting

RESCUE AND FIREFIGHTING PERSONNEL

(a) An aerodrome operator shall, in accordance with **CAR AGA PART ADR ADR.OR.H. Personnel Requirements**:

(1) appoint a competent person with the authority and responsibility to oversee and manage a rescue and firefighting service at an aerodrome;

(2) ensure sufficient number of rescue and firefighting personnel including supervisors and managers are readily available at an aerodrome;

(3) complete a task resource analysis to determine the minimum number of rescue and firefighting personnel required and the level of staffing is documented in the Aerodrome Manual;

(4) ensure personnel assigned for rescue and firefighting duties are trained and competent to perform their duties in safe and efficient manner;

(5) establish, implement and maintain training and proficiency check programmes for rescue and firefighting personnel including training in human performance and team coordination;

(6) ensure personnel assigned for rescue and firefighting duties participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting vehicles and equipment in use at an aerodrome, including pressure-fed fuel fires;

(7) ensure personnel assigned for rescue and firefighting duties shall be fit to perform their duties in safe and efficient manner;

(8) ensure personnel assigned for rescue and firefighting duties are provided with personal protective equipment; and

(9) these personnel are trained and competent in the use of personal protective equipment to enable them to perform their assigned duties in safe and effective manner.

GM ACM.OPS.CERT.E.025(a) Rescue and firefighting

TRAINING AND PROFICIENCY CHECKS REQUIREMENTS

(a) Training and proficiency checks requirements for rescue and firefighting personnel are specified in **CAR AGA PART TRAINING**.

(b) Guidance material to design training programmes on human performance and team coordination can be found in the ICAO Doc 9683 Human Factors Training Manual.

(c) Fires associated with fuel discharged under very high pressure from a ruptured fuel tank are known as “pressure-fed fuel fires”.

AMC1 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RFFS COMPETENT PERSON

(a) A formal process should be established and implemented for the selection and appointment of the RFFS competent person.

(b) The RFFS competent person should:

(1) have appropriate skill, knowledge and experience based on the scale of aerodrome rescue and firefighting operations;

(2) have direct reporting to the Accountable Manager and acts as the principal communicator to the GCAA, with the authority and responsibility to:

(3) be responsible for establishing and effectively managing all aspects of rescue and firefighting services, facilities and equipment as per the requirements of this regulation;

(4) be the principal communicator with the GCAA in relation to aerodrome rescue and firefighting services;

(5) ensure that Aerodrome Certificate requirements are met, and that the aerodrome operates in accordance with the regulatory requirements in the provision of RFFS;

(6) ensure rescue and firefighting services, facilities and equipment commensurate with the sizes, types and frequency of aircraft in accordance with the aerodrome and regulatory requirements;

(7) assess the feasibility of continuing aerodrome operations in an emergency situation; and

(8) establish and implement necessary policies and procedures for the safe and effective management of aerodrome emergencies and training activities.

GM AMC1 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RFFS COMPETENT PERSON

(a) It is important that the competent person responsible to oversee and manage a rescue and firefighting service is subjected to a rigorous selection process by the aerodrome operator, in accordance with **CAR AGA PART ADR Post Holders**.

(b) To ensure the competent person has the relevant qualifications and experience in managing a rescue and firefighting service, commensurate with the size, complexity and risks at an aerodrome, the person should, at least, demonstrate the following competencies:

(1) academic qualifications;

(2) relevant industry experience;

(3) strategic leadership and management;

(4) strategic and/or tactical incident command competence;

(5) aerodrome emergency planning including managing exercises;

(6) crisis management;

(7) human factors;

(8) safety management system;

(9) training and development;

(10) fire prevention; and

(11) national and international standards and recommended practices.

AMC2 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RFFS OPERATIONAL PERSONNEL

(a) Sufficient trained and competent personnel including supervisors and managers should be designated and are readily available to ride the rescue and firefighting vehicles and to operate the equipment at maximum capacity.

(b) Rescue and firefighting personnel should be deployed in a way that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained.

(c) Considerations should be given for rescue and firefighting personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and firefighting operations.

(d) Where the available rescue and firefighting personnel display limited capacity to use initiative, the deficiency should be mitigated by the provision of additional supervisory staff who will be responsible for exercising command and control over their crews.

(e) Where rescue and firefighting personnel are assigned to drive and operate rescue and firefighting vehicles or vessels at the aerodrome, these personnel should be suitably qualified and authorised to drive and operate the types of vehicles or vessels, in accordance with local transport laws and regulations.

AMC3 ACM.OPS.CERT.E.025(a) Rescue and firefighting

DETERMINING RFF STAFFING LEVELS

(a) The aerodrome operator should ensure sufficient number of rescue and firefighting personnel including supervisors and managers, is provided at the aerodrome including:

(1) a minimum staffing level commensurate with the level of aerodrome protection determined by a task resource analysis;

(2) an optimum staffing level appropriate to the size and complexity of the aerodrome operations;

(3) staffing levels are approved by the Accountable Manager or delegated executive; and

(4) immediately notifying the GCAA in writing on changes to the staffing levels.

(b) Where the GCAA determines that the staffing level is insufficient to meet the promulgated level of protection, the aerodrome operator should:

(1) conduct a systematic review of the task resource analysis and current staffing arrangements, taking into account the RFF category, aerodrome risk profile, and the response objectives; and

(2) revise and implement the required number of personnel including supervisors and managers, in order to maintain command, control, and oversight of ARFFS activities.

(c) Policies and procedures should be implemented for managing changes to the task resource analysis, according to the aerodrome operator's safety management system, including:

(1) a systematic process to review, revise, and validate the task resource analysis;

(2) a documentation control process;

(3) quality assurance and audit process;

(4) an approval process by the Accountable Manager or a delegated executive; and

(5) updating the GCAA on any changes to the staffing levels.

(d) Policies and procedures should be implemented for the recruitment, selection and promotion of rescue and firefighting personnel including supervisors and managers.

(e) Where rescue and firefighting personnel are assigned for other additional duties in the aerodrome, suitable arrangements should be made for their immediate mobilization in the event of an emergency.

(f) Wherever possible, rescue and firefighting personnel assigned for additional duties should travel in their assigned vehicle and maintain constant radio contact with the fire station or air traffic control.

GM1 AMC3 ACM.OPS.CERT.E.025(a) Rescue and firefighting

DETERMINING NUMBER OF RFF PERSONNEL

(a) It is important that sufficient number of ARFFS personnel including supervisors and managers are provided at an aerodrome, commensurate with the promulgated aerodrome category to ensure safe and effective ARFFS. See guidance at **GM2 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting**.

(b) To ensure a sufficient number of ARFFS personnel including supervisors and managers is provided at an aerodrome, it is essential for ARFFS to determine both the minimum and optimum level of personnel. Other than ensuring a minimum number of ARFFS personnel is readily available on duty, there is also a need to establish an optimum number of personnel to ensure an appropriate level of resilience is maintained at an aerodrome in case of shortfall due to leaves, trainings, other exigency of service, etc.

(c) A task resource analysis (TRA) is a risk-based approach to establish a justification as to the minimum number of qualified/competent personnel required to deliver an effective ARFFS to deal with an aircraft incident/accident. If ARFFS is expected to attend structural incidents and road traffic accidents in addition to aircraft incidents/accidents, due regard should be given to

the inability of not meeting required response times and robust procedures should be introduced accordingly. The following items will assist in determining the basic contents of a TRA:

(1) Description of aerodrome(s) including the number of runways;

(2) Promulgated ARFFS categories (Aeronautical Information Publication);

(3) Response time criteria (area, times and number of fire stations);

(4) Current and future types of aircraft movements;

(5) Operational hours;

(6) Current ARFFS structure and establishment;

(7) Current level of personnel;

(8) Incident command structure;

(9) Level of supervisory and managerial personnel;

(10) ARFFS qualifications/competence (training programmes and facilities);

(11) Extraneous duties (to include domestic and first aid response);

(12) Communications and ARFFS alerting system including extraneous duties;

(13) Appliances and extinguishing agents available;

(14) Specialist equipment— rescue boat, hovercraft, water carrier, hose layer, extending boom technology, rescue stair, aerial ladder, etc;

(15) First aid — role responsibility;

(16) Medical facilities — role responsibility;

(17) Pre-determined attendance: local authority services — police, fire and ambulance, etc.;

(18) Incident task analysis — feasible worst-case scenarios) (workload assessment) (human performance/factors. To include: mobilization, deployment to scene, scene management, firefighting, suppression and extinguishment, application of complementary agent(s), post fire security/control, personnel protective equipment, rescue team(s), aircraft evacuation and extinguishing agent replenishment, effects of ambient temperature; (*Note. — The aim is to identify any pinch points within the current workload and proposed workload.)*

(19) Appraisal of existing ARFFS provision;

(20) Future requirements. Aerodrome development and expansion;

(21) Aerodrome emergency plan and procedures; and

(22) Enclosures could include: aerodrome maps, event trees to explain tasks and functions conducted by the ARFFS, etc.).

(d) When developing a task resource analysis, the following phase approach should be considered:

(1) For aerodrome categories 1 – 5, a TRA may be structured using a three-phase approach (see Table 33).

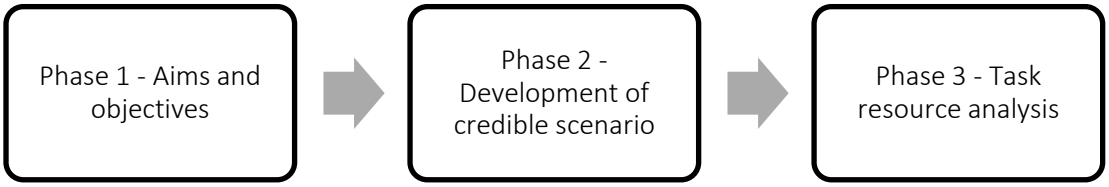


Table 33: Developing a task resource analysis using a three-phased approach

PHASE 1 – AIMS AND OBJECTIVES

The aims and objectives of the ARFFS should clearly identify the required tasks that personnel are expected to carry out.

Aims

(a) To maintain a dedicated ARFFS of qualified and competent fire and rescue personnel equipped with vehicles and specialist equipment to make an immediate response to an aircraft incident/accident on or in the immediate vicinity of the aerodrome within the specified response time criteria.

(b) To identify any pinch points within the current workload and proposed workload. For small ARFFS units, identified pinch points may have to be covered by alternative resources.

Tasks Objectives

(1) Meet the required response time
(2) Extinguish an external fire
(3) Protect escape slides/ exit routes
(4) Assist in the self-evacuation of the aircraft
(5) Create a survivable environment
(6) Rescue trapped personnel
(7) Maintain post-fire security/control
(8) Preserve evidence

PHASE 2 – SCENARIO(S) DEVELOPMENT

Identify a selection of representative realistic and feasible aircraft accidents/incidents that may occur at an aerodrome. It is also important to consider aircraft at the high end of the ARFFS category to enable analysis of the upper limits of the ARFFS response. This can be achieved by:

(a) analysis of accidents around the world;

(b) consideration of the accident/incident history at an aerodrome;

(c) brainstorming ideas using a representative team from the aerodrome;

(d) statistical analysis of previous accidents at aerodromes.

In order that the feasible accident scenario can be modelled/simulated, a major factor is to consider the probable location for the most realistic accident type that may occur, taking into account the aerodrome's particular location, environment, runway and taxiway configuration, etc., which may present specific risks.

The team may have identified that the following elements contribute to a worst-case location:

(1) Response time;

(2) Route to the accident site (on or off paved surfaces);

(3) Terrain;

(4) Crossing procedures for active runway(s);

(5) Communications;

(6) Supplementary water supplies;

(7) Adverse weather conditions – e.g. Low Visibility Procedures, fog, sandstorms, rain/hail;

(8) Daylight and darkness;

From the above analysis a location or a number of locations may be identified, in agreement with the aerodrome operator , the TRA facilitator and, if necessary, the regulator.

PHASE 3 – TASK AND RESOURCE ANALYSIS

Led by the TRA facilitator, the TRA team evaluates the accident scenario(s) developed in Phase 2 in a series of table top exercises/simulations.

The TRA objective should be to identify in real-time, and in sequential order the minimum number of RFF personnel required at any one time to achieve the following:

(1) Receive the message and dispatch the ARFFS (the dispatcher may have to respond as part of the minimum riding strength)

(2) Respond utilising communications; taking appropriate route and achieving the defined response time

(3) Position appliances/vehicles in optimum positions and operate RFF appliances effectively

(4) Use extinguishing agents and equipment accordingly

(5) Deploy equipment accordingly

(6) Instigate Incident Command Structure

(7) Assist in passenger and crew self-evacuation

(8) Access aircraft to carry out specific tasks if required, e.g. firefighting, rescue etc.

(9) Support and sustain the deployment of fire-fighting and rescue equipment

(10) Support and sustain the delivery of supplementary water supplies

(11) Need to replenish foam supplies

The results of the analysis should be recorded in a table, spreadsheet or other suitable format. The TRA may be set out in a table that times each task and identified the resource required for each step of the response.

(1) For aerodrome categories 6 – 10, a TRA should be structured in a six-phase approach (see Table 34).

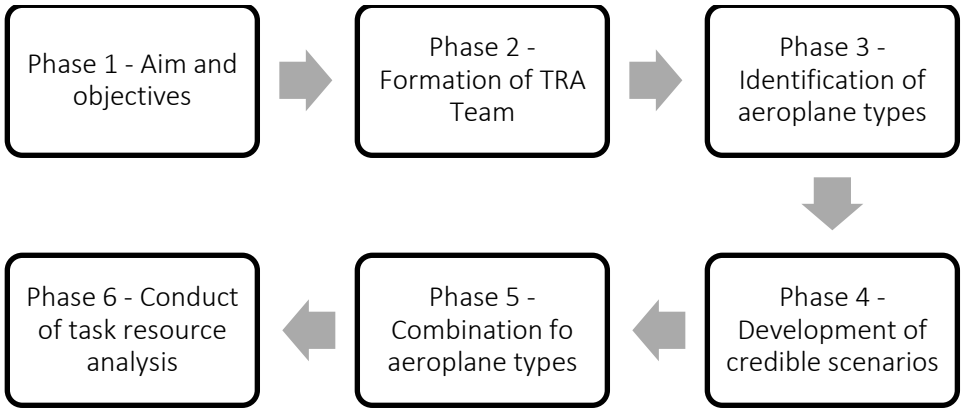


Table 34: Developing a task resource analysis using a six-phased approach.

PHASE 1 – AIMS AND OBJECTIVES (1) The aerodrome operator should be clear as to the aims and objectives for the RFF services, and the required tasks that personnel are expected to carry out.
PHASE 2 – FORMATION OF A TRA TEAM (1) Identify a selection of representative realistic, feasible accidents that may occur at an aerodrome. This can be achieved by a statistical analysis of previous accidents on aerodromes and by analysing data from international, national and local sources.
PHASE 3 – TYPES OF AIRCRAFT (1) Identify the types of aircraft commonly in use at an aerodrome; this is important as the type of aircraft and its configuration has a direct bearing on the resources required in meeting Phase 1. It may be necessary to group the aircraft types in relation to common aircraft configurations for ease of analysis or identify precise aircraft type that may have a unique configuration.

PHASE 4 – DEVELOPMENT OF CREDIBLE SCENARIO

(1) Every aerodrome is unique in that the location, environment, runway and taxiway configuration, aircraft movements, aerodrome infrastructure and boundary, etc., may present specific additional risks.

(2) In order that the feasible accident scenario can be modelled/simulated, a major factor is to consider the probable location for the most realistic accident type that may occur.

(3) To confirm the location of the scenario, it is important that a facilitator using a team of experienced fire service personnel, who have knowledge of the aerodrome and the locations in which an aircraft accident is likely to occur, evaluate the scenario.

(4) The role of the facilitator is to seek agreement in identifying the credible worst-case locations and, by using a scoring system place, these locations in order of relevance and priority. The team should determine why the locations have been identified and provide a rationale for each location. One methodology would be to award a weighted number to each location, then total the numbers in relation to each identified location.

(5) An additional time delay for any of the factors listed above should be estimated and recorded, then the location with the highest additional response time could be identified as the worst-case location.

(6) It is important to note that the location of an accident could have an impact on the resources and tasks that will be required to be carried out by RFF personnel.

(7) From the above analysis, a location or a number of locations could be identified, in agreement with the aerodrome operator and the TRA facilitator.

PHASE 5 – COMBINATION OF AIRCRAFT TYPES

(1) Phase 5 combines the accident types to be examined as described in Phase 2, with the aircraft identified in Phase 3 and the locations as described in Phase 4; the accident types should be correlated with the possible location. In some cases, this could be in more than one location on an aerodrome, for which a task and resource analysis needs to be carried out.

(2) The above information is to be built into a complete accident scenario that can be analysed by experienced supervisors and firefighters for the task and resource analysis in Phase 6.

PHASE 6 – TASK RESOURCE ANALYSIS

(1) By using a TRA facilitator with teams of experienced aerodrome managers, supervisors and ARFFS personnel the accident scenario(s) developed in Phase 5 is subject to a task and resource analysis carried out in a series of table top exercises/simulations.

(2) When carrying out a task and resource analysis, the principal objective should be to identify in real time and in sequential order the minimum number of RFF personnel required at any one time to achieve the following:

- receive the message and dispatch the RFF service (the dispatcher may have to respond as part of the minimum riding strength);
- respond utilizing communications, taking appropriate route and achieving the defined response criteria;
- position appliances/vehicles in optimum positions and operate RFF appliances effectively;
- use extinguishing agents and equipment accordingly;
- instigate incident command structure — supervisors;
- assist in passenger and crew self-evacuation;
- access aircraft to carry out specific tasks if required, e.g. firefighting, rescue;
- support and sustain the deployment of firefighting and rescue equipment;
- support and sustain the delivery of supplementary water supplies; and
- need to replenish foam supplies as needed.

(3) The task and resource analysis should identify the optimum time when additional resources will be available to support/augment and/or replace resources supplied by RFF services (aerodrome emergency plan). It can also provide vital evidence to support the level of RFF vehicles and equipment.

(4) In order to start a task and resource analysis the required category of the aerodrome should be identified as required by the regulatory authority. This should confirm the minimum number of vehicles, and the minimum extinguishing agent requirements and discharge rates, this should also determine the minimum number of personnel required to functionally operate the vehicles and equipment.

(5) The results of the analysis should be recorded in a table or spreadsheet format and should be laid out in a method that ensures that the following is recorded:

- receipt of message and dispatch of the RFF response;

- time — this starts from the initial receipt of call and the timeline continues in minutes and seconds until additional external resources arrive or the facilitator decides an end-time;
- list of assessed tasks, functions and priorities achieved;
- the resources (personnel, vehicles and equipment) required for each task should be defined;
- comments to enable team members to record their findings; and
- identified pinch points.

Table 35: A working example of a task/workload analysis

• Major foam tenders are identified as MFT A, B, C and D.

• Minimum number of personnel riding the MFTs are identified as: A1, A2, B1, B2, etc.

Major foam tenders:

• Four MFTs carrying 11,00 Litres with a total water capacity of 44 000 Litres: (A, B, C and D).

• Minimum number of ARFFS personnel: total 14.

RFF Supervisors:

• Watch commander: 1= A1

• Crew commanders: 3 = B1, C1 and D1

RFF operational personnel (firefighters and drivers):

• Total — 10.

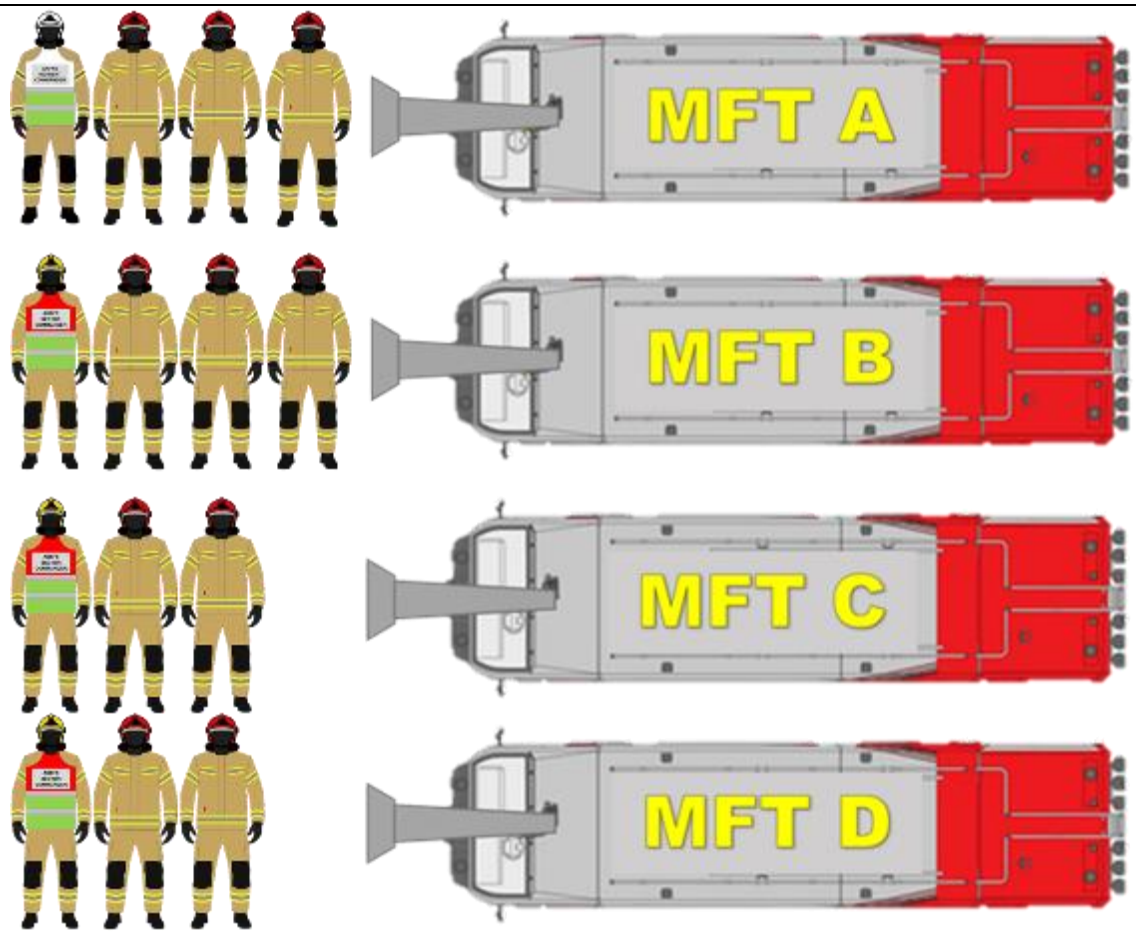
• A2 and A3.

• B2 and B3.

• C2, C3 and C4.

• D2, D3 and D4.

Table 36: Example of a TRA determination on minimum numbers of RFF vehicles and personnel



Note 1. — For this example, the ARFFS is deployed from a single fire station at an airport with a single runway, designated 06-24.

Note 2. — Time has been defined in minutes and seconds.

Note 3. — For this TRA, the watchroom attendant is excluded in the minimum number of RFF personnel.

Stated objectives for the ARFFS:

(1) instigate aerodrome emergency plan;

(2) respond within the required response time;

(3) select appropriate route and communications;

(4) position appliances in optimum positions and operate effectively;

(5) instigate incident command system;

(6) suppress/extinguish any fires;

(7) assist with self-evacuation of the aircraft;

(8) if appropriate, extinguish any internal fire;

(9) if required, ventilate aircraft to create survivable conditions;

(10) maintain post fire control of the critical area; and

(11) preserve evidence.

Table 37: Example of a TRA Workload Analysis

Time	Tasks	Resources	Comments
00.00	Call received from ATC as aircraft accident runway 06 RESA. Boeing 747-400.	Watchroom	Achieved
00.00	RFF personnel mobilized by watchroom.	Watchroom	Achieved
00.15	Call made to operate the airport emergency plan.	ATC/watchroom/operations unit	Achieved ATC
00.30	RFF personnel donning in appropriate PPE.	Minimum riding strength	Achieved
00.40	Route selected and all appliances mobile en-route to 06 RESA.	MFTs A, B, C and D	RFF supervisors and drivers.
00.50	RFF supervisor(s) utilize appropriate communications (RTF): discreet frequency, ATC, local authority, etc.	Supervisor(s)	Achieved. Note. — Aircraft may have already instigated evacuation (air crew).
02.00	All RFF appliances in position: A1 instigates ICS.	A1 supervisor B1 supervisor C1 supervisor D1 supervisor	Achieved.
	Offensive mode identified by supervisor(s) to extinguish ground pool fire and fire in number 3 engine that is impinging on fuselage.	Supervisors and drivers MFTs A, B, C and D	Achieved. A, B and C deploy monitors.
02.15	Priority is to create and maintain survivable conditions for the passengers and crew to reach a place of safety. Complementary agent required. D1 is supervisor. D2 is pump operator. Breathing apparatus entry control officer (BAECO).	A2 A3 B1 B2 B3 C1 C2 C3 D1 D2 D3 deploy, use complementary agent donned in RPE D4	Achieved.
03.15	All external fires extinguished. MFTs	A, B, C and D All crewmembers	Achieved
03.20	Initiate PEMS. Assist with self-evacuation, and maintain survivable conditions for the passengers and crew to reach a place of safety.	MFTs A B B1 A2 A3 B2 B3	Achieved: hand-lines deployed accordingly
03.20	Crew prepares to enter aircraft in RPE.	MFT D D1 D3 and D2 (pump)	Achieved.

			D1 D3 briefed by BAECO
	Crew prepares appropriate entry point and hand-line.	C1 C2 C3 C4	Achieved by use of: specialist vehicle / equipment / ladder
	Note. — MFT A maintains post fire control.	A2 A3	Achieved
03.55	Crew enters aircraft in RPE with hand-line (BAECO). Ladder made safe for internal crew. Crews assist with hand-line for BA entry team.	D1 D3 D4 C4 B2 B3	Achieved Achieved Achieved
04.15	Following self-evacuation of aircraft, provide assistance with gathering passengers and crew to place of safety. (PEMS)	C1 C2 C3	Achieved. Assistance provided by aircraft crew and additional responders from airport in accordance with the emergency procedures
04.15	A2 remains as monitor/turret operator, and provides escape route protection.	MFT A	Achieved
04.30	Supervisor A1 liaises with ATC, rendezvous point officer and arriving emergency services to ensure appropriate resources are brought forward to the accident site/location.	A1	Achieved
04.50	Supervisor A1 instructs airside operations to assist in containing exiting passengers and crew and obtaining a head count of survivors.	A1	Achieved
04.55	D1 reports 20 survivors still on-board aircraft require medical aid and assistance. There is no smoke in cabin or flight deck areas and survivors are having no difficult with breathing.	D1 A1	Achieved
05.05	External emergency services are brought forward to the accident site with additional equipment to support the removal of the remaining survivors and to transport the survivors to the appropriate safety zone.	A1 and external commanders: • police • fire • ambulance • medical, etc.	Achieved
Additional Points			

	Note 1.— At this point, the airport emergency plan is fully instigated and the supporting services can relieve D1 D3, provide supplementary water if required from the nearest hydrant or emergency water supply, assist in the deployment of specialist fire ground equipment and if required support the teams that are engaged in removing the survivors to a place of safety.		
	Note 2. — The facilitator may decide to terminate the analysis at this point or continue with the exercise to evaluate specific elements of the emergency plan, e.g. preservation of evidence.		

Note 1. — It can be seen that ten firefighters and four supervisors including the officer in charge are required to achieve the above supported by four major foam tenders.

Note 2. — The timeline can be further verified by the use of practical exercises and individual analysis to establish if the times are realistic and achievable for each task and function.

Note 3. — Each of the above tasks can be subdivided into individual functions associated with the specific task performed at a particular time.

Example (see Table-37):

(1) How long does it take to don protective clothing?

(2) How long does it take to don self-contained breathing apparatus?

(3) How long does it take to slip and pitch a ladder?

(4) How long does it take to open an aircraft door from the head of a ladder? (If required).

(5) How long does it take to deploy one, two, three (etc.) lengths of delivery hose?

(6) How long does it take to carry any item of rescue equipment over a specified distance and get to work?

Table 38: Example of a TRA timeline assessment of ARFFS activities

Timeline assessment for personnel: firefighters and supervisors.

Table 38 gives an indication of the timeline from the above analysis and can be utilized to verify an individual task, function or identify “pinch points” ensuring each task is achievable effectively within the timeline.

Task / **Time**	**A1**	**A2**	**A3**	**B1**	**B2**	**B3**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**

00.00														
00.00														
00.15														
00.30														
00.40	A1	A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	D4
00.50														
02.00	A1			B1			C1				D1			
02.15		A2	A3	B1	B2	B3	C1	C2	C3		D1	D2	D3	D4
03.15														
03.20		A2	A3	B1	B2	B3	C1	C2	C3	C4	D1	D2	D3	
03.20		A2	A3											
03.55					B2	B3				C4	D1		D3	
04.15														
04.15							C1	C2	C3					
04.30	A1													
04.50	A1													
04.55	A1										D1			
05.05	A1													

Notes. — From the above table it can be seen that a potential pinch point exists with firefighters A2 and A3. However, the tasks that they are performing are achievable as A2 and A3 are already utilizing a foam hand-line to maintain the evacuation route and maintaining post fire control. This is considered logical and an achievable process for this crew.

(2) Conclusion. A task analysis should be as detailed as necessary. The aim is to itemize the knowledge and practical skills (doing) involved in carrying out the task or function effectively and to the correct the standard of competence based on a qualitative analysis. Having gathered the appropriate data and agreed to the outcome, the TRA should enable an ARFFS to confirm and subsequently provide the correct level of vehicles, equipment and personnel. It would also enable the ARFFS to develop a training specification, and a learning programme can then be designed around role and task. When planning a task and resource analysis, ask the following questions:

a) What is done?

b) Why is it done?

c) When is it done?

d) Where is it done?

e) How is it done?

f) Who does it?

(3) It is often difficult to assess the overall effectiveness of a complete unit by observation only. However, observation/demonstration does allow the aerodrome operator to assess the effectiveness of individual units and any element(s) of the emergency arrangements. Documentary evidence relating to previous accidents or exercises may also assist in establishing if the current ARFFS is staffed at an appropriate level. The overall objective is to be satisfied that the ARFFS is organized, equipped, staffed, trained and operated to ensure the most rapid deployment of facilities to the maximum effect in the event of an accident. The above process can also be used to identify equipment shortages and training needs for personnel required to deal with identified tasks.

(e) Further guidance on the developing a task resource analysis is given at ICAO Doc 9137 Airport Services Manual Part 1 – Rescue and firefighting.

GM2 AMC3 ACM.OPS.CERT.E.025(a) Rescue and firefighting

DETERMINING NUMBER OF PERSONNEL FOR MULTI-RUNWAY OPERATIONS

(a) In addition to **GM1 AMC3 ACM.OPS.CERT.E.025(a) Rescue and firefighting**, this guidance provides a structured methodology for determining the minimum number of rescue and firefighting (RFF) personnel required at airports with multi-runway operations. The process leverages Task Resource Analysis (TRA) to ensure that personnel resources are aligned with operational needs, safety requirements, and regulatory standards.

(b) This methodology provides a robust framework for determining the minimum number of rescue and firefighting personnel required for multi-runway airport operations. By systematically analysing tasks, developing operational scenarios, and validating requirements through testing and continuous monitoring, airport operators can ensure that they have the necessary personnel to maintain safety and operational efficiency. Regular reviews and adjustments will ensure that the personnel levels remain aligned with evolving operational needs and regulatory standards. The objectives of this approach are:

(1) To identify the critical tasks associated with rescue and firefighting operations at multi-runway airports.

(2) To determine the necessary personnel required to effectively carry out these tasks.

(3) To ensure compliance with applicable regulatory requirements while optimizing resource allocation.

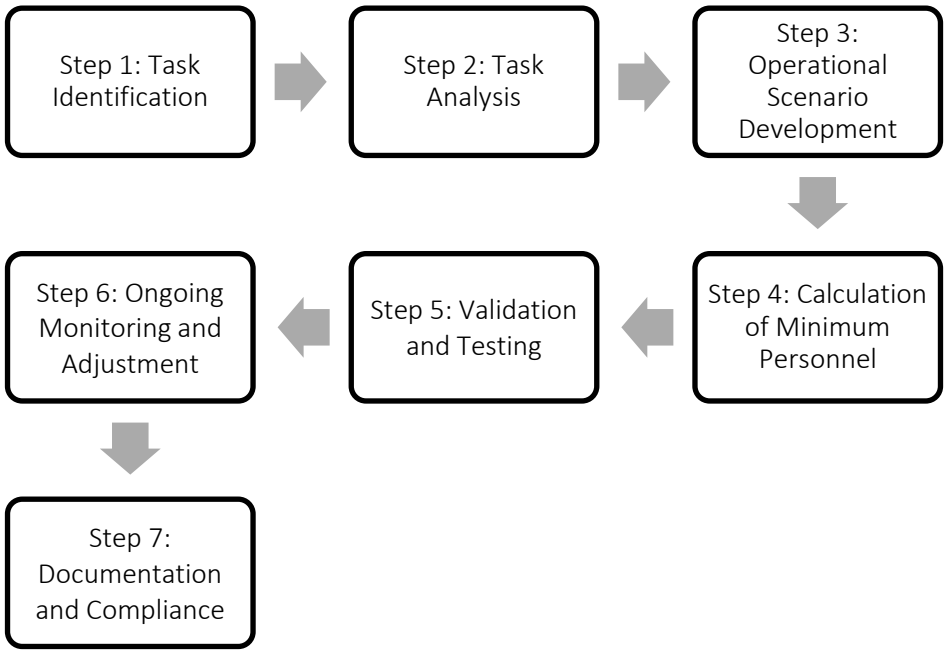


Figure-23: A methodology for determining the minimum number of personnel required at airports with multi-runway operations

STEP 1: TASK IDENTIFICATION

(a) Identify all tasks that rescue and firefighting personnel must perform, including:

(1) Emergency Response Tasks: Fire suppression, rescue operations, medical assistance, hazardous material containment, and evacuation procedures.

(2) Routine Operations: Daily equipment checks, vehicle maintenance, training, and drills.

(3) Support Tasks: Coordination with air traffic control (ATC), ground operations, and emergency services.

(b) Assign tasks to specific runways based on typical operations and incident scenarios. For example, emergency response tasks are linked to runways handling larger aircraft or higher traffic volumes.

STEP 2: TASK ANALYSIS

(a) Define Task Requirements. For each identified task, determine the following:

(1) Time: Estimate the time required to complete each task, considering both average and peak workload scenarios.

(2) Personnel: Identify the number of personnel needed to execute each task effectively, including specialists (e.g., drivers, medical responders) and support staff.

(3) Equipment: Determine the equipment needed for each task and the personnel required to operate it.

(b) Assess Simultaneous Operations. Consider the potential for simultaneous operations across multiple runways, which may require concurrent task execution. Identify tasks that may overlap or require additional personnel during peak periods or complex incidents.

STEP 3: OPERATIONAL SCENARIO DEVELOPMENT

(a) Develop Operational Scenarios. Create a range of operational scenarios, including:

(1) Routine Scenarios: Daily operations under normal conditions.

(2) Emergency Scenarios: Worst-case incidents, such as a large aircraft fire or multi-runway emergencies.

(3) Peak Traffic Scenarios: High traffic periods where multiple runways are in use simultaneously.

(b) Simulate Personnel Requirements. For each scenario, simulate the personnel requirements based on the task analysis. Ensure that all critical tasks are covered, and consider the impact of simultaneous operations on personnel needs.

STEP 4: CALCULATION OF MINIMUM PERSONNEL

(a) Establish Base Personnel Numbers. Calculate the base number of personnel required for each runway, ensuring compliance with regulatory requirements for the RFF category. Include personnel needed for:

(1) Primary Response Teams: Immediate responders to incidents on each runway.

(2) Support Teams: Personnel for coordination, communication, and logistical support.

(b) Adjust for Scenario Demands. Adjust the base personnel numbers to account for:

(1) Simultaneous Operations: Ensure sufficient personnel are available for concurrent incidents on multiple runways.

(2) Peak Workload: Increase personnel numbers for high traffic periods or complex emergencies.

(3) Environmental Conditions: Factor in additional personnel for adverse weather or other challenging operational conditions.

STEP 5: VALIDATION AND TESTING

(a) Conduct Drills and Simulations. Implement drills and simulations to test the adequacy of the determined personnel numbers under various operational scenarios. Evaluate performance metrics such as response time, task completion, and coordination efficiency.

(b) Review and Refine. Analyse the results of drills and simulations to identify any gaps or areas where personnel numbers may need adjustment. Refine the personnel requirements based on this feedback.

STEP 6: ONGOING MONITORING AND ADJUSTMENT

(a) Continuous Monitoring. Establish a system for ongoing monitoring of RFF operations, focusing on key indicators such as response times, personnel availability, and incident outcomes.

(b) Periodic Review. Regularly review and update the personnel requirements to reflect changes in airport operations, traffic patterns, regulatory standards, or after-action reviews from incidents and exercises.

STEP 7: DOCUMENTATION AND COMPLIANCE

(a) Document the Methodology. Maintain comprehensive documentation of the methodology used to determine the minimum number of RFF personnel. This should include task analyses, scenario simulations, drill results, and any adjustments made.

(b) Ensure Regulatory Compliance. Regularly review the personnel numbers to ensure they meet all applicable regulatory requirements. Update documentation and practices as necessary to remain in compliance.

GM3 AMC3 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RECRUITMENT AND SELECTION OF RFF PERSONNEL

(a) A robust structured process for the recruitment, selection and promotion of RFF personnel is important for the provision of a professional ARFFS, hence it is necessary to establish and implement clear policies and procedures at an aerodrome for the following roles:

(1) new hires;

(2) existing personnel; and

(3) direct entry personnel (refers to any internal or external personnel who has the qualifications, competencies and experiences to be directly employed at the appropriate grades)

(b) Personnel recruited and selected for RFF services are categorised as operational (firefighters, drivers & watchroom operators), supervisory (crew, watch & station commanders) and managerial (unit commanders, deputy and chief fire officers). See guidance at **GM2 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting**.

(c) RFF personnel should be resolute, possess initiative and competent to form an intelligent assessment of a fire situation and, above all, should be well trained and fully qualified. Every

individual should be capable of sizing up changing circumstances at an aircraft accident and taking the necessary action without detailed supervision.

(d) RFF supervisors and managers responsible for the organization, management and training of the RFF service should be experienced, qualified and competent leaders. The capabilities of these personnel should have been proved wherever practicable by training at a recognized training establishment and measures should be taken to ensure the personnel's continuing proficiency. Where such personnel may not fully meet the necessary qualifications but has the relevant experiences, a recognition of prior learning (RPL) route may be considered, provided a full competence assessment is conducted to assess suitability for the position he/she is applying for.

(e) Due regard should be given to the arduous nature of RFF duties and personnel selected for this work should be free from any medical and physical disabilities which might limit their performance or which might be aggravated by a high level of exertion. Particular care should be taken in selecting personnel as wearers of respiratory protection equipment, where psychological factors are significant, in addition to physical suitability. See guidance at **GM1 AMC4 ACM.OPS.CERT.E.025 Rescue and firefighting** and **GM2 AMC4 ACM.OPS.CERT.E.025 Rescue and firefighting**.

(f) RFF personnel may be assigned other duties, provided that the performance of these duties does not impair their ability to respond immediately to an emergency, or restrict their performance of essential training, inspections and equipment maintenance. These subsidiary duties could include fire prevention inspections, fire guard duties or other functions for which their equipment and training make them particularly suitable. Suitable arrangements should be made for their immediate mobilization in the event of an emergency and, wherever possible, a crew assigned to subsidiary duties should travel in the RFF vehicle to which they are appointed, maintaining constant contact with the fire station/air traffic control by radio. See guidance on **GM1 AMC1 ACM.OPS.CERT.E.020 Rescue and firefighting**.

AMC4 ACM.OPS.CERT.E.025(a) Rescue and firefighting

FITNESS PROGRAMME

(a) A medical fitness programme for rescue and firefighting personnel should include:

(1) a pre-employment evaluation for new hires;

(2) continued evaluation for in-service personnel:

(i) < below 40 years old, every 5 years;

(ii) 41 - 49 years old, every 2 years; and

(iii) > 50 years old, annually;

(3) a medical surveillance programme to identify any underlying medical conditions, which may pose a risk to the RFF personnel; and

(4) a medical screening conducted by an authorised occupational medical person;

(b) A physical fitness programme for rescue and firefighting personnel should include:

(1) a pre-employment assessment for new hires and at least, an annual assessment for in-service personnel to ensure an appropriate level of physical fitness is maintained;

(2) a fitness preparatory programme including sufficient fitness equipment and instructors; and

(3) a suitable testing programme to assess the aerobic, anaerobic and flexibility level of all personnel assigned for rescue and firefighting duties;

(c) A fitness standard and review committee should be established and implemented, that:

(1) determines appropriate physical fitness programmes including instructors, assessors, facilities and equipment;

(2) determines the appropriate occupational medical evaluation programmes;

(3) monitors the implementation of fitness programmes; and

(4) assesses suitability of new hires and continuation of in-service personnel for operational duties after returning from a long medical absence, suffering from serious illness, medically unfit or demonstrating repetitive fitness failures.

GM1 AMC4 ACM.OPS.CERT.E.025(a) Rescue and firefighting

MEDICAL FITNESS PROGRAMME

1. SELECTION OF PERSONNEL

(a) Regard should be given to the arduous nature of rescue and firefighting activities. Personnel selected for these duties should be free from any physical disability which may impair their performance or which may be aggravated by prolonged exertion.

(b) RFF personnel should have at least average strength and have no abnormalities, which could reduce their physical powers during a rescue. Any conditions liable to be induced or aggravated by smoke, dust, heat, irritants or fumes (e.g. asthma) should be considered a disqualification).

2. MEDICAL EXAMINATIONS

(a) Personnel who are employed for rescue and firefighting duties at Categories 3-10 aerodromes should have an initial examination before recruitment and undergo further examinations at five-yearly intervals up to the age of 40 (If fitness is in doubt, frequency should be increased), then at two-yearly intervals up to the age of 50 and annually thereafter for those above age of 50.

(b) RFF personnel should have at least average strength and have no abnormalities, which could reduce their physical powers during a rescue. Any conditions liable to be induced or aggravated by smoke, dust, heat, irritants or fumes (e.g. asthma) shall be considered a disqualification).

(c) An ECG is to be carried out at the initial examination. At subsequent examinations an ECG may be carried out if the examiner considers it necessary.

(d) Personnel should not be overweight. A suggested maximum is 20% above ideal weight, i.e. a Body Mass Index of 30. Exceptions may be made for persons of heavy muscular build.

(e) The hazardous nature of the job makes most types of medication inadvisable. For example, antihistamines and tranquillizers may cause drowsiness and a slowing of reaction time. Persons who use antihistamines should be assessed unfit.

3. MEDICAL REQUIREMENTS

(a) Persons employed for rescue and firefighting duties should meet the following medical assessment requirements as shown at Table 39 below.

Table 39: Medical fitness assessment for RFF personnel

CANDIDATE INFORMATION		
CANDIDATE NAME:		
ID NUMBER:		
AGE:		
DATE:		
LOCATION:		
PURPOSE:	INITIAL □ RENEWAL □ RE-EVALUATION □	
MEDICAL FITNESS REQUIREMENTS		**RESULTS**
GENERAL PHYSIQUE (1) Candidates should be of good general muscular development, with no marked obesity.		

(2) Body mass index: Normal Weight (BMI 18.5 to 24.9) and Overweight (BMI 25 to 29.9), Obese (BMI 30 to 34.9); Severe Obese (BMI 35 to 39.9); Morbid Obese (BMI > 40). (3) They should be not less than 1.67m in height. (4) They should be fit for any manual work, including lifting, climbing and all aerodrome rescue and firefighting service duties, and the use of breathing apparatus where appropriate. (5) Not pregnant	
UPPER LIMBS (1) Muscle power average. (2) Able to do heavy manual work. (3) Any disability should be so slight that it does not interfere with the ability to handle tools or do heavy manual work.	
CARDIOVASCULAR (1) Heart's performance and capacity (VO2 max) within above average ranges. (2) Normal breathing capacity and air flow of the lungs	
LOCOMOTION (1) Capable of running, climbing ladders, jumping, crawling and performing all kinds of manual labour under conditions expected at an operational incident.	
HEARING (1) Ability to hear sufficiently well under adverse circumstances is essential. (2) Forced whisper to be heard in each ear separately at 6-m. (3) An audiometric test should be conducted.	
VISION (1) Distance visual acuity should not be less than 6/12 in one eye and 6/36 in the other, with glasses if necessary, and not less than 6/18 with both eyes unaided.	

(2) Where spectacles are required to achieve the above standard, for operational duties they should be of a safety type accepted by the GCAA. (3) The use of contact lenses is not permitted. (4) Colour perception should be normal on initial testing by Ishihara plates. If a defect is found during the examination, a further test is to be carried out using a suitable lantern to demonstrate the ability to distinguish the signal colour, red, green and white.	
MENTAL CAPACITY (1) Able to understand instructions and perform all duties successfully.	
EMOTIONAL STABILITY (1) Emotionally fit to perform rescue and firefighting service duties sufficiently under operational conditions.	
FINAL ASSESSMENT RESULT:	
Candidate is declared fit for occupational duties and require no medical follow-up action:	
Candidate is declared partially fit for occupational duties and require medical follow-up action:	
Candidate is declared unfit and should withdraw from occupational duties on temporary or permanent basis:	
MEDICAL FOLLOW-UP ACTION (IF ANY):	
Name and ID of Occupational Medical Professional:	
Contact details:	

4. MEDICAL FITNESS STANDARDS FOR RFF PERSONNEL PERFORMING SPECIALISED DUTIES

(a) Rescue and firefighting personnel assigned to perform specialised rescue duties such as water or dive rescue, should be subjected to additional medical fitness assessment in accordance with

applicable requirements detailed in NFPA 1582 Standard on Comprehensive Occupational Medical Programme for Fire Departments.

5. DISQUALIFICATIONS

(a) There are certain medical conditions or disabilities that may render a person unsuitable or disqualified for operational rescue and firefighting duties. In such case, an aerodrome operator should seek the confirmation from an occupational medical person/organisation. The fitness standard and review committee should formally review the medical case and decide on the temporary or permanent removal of the medical case from operational duties.

(1) History of epilepsy, gastric or duodenal ulcer or mental instability

(2) Hearing in either ear less than 6 m for ordinary conversational voice or any evidence of labyrinthine disturbance.

(3) Patent perforation of one or both ears, otitis media, or gross nasal sepsis or obstruction. Healthy perforation of one or other eardrum may be acceptable provided there is no serious hearing loss of chronic discharge.

(4) Hernia or hydrocele.

(5) Serious varicose veins giving rise to symptoms.

(6) Serious chronic skin disease.

(7) Chronic bronchitis or asthma or other disabling disease of the lungs.

(8) Organic disease of the cardiovascular system.

(9) Albuminuria, unless shown to be simple orthostatic with proof of normal renal function.

(10) Personnel with glycosuria should normally be rejected, but if they are able to furnish satisfactory evidence of normal sugar metabolism (e.g. from a hospital, clinic or specialist) they may be accepted.

(11) Organic nervous disorder of any kind, a history of vertigo or any condition, which would impair a candidate's sense of balance.

(12) Significant obesity: Obese - Class I (BMI 30 to 34.9); Severe Obese - Class II (BMI 35 to 39.9); Morbid Obese - Class III (BMI > 40).

(13) Pregnancy

6. OTHER MEDICAL STANDARDS

(a) Other equivalent medical fitness standards suitable for rescue and firefighting personnel may be considered provided that a safety assessment including practical testing, is conducted by an authorised medical person/organisation.

GM2 AMC4 ACM.OPS.CERT.E.025(a) Rescue and firefighting

PHYSICAL FITNESS PROGRAMME

1. IMPORTANCE OF PHYSICAL FITNESS

(a) As the nature of RFF operations involves periods of intense physical activity, all RFF personnel have to possess a minimum level of physical fitness and medical fitness to be able to perform the tasks associated with these operations. Physical fitness and medical fitness is often described as the overall physical condition of the body, which can range from peak condition for performance at one end of the spectrum to extreme illness or injury at the other. The key fitness components for RFF are generally aerobic fitness, anaerobic fitness, flexibility and medical fitness. Optimum physical fitness and medical fitness for RFF personnel would mean that a firefighter is able to carry out RFF activities safely, successfully and without undue fatigue.

(b) Aerobic fitness is the ability to continue to exercise for prolonged periods of time at low to moderate or high intensity. This is typically what limits the ability to continue to run, cycle or swim for more than a few minutes and is dependent upon the body's heart, lungs and blood to get the oxygen to the muscles (VO2) providing the sustained energy needed to maintain prolonged exercise. Typical aerobic activities include walking, jogging, cycling, rope skipping, stair climbing, swimming, or any other endurance activities.

(c) Anaerobic fitness works differently to aerobic fitness. It is an activity that requires high levels of energy and is done for only a few seconds or minutes at a high level of intensity. The term anaerobic means "without oxygen". Participation in anaerobic activities leads to anaerobic fitness, which may be defined as higher levels of muscular strength, speed and power. Examples of anaerobic activities include heavy weight lifting, running up several flights of stairs, sprinting, power swimming, or any other rapid burst of hard exercises.

(d) Flexibility refers to the ability to move the limbs and joints into specific positions at the end of their normal range of movement. Flexibility is important as it will allow the body to work in cramped positions without unduly stressing the muscles, tendons and ligaments and may reduce the risk of injury. Flexibility is best developed using slow controlled stretching exercises.

2. PHYSICAL FITNESS EVALUATION PROGRAMME

(a) The physical fitness of rescue and firefighting personnel should be evaluated, at least, once a year. Where more regular intervals are necessary, a physical fitness evaluation programme is necessary.

(b) The evaluation should be anti-discriminatory, non-punitive or non-competitive. The results of the evaluation may be used to establish the person's baseline or measured against the person's previous assessments.

(c) A physical fitness evaluation should be conducted following significant absence, illness or injury prior to a return to operational duty. A medical evaluation may be necessary prior to physical fitness evaluation.

(d) The physical fitness evaluation should include:

(1) a pre-evaluation health questionnaire; and

(2) an evaluation of aerobic, anaerobic and flexibility capabilities.

3. PRE-EVALUATION PROCEDURE

(a) RFF personnel should complete a pre-assessment screening questionnaire to identify contraindications for participation in the fitness assessment.

(b) If RFF personnel have an incapacitating medical problem or a chronic medical condition, the physical fitness assessment should be postponed until the personnel have been assessed as fit by an occupational medical physician. In such circumstances, the RFF personnel should be assessed as unfit and where necessary, place on non-operational duty until medically cleared by the medical physician.

4. PHYSICAL FITNESS ASSESSMENT FOR LAND-BASED RFF PERSONNEL

(a) All RFF personnel are required to undertake physical fitness tests which aim to assess the level of fitness, strength and manual dexterity as well as level of confidence in simulated exercises.

(b) The three types of fitness tests shown at Table 40 are designed to reflect operational practice and may change from time to time. Candidates will be asked to complete a Medical Screening Form prior to undertaking many of these tests, this is to ensure that individuals are fit enough to undertake them.

Table 40: Physical fitness assessment for land-based RFF personnel

Assessment Type	Assessment Criteria
(a) Operational fitness assessment - Physical fitness is evaluated using appropriate standard protocols. The physical fitness test ensure that the RFF personnel are able to effectively demonstrate the	(1) Stair or ladder climbing in full PPE & RPE with carrying an additional load equivalent to a height of 8-metres; (2) Double-extension ladder raise and extension; (3) Rescue equipment carry;

following representative operational competencies.	(4) Rescue drag a simulated adult casualty; (5) Operating in an enclosed space; (6) Hose drill and operations; and (7) Operating in a high temperature environment with breathing apparatus.
(b) Gym-based fitness assessment (aerobic and anaerobic)	(1) Aerobic (cardiovascular) For full operational duties, a VO2 Max of at least the firefighters' average or better for age and gender and not less than 35 ml/kg/min is recommended. The estimation of VO2 Max may be performed using the following tests: • Shuttle run; • Validated step test, e.g. Cooper, Chester; • Cycle ergometer; • Treadmill; and • Full spiro-ergometry (2) Muscular strength • Handgrip dynamometer; • Static bicep curl with dynamometer; • Lat pull; • Static leg press with dynamometer; • Bench press; and leg press. (3) Muscular endurance • Push-ups, modified push-ups; • Pull-ups; • Bent knee sit-ups; and • Crunches in a given time, crunches to cadence.
(c) Simulated operational physical fitness assessment.	(1) Aerobic (cardiovascular) • 2.4 km run; or

• Tests conducted in an appropriate facility may be used as an alternative for new recruits, untrained personnel or where the operational test is unavailable and where there is evidence that the simulated tests are a reasonable representation of operational tasks. • The choice of the appropriate test depends on various aspects such as ease of administration, safety, cost and predictive value. The following methods may be used for the fitness evaluation of rescue and firefighting personnel.	• Bleep run. (2) Muscular strength • Handgrip dynamometer; • Static bicep curl with dynamometer; • Lat pull; • Static leg press with dynamometer; • Bench press; and • Leg press. (3) Muscular endurance • Push-ups, modified push-ups; • Pull-ups; • Bent knee sit-ups; and • Crunches in a given time, crunches to cadence. (4) Flexibility • Sit and reach, modified sit and reach; • Trunk extension; and • Shoulder elevation.

Note: The above functions may be included as part of an operational exercise or carried out separately.

5. PHYSICAL FITNESS ASSESSMENT FOR WATER-BASED RFF PERSONNEL

(a) The watermanship skills assessment is based on NFPA 2500, Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services.

(b) There are five tests that evaluate stamina and comfort in the water, each rated by points and to be conducted at an Olympic-size pool (50-metres length x 25-metres width x 2-metres deep) or equivalent (see Table 41). Where such tests are conducted in open water, a safety risk assessment and site inspection should be conducted to ensure safety of rescuers and test integrity.

(c) A candidate should successfully complete all stations and score a minimum of 12 points to pass the test. The test should be completed consecutively with not more than 15 minutes intervals between each test.

Table 41: Physical fitness assessment for water-based RFF personnel

Test 1 - 450-metres swim	
Using no swim aids and wearing only a swimsuit, a candidate should swim 450-metres without stopping using any forward stroke. Stopping or standing up in the shallow end of the pool at any point during this test will constitute a failure of this evaluation station.	
Performance Criteria	**Points**
Under 10 minutes	5
10-13 minutes	4
13-16 minutes	3
16-19 minutes	2
More than 19 minutes	1
Stopped or incomplete	0
Test 2 - 15-mins tread water	
Using no swim aids and wearing only a swimsuit, a candidate will stay afloat by treading water, drown proofing, bobbing or floating for 15 minutes with hands only out of the water for the last 2-minutes.	
Performance Criteria	**Points**
Performed satisfactorily	5
Stayed afloat, hands not out of water for 2 minutes	3
Used side or bottom of support at any time	1
Used side or bottom for support > twice	0
Test 3 – 750-metres Snorkel Swim	
Using a dive mask, fins, snorkel, and a swimsuit (no BCD or other flotation aid) and swimming the entire time with the face in the water, a candidate should swim non-stop for 750-metres. The candidate should not use arms to swim at any time.	
Performance Criteria	**Points**
Under 15 minutes	5
15-17 minutes	4
17-19 minutes	3
19-21 minutes	2
More than 21 minutes	1
Stopped at any time	0
Test 4 – 100-metres Inert Rescue Tow	

A candidate should push or tow an inert victim wearing appropriate PPE on the surface 100-metres non-stop and without assistance.	
Performance Criteria	**Points**
Under 2 minutes	5
2-3 minutes	4
3-4 minutes	3
4-5 minutes	2
More than 5 minutes	1
Stopping or touching bottom of pool at any time	0
Test 5 - Free Dive to a depth of 3-metres feet and retrieve an object	
Without any swim aids except a google or mask, a candidate should conduct a free dive to 3-metres without assistance and retrieve an assigned object to the surface. (Where the depth of the pool is less than 3-metres, a horizontal underwater swim of 5 metres from shallow edge to the deeper part can be considered)	
Performance Criteria	**Points**
Performed satisfactorily	1
Stopped or incomplete	0

6. OTHER ALTERNATIVE FITNESS STANDARDS

(a) An aerodrome operator may propose alternative fitness standards having equal to or stringent requirements for rescue and firefighting personnel provided that a safety assessment including practical testing, is conducted by an authorised medical person/organisation and submitted to the GCAA.

7. MANAGING FITNESS FAILURES

(a) There can be a variety of reasons for a need to maintain fitness. Most firefighters will reach a point in their career when fitness levels decline. However, evidence indicates that although fitness does decline with age this can be mitigated in part by maintaining a healthy lifestyle and training regime.

(b) Some firefighters however may need more assistance if they are to be able to maintain their safe operational fitness level.

(c) Arising from a particular issue - access to a physiotherapy service may be beneficial and a phased return to work with access to fitness support can ensure a quicker return to full

firefighting duties. Encouragement should be given to access a rehabilitation programme to assist with returning to work/full duties.

(d) It is important that both the firefighter and the Aerodrome operator are aware of their responsibilities and work together to best achieve a positive outcome.

(e) Aerodrome operator and firefighters will recognise that regular periodic monitoring is necessary to assist the individual, identify the current position and to monitor sufficient progress.

(f) Despite a firefighter being aware throughout their career of the importance of maintaining the required fitness level for their role and actively working towards doing so with the support of their RFF Service Provider, it may be that a firefighter is unable to do so due to genuine medical or physical reason endorsed by an authorised medical authority or person. In such circumstances redeployment to non-operational role is an option that should be considered.

(g) Following discussion this may be redeployment in role or, with the agreement of the firefighter, Aerodrome operator may also wish to consider if there are any other suitable redeployment options available within the organisation / service, or in extreme cases, removal from the service. Figure-24 provides a risk assessment flow chart in managing fitness failures.

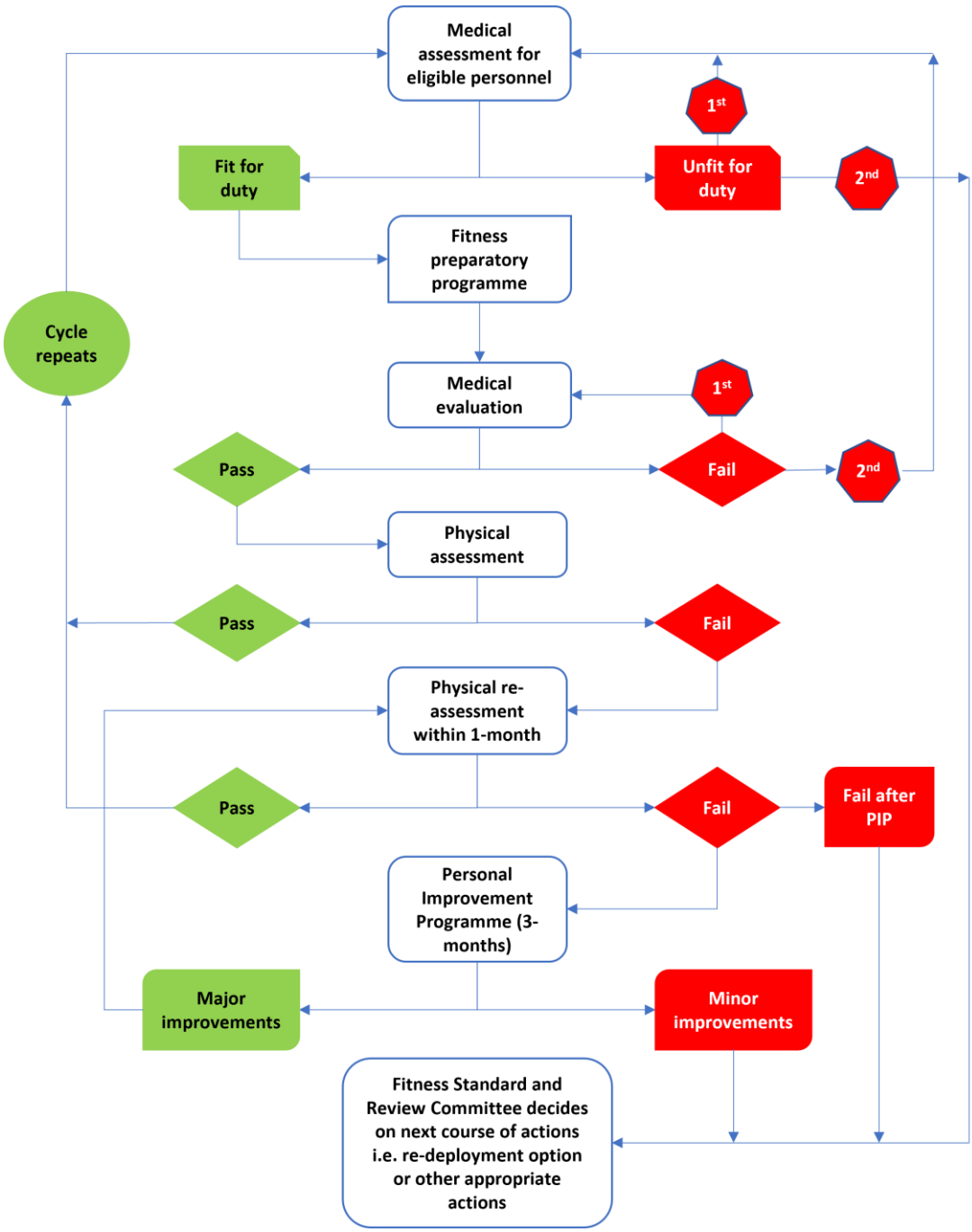


Figure-24: Fitness risk assessment flow chart

Note. — Fitness Standard and Review Committee will assess and decide the next course of actions on operational suitability of those personnel with repeated fitness failures and certified medically unfit for duty. Fitness records are maintained for audits and inspections.

AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting

PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION

(a) Rescue and firefighting personnel should:

(1) be provided with fit for purpose protective clothing, as a minimum: a firefighting suit, helmet, boot, glove and flash hood; and readily available for immediate use for these personnel to perform the assigned operational duties safely and effectively;

(2) where rescue and firefighting personnel are assigned for specialised rescue duties, additional protective clothing and equipment are provided, commensurate with the risks and hazards at the incident;

(3) be provided with fit for purpose respiratory equipment (breathing apparatus) when working at high-risk irrespirable atmosphere in which fire, smoke and any environment that is immediately dangerous to life and health, are present during an operational incident, overhaul operations and training; and

(4) when assigned to wear respiratory equipment at operational incidents and training activities, maintain sufficient facemask seal in accordance with national occupational safety and health regulations.

(b) Training and proficiency checks programme for rescue and firefighting personnel required to use protective clothing and respiratory equipment should be established and implemented.

(c) Policies and procedures for rescue and firefighting personnel wearing protective clothing and respiratory equipment activities should be established and implemented at operational incidents and training activities.

(d) Where necessary, radio communication equipment should be provided to rescue and firefighting personnel wearing respiratory equipment at operational incidents.

(e) A procurement programme for protective clothing and respiratory equipment should be implemented to ensure such clothing and equipment are fit for purpose and designed for use at aircraft incident.

(f) A preventive maintenance programme for protective clothing and respiratory equipment should be implemented including:

(1) the provision of suitable facilities for the storage, maintenance and cleaning of the equipment; and

(2) associated facilities, plants and equipment for the storage, maintenance and cleaning of the equipment are constructed, inspected and maintained, in accordance with the local occupational safety and health regulations.

GM1 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting

PROTECTIVE CLOTHING

(a) Fit for purpose refers to a personal protective equipment (PPE) that is manufactured and capable of performing the task it was designed for. Properly design PPE is fundamental to firefighter safety and performance. Ensuring that PPE fits well is not merely a matter of comfort but enhances firefighters' ability to carry out their duties safely and effectively while helping minimize the risk of accidents and injuries. Ill-fitting gear can impede movement, restrict flexibility, decrease work capacity, and compromise overall functionality, posing potential hazards on the fireground.

(b) Special rescue duties may include other operational incident where the use of different type of PPE is required e.g chemical protective clothing, etc.

RESPIRATORY PROTECTION

(a) A standard issued respiratory equipment (self-contained breathing apparatus) for rescue and firefighting personnel operating at operational incident and training activity consists of a backplate, body harness, full facemask, pressure gauge, regulator, pressure reducer, two 200/300-bar air cylinder (main & spare), a 6-m personal line and torchlight.

(b) Where rescue and firefighting personnel wears a respiratory equipment, a facemask fit assessment is conducted to ensure positive pressure within the facemask is achieved. Failure to achieve a good facemask seal may impair the efficiency of the equipment and cause a safety hazard to the wearer when working at irrespirable environment.

GM2 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting

PERSONAL PROTECTIVE CLOTHING

(a) It is essential that all personnel operating at an operational incident e.g aircraft fires are provided with protective clothing which will ensure the wearer is able to perform the assigned duties. This clothing provided should be fit for purpose, maintained and readily available for instant use. This specification should therefore have regard for three important factors in determining the types of clothing to be provided and the conventions specified in respect of its use during hours of duty. These are:

(1) the extent to which it is necessary to wear continuously all, or some elements of, the protective clothing so as to ensure immediate response when a call for attendance at an aircraft accident is received. Some forms of protective clothing create dressing problems which cannot easily be solved within the crew compartment of a moving vehicle;

(2) assuming that some elements of the protective clothing should be worn at all times during a tour of duty, there will be significant effects on the wearers in locations with high ambient temperatures. This is due to the nature of protective clothing and its inevitable restriction on the loss of body heat through natural ventilation processes. This suggests that there may have to be a compromise solution between the ultimate degree of protection offered by some forms of clothing and a lesser, but acceptable, form of protection which can be provided by clothing specifically designed for use in areas with high ambient temperatures. This compromise does not expose wearers to unacceptable risk but does ensure that immediate response to an operational incident is feasible; and

(3) in all protective clothing considerations, it is essential to recognize the problems which will arise for aesthetic and hygienic reasons if clothing has to be shared on an "impersonal issue" basis. The costs of protective clothing may be regarded as reasonable grounds for requiring certain elements, e.g. protective suits, to be used successively by a number of operatives in the course of a tour of duty. Apart from the practical difficulties of ensuring that each wearer is provided with clothing of the correct size, in these circumstances there may well be strong personal objections to this practice. One solution is the acquisition of relatively inexpensive uniforms, some of which require a special form of undergarment for complete protection, which can be worn in part throughout hours of duty without discomfort. Sufficient protection can be provided and clothing issues may then be possible on a personal basis, ensuring correct sizing and eliminating the personal difficulties described above. With reasons stated above, the sharing of protective clothing amongst RFF personnel is highly discouraged and each personnel should be issued with appropriately sized protective clothing including spare, where required.

(b) Protective clothing is distinct from ordinary rescue and firefighting service uniforms (see Figure-25) and is worn at operational incidents e.g., firefighting, overhauling, fire investigation activities, and training activities. It is designed to provide the firefighter with protection from radiated heat and from injuries arising from impact or abrasion during operational incident, activities and training. A measure of protection from the ingress of water is also desirable particularly in low temperature operations. A typical protective uniform consists of a helmet, with visor, a suit, either in one piece or in a jacket and trousers combinations, boots, gloves and flash hood. The desirable characteristics of each component are described below.

Figure-25: Examples of a station/work uniform and personal protective clothing

(c) Helmets.

(1) Helmets should provide sufficient protection from impact, be resistant to penetration and electrical conductivity and should not be susceptible to deformation due to heat absorption. A moveable visor, resistant to abrasion, impact, and radiant heat should offer a wide angle of vision. A jet-style helmet is most preferred as it provides sufficient protection to the head, neck and chest may also form part of the helmet if not otherwise provided by the protective suit. The helmet should not give the wearer a sense of isolation and should permit both speech and the reception of audible signals or words of command. Ideally, the helmet should be capable of use in conjunction with respiratory protection equipment and of incorporating radiotelephone receiver installations. Where helmets incorporate radiotelephone receivers, the helmet should carry a distinctive number to identify the wearer, applied in a contrasting colour and reflective medium. Helmet should be of different colour to differentiate different rank/authority at operational incidents and during trainings. See guidance at GM2 AMC1 ACM.OP.D.010(a) ARFFS administration.

(d) Protective suits. Protective suits can be classified into two categories, proximity suits and structural firefighting suits.

(1) Proximity suits, designed to permit firefighters to approach, and suppress, a fire situation, are not intended to provide the level of protection necessary for entering active fire areas. Suits with acceptable protective characteristics are provided in one-piece overall designs and in two-piece jacket and trousers combinations. Materials of construction vary widely, having regard to the climatic and other considerations in the location of intended use. The comments in paragraph (a) above are relevant in the selection of proximity suits by the aerodrome or appropriate authority but there are basic criteria which should be applied before acquisition whenever proximity suits are being assessed.

(2) The suit should provide sufficient thermal insulation, should resist radiant heat and occasional direct flame contact and be impervious to solid, liquid and gas. The garments should be lightweight, provide freedom of movement, be comfortable in extended periods of wear and easy to don without assistance. The fabrics employed should not be bulky and should be resistant to tearing and abrasion. They may be coated in a reflective medium or lined to minimize the effects of radiated heat on the wearer.

(3) Fastenings should be easily secured by the wearer, sufficient to maintain their security under stress and resistant to damage by heat or flame contact. Seams should be waterproof and any pockets should have drainage holes in the lower corners.

(4) The entire suit should be capable of being cleaned without reducing its protective qualities. Maintenance and minor repairs should be within local capabilities and not require the return of suits to a manufacturer or distributor.

(e) Boots.

(1) Uppers should be of a tough, flexible, heat-resistant material and extend to the mid-calf or knee level. Soles should be of a non-slip material, which may include synthetic materials, resistant to heat, oil, aircraft fuels or acids. Toe caps and soles may be reinforced with steel. The use of rubber boots in this application is not recommended.

(f) Gloves.

(1) These should be of the gauntlet type to provide wrist protection and their construction should permit the wearer to operate switches, fastenings and hand tools. The nature of firefighting operations indicates that the back of the glove should have a reflective surface to minimize radiated heat effects and that the palm and fingers should be provided in a material resistant to abrasion and penetration by sharp objects. All seams should be resistant to penetration by liquids.

(g) Flash hoods.

(1) Intended use for firefighting operations and associated activities such as rescue work, assistance during disasters. Flash hood is designed to be worn next to the skin to give a specified level of protection against accidental contact with flame. The flash hood is for use as secondary protection against heat and flame and should be worn with another protective head gear.

(h) Protection requirements. As a general guide, the protective clothing, when correctly worn, should offer at least the same level of protection as a structural firefighting suit. The exact level of protection should be decided with regard to operational considerations and risk assessment. Guidance relative to firefighting suits is available, as some examples, in the following standards:

(1) ISO 11613: Protective clothing for firefighters — Laboratory test methods and performance requirements;

(2) EN 469: Protective clothing for firefighters — Requirements and test methods for protective clothing for firefighting;

(3) NFPA 1971 Standard on protective clothing for structural firefighting; and

(4) ISO 15538:2001 Protective clothing for firefighters — Laboratory test methods and performance requirements for protective clothing with a reflective outer surface.

(5) For personal protective equipment for personnel performing water rescue operations refer to NFPA 1952, Standard on Surface Water Operations Protective Clothing and Equipment.

(i) Sufficient facilities for the cleaning, maintenance and storage of protective clothing should be provided at a fire station. These facilities should be well-ventilated and sheltered from direct sunlight. Some form of climate control environment is preferred. Cleaning and maintenance of protective clothing should adhere to suit manufacturer or supplier recommendations. See guidance at GM AMC5 ACM.OP.D.010(d) Fire station and facilities. ISO 23616 provides detailed guidance on cleaning, inspection and repair of firefighters' personal protective equipment (PPE).

(j) The health and safety of all personnel working at operational incident and during training are critical to the success in achieving the operational objectives. Strict policies and procedures on the safe use and operations of protective clothing should be established and implemented, including decontamination protocols, inspection and replacement programmes. Whenever there is a sign of deterioration and its protective performance is in doubt i.e after an incident or during an investigation, protective clothing should be immediately withdrawn from operations and its continued safe use is risk assessed.

Table 42: International standards on protective clothing and respiratory equipment

ITEM	NFPA (US)	EN (EU)	BS (UK)
Station/Work Uniform	NFPA 1975	EN ISO 21942	BS ISO 21942
Helmet with full visor	NFPA 1971	EN 443	BS EN 443
Gloves	NFPA 1971	EN 659	BS EN 659
Boots (footwear)	NFPA 1971	EN ISO 20345	BS ISO 20345
Tunic and trousers	NFPA 1971	EN 469	BS ISO 14116
Flash-hood	NFPA 1971	EN 13911	BS EN 13911
Breathing apparatus	NFPA 1981	EN 137	BS EN 137

GM3 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RESPIRATORY EQUIPMENT (BREATHING APPARATUS) — GENERAL REQUIREMENTS

(a) Rescue and firefighting personnel entering any environment in which fire is present during an aircraft incident, as well as during overhaul operations, should be protected with self-contained respiratory equipment. This applies equally to aircraft that comprise aluminium and composite fibre materials.

(b) The cabin interior of modern passenger aircraft comprises synthetic materials which, during fire or charring, will produce dangerous toxic gases. Such gases include carbon monoxide, hydrogen chloride, chlorine, hydrogen cyanide and carbonyl chloride (phosgene). Firefighters required to enter a smoke-filled cabin or other toxic environment will need self-contained respiratory equipment of an accepted design for the anticipated environment.

(c) Increasingly, composite fibre material is being used in the construction of modern aircraft and in particular replacing the external aluminium skin. Composite fibre, if involved in fire, can produce dangerous substances such as hydrogen cyanide, hydrogen chloride, hydrogen sulphide, hydrogen fluoride, acrolein and nitrogen dioxide. RFF personnel required to operate inside high risk and toxic environments will need self-contained breathing apparatus of an accepted design (see Table 42 on international standards on personal protective clothing and respiratory equipment and Figure-26 for example of a self-contained breathing apparatus unit).

(d) Composite fibre, if involved in high impact, such as an aircraft crash landing without the presence of fire, may become damaged to the extent minute particles of composite fibres are released into the atmosphere. Firefighters required to enter an area where minute particles of composite fibre are present will need self-contained breathing apparatus or, as a minimum, full face respirators with the appropriate filtration filters.

(e) It is essential to ensure that the respiratory equipment selected is sufficient in terms of its basic function, and its operational duration for the tasks involved. Industrial smoke masks and certain types of limited capacity compressed air equipment are unlikely to meet the stringent requirements of these operations.

(f) It is essential to develop and maintain a high level of competence in those firefighters appointed to wear respiratory equipment. This competence should include the most stringent procedures for the inspection, testing and maintenance of the equipment. If the highest standards are not achieved and maintained by regular training, the equipment can become ineffective and present a serious hazard to the wearer.

(g) Wherever self-contained respiratory equipment is operated, sufficient arrangements should be made for the recharging of air cylinders with pure air and a quantity of spare parts should be hand-held to ensure the continuous availability of the service.

Figure-26: Respiratory protective equipment (self-contained breathing apparatus)

GM4 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting

RESPIRATORY EQUIPMENT (BREATHING APPARATUS) — OPERATIONAL GUIDANCE

1. INTRODUCTION

(a) Breathing apparatus (BA) enables firefighters to breathe safely in otherwise irrespirable atmospheres. Using BA is one of the control measures likely to be employed as part of the overall incident plan for any incident involving fire and hazardous materials.

(b) This guidance document defines how breathing apparatus procedures should be used at operational incidents. BA command and control procedures provide a clear framework for operational activities to function effectively, structured around the incident command system. The procedures will allow efficient, effective and safe working practices to be adopted and can be adapted to all sizes and types of incidents that require the use of BA.

(c) This guidance document is adopted from the UK National Operational Guidance Programme – Foundation of Breathing Apparatus. Aerodrome rescue and firefighting services may refer to the following website for updates to the document - https://nfcc.org.uk/

2. SCOPE

(a) This document describes in detail the principles underpinning the planning, use and command and control of BA. It also describes the responsibilities of relevant personnel when BA is implemented as a control measure. The tactical guidance in this document will assist aerodrome rescue and firefighting services with:

(1) Developing safe work procedures

(2) Managing BA operations

(3) Defining specific roles and responsibilities in relation to BA

(4) Intra-operability at large or cross-border incidents where more than one Aerodrome rescue and firefighting services is in attendance

(5) Interoperability at incidents where other emergency responders are in attendance

3. OPERATONAL PRE-PLANNING

(a) Aerodrome rescue and firefighting services are required to identify risks and collect information indicating where there may be hazards to personnel. This may include information gained under aerodrome rescue and firefighting service legislation, industrial on-site plans and risk-based geographical information. Information collected may be used for developing plans and for briefing BA wearers.

(b) Information gathered during pre-planning should identify locations that may require additional control measures and therefore enhanced operational resources, such as guidelines, extended duration BA, airline equipment or thermal imaging cameras. The strategic siting and arrangements for mobilising suitable resources to implement these additional control measures should also be identified during this process.

(c) To ensure the safety and effectiveness of communications with BA teams, local planning arrangements should identify where there may be limited penetration of radio signals into buildings and into structures below ground. Steps may be taken at this preplanning stage to enhance the effectiveness of radio communications and telemetry within structures.

4. BREATHING APPARATUS PROCEDURES

Pre-incident Procedures

(a) All personnel have responsibilities for the organisation, planning and implementation of breathing apparatus procedures before, during and following incidents. Arrangements should be in place to ensure that on deployment, BA wearers are sufficiently prepared and equipped to carry out the tasks they are given.

(b) Aerodrome rescue and firefighting services should:

(1) Ensure that personnel required to wear BA are fit (as set out in local procedures) to carry out that role

(2) Ensure that personnel required to wear BA are suitably trained and practised in the procedures detailed in this document

(3) Ensure that suitable and sufficient testing, maintenance and servicing arrangements are in place for BA equipment, including associated ancillary equipment

(4) Provide the means to log and record BA set and associated equipment test results

Role and Responsibilities of the Nominated ARFFS Personnel

(a) The BA supervisor/manager will:

(1) Ensure that the appropriate tests of BA and associated equipment are carried out and that test records are accurately maintained

(2) Ensure that defective equipment is removed and reported as defective and that replacement equipment is obtained as soon as possible

(3) Ensure that BA and associated equipment is maintained in a clean, safe and serviceable condition and is available for operational use

(4) Nominate suitably qualified and competent individuals to wear BA

(5) Nominate a suitably qualified and competent individual to assume the duties of BA entry control operative

(6) Nominate any other role required for the management of BA operations

(b) The nominated BA entry control operative will:

(1) Examine and test the BA entry control board to ensure serviceability Examine the BA tabard(s)

(2) Ensure the availability of BA ancillary equipment

(3) Ensure the availability and operation of emergency air supply equipment (if provided) Check and, where practicable, adjust the BA entry control board clock to the correct time Report any defects or omissions to the supervisory manager

(c) The nominated BA wearer will:

(1) Ensure that before using BA, the apparatus is checked to ensure it is functioning correctly by carrying out the tests prescribed by the aerodrome rescue and firefighting service in accordance with manufacturers' instructions. A BA set that fails a test must not be worn until the reason for the failure is rectified.

(2) As soon as practicable after completing the appropriate tests, record the outcome in accordance with aerodrome rescue and firefighting service procedures

(3) Ensure that their competencies for their BA role and associated tasks are maintained Report any defects or omissions to the supervisory manager

(4) Be aware of all nominated BA command and control roles and personnel, including the BA team leader, the person responsible for the BA ECP and the BA entry control operative Achieve and maintain a satisfactory face-fit seal before deployment.

Deployment of Breathing Apparatus Wearers

(a) The BA Incident Commander (BIC) will only deploy breathing apparatus after identifying the operational outcomes and objectives to be achieved. They must make a suitable and sufficient assessment of the risks involved using all the information and local intelligence available, including:

(1) Risk assessments

(2) Site-Specific Risk Information (SSRI)

(3) Local aerodrome rescue and firefighting services standard operational procedures

(4) Other local or circumstantial information

(b) BIC should give consideration to:

(1) Immediate dangerous to life and health (IDLH) conditions

(2) Prevention of significant escalation of an incident

(3) Size and complexity of the incident, and specifically the requirement for BA operations

(4) Long-term operational objectives and short-term specific or critical tasks to be achieved Resources immediately available at the incident

(5) The full extent of resources required to fully execute the overall incident plan

(6) Estimated time of arrival of necessary additional resources

(7) Hazards and risks associated with the incident

(8) Structural integrity of the aircraft, building or risk area

(9) Location of suitable points of entry

(10) Safety and welfare of BA wearers

(11) Means of escape for BA wearers

Requirement for appropriate BA emergency arrangements

(a) The appropriate level of BA command and control procedures and safe work procedures outlined in this document should be used at all incidents where BA is deployed. Incident command system principles and practices should be adhered to at all times.

(b) BA will only be used on the instruction of, or with the authority of, the incident commander. Only the incident, operations or sector commander may nominate BA entry control operatives. During an incident, the incident commander may delegate authority to deploy BA wearers to operations or sector commanders. However, operational personnel have the right to request BA for respiratory protection, such as when a sudden change of wind direction affects a pump operator and the crew's safety would be compromised by leaving the pump unattended. In such instances, the firefighter should inform the incident commander and BA entry control operative, who should initiate the appropriate BA entry control procedures whilst the firefighter dons BA. Such requests should be considered as part of the normal risk management process.

(c) Procedures for briefing and debriefing BA wearers and teams are critical to establish safe work procedures and maintain firefighter safety. Full and effective briefing and debriefing of BA teams should therefore take place every time BA is deployed.

(d) Suitable, sufficient and resilient means of communication methods should be established at all times to ensure the effectiveness and safety of BA wearers. Communications between the BA entry control points, BA wearers and, where established, command support are essential.

(e) Suitable and sufficient firefighting equipment must be provided whenever BA teams are committed to a risk area involving fire or a flammable atmosphere.

Breathing Apparatus Operational Procedures at All Incidents

(a) Breathing apparatus must be worn at incidents to provide respiratory protection for firefighters working in oxygen-deficient, toxic and hazardous atmospheres.

(b) The level of supervision required should be subject to the situation and circumstances of any incident. It should take the size and complexity of BA operations at the incident into consideration, along with the hazards and risks presented to BA wearers.

(c) The guidance in this section should be followed on every occasion that BA is worn at an operational incident. Additional guidance relating to individual activities is described in later sections of this document.

(d) BA shall be donned and doffed in 'safe air' only. BA teams will consist of no less than two BA wearers. One BA team member should be a competent firefighter and all BA wearers must be trained in the use of BA.

(e) The exception to the above is where a single BA wearer is deployed in a low-risk situation (as described in this document) and supported by the local standard operational procedures and training of the individual aerodrome rescue and firefighting service.

(f) The BA team should normally remain as a team for the entire time they are deployed. However, in exceptional circumstances and following a suitable and sufficient risk assessment, the BA team leader may decide to split a team of four into two teams of two for a specific task, such as the rescue of multiple casualties. This decision should take account of the:

(1) Requirement for each team to be equipped with firefighting media to ensure personal protection where there is, or is likely to be, a fire or flammable atmosphere

(2) Provision of sufficient communications equipment

(3) Remaining cylinder contents of team members

(4) Physiological nature of the tasks being undertaken

(5) Ability, based on the competence of BA wearers, to appoint a team leader for each team (see minimum BA team competencies)

(6) Any alteration to the size of the BA team(s), the initial briefing or the name(s) of the team leaders should be relayed immediately to the person responsible for the BA entry control point.

<u>Role and Responsibilities of ARFFS Personnel when Managing the Use of Breathing Apparatus</u>

(a) The incident commander shall be responsible for:

(1) Determining, on the basis of a suitable and sufficient risk assessment, whether BA is required to deal with the incident.

(2) Ensuring that resources are sufficient to deal with the size and complexity of BA operations

(3) Requesting suitable resource provision for additional BA teams, particularly where the need for BA emergency resources is foreseeable.

(4) Determining, on the basis of a suitable and sufficient risk assessment, the appropriate procedures and level of BA command and control

(5) Ensuring that all personnel are aware which BA entry control procedures are in use

(6) Communicating the level of BA entry control procedures to watchroom control

(7) Adopting any other appropriate safety precautions and personal protective equipment for specific risks (e.g. chemical-protective clothing) required in conjunction with BA

(8) The siting and number of BA entry control points Implementing BA ECP support arrangements

(9) Nominating and briefing, or specifically delegating the responsibility to a suitably qualified person to nominate and brief, a person responsible for establishing each BA ECP to manage and monitor the implementation of BA entry control procedures

(10) Communicating the location of all BA entry control points to the operations and/or sector commanders, all BA entry control operatives, the BA sector commander and command support

(11) Nominating and briefing safety officers on their specific role requirements, including BA operations

(12) Establishing and communicating responsibilities for suitable and sufficient briefing and debriefing of BA teams in accordance with the principles and procedures set out in this document

(13) Ensuring that a structured and comprehensive handover takes place and all relevant information is transferred and understood when personnel responsible for managing a BA ECP are replaced

(14) Establishing suitable and sufficient systems and processes for logging and recording all relevant BA command and control information

(15) Determining, applying and communicating the appropriate structural search procedures where appropriate

(16) Assessing the need for, and authorising the use of, BA guidelines

(17) Determining the need for BA line communications

(18) Determining the need for and detailing the specific duties of the BA sector commander Determining BA wearer welfare requirements and establishing suitable arrangements where a BA sector commander has not been appointed

(19) Implementing the appropriate procedures in cases of BA wearer distress Ensuring appropriate BA emergency arrangements

(20) Appropriate provision of relief BA teams at BA entry control points in a timely fashion where a BA sector commander has not been appointed

(21) Ensuring that each BA team is equipped with the means to communicate with the person responsible for the BA entry control point

(22) Arrangements for communicating with the people responsible for the BA entry control points via the command structure

(23) Ensuring that a single level of BA entry control is applied to the whole incident

(b) The BA entry control operative (ECO) shall be responsible to:

(1) Monitor the time to activation of the low pressure warning device

(2) Set up and operate a BA entry control board or unit in a position nominated by the incident commander

(3) Log on BA wearers who are to be committed to the risk area

(4) Monitor the displayed cylinder pressure of all telemetry radio units logged on to BA entry control boards or units

(5) Ensure that appropriate action is taken if the cylinder contents of a BA wearer do not correspond with the BA wearer's time of whistle or low-pressure warning

(6) Initiate BA emergency procedures if appropriate

(7) Log off BA wearers leaving the risk area through the BA ECP from their BA entry control boards/units

(c) The BA team leader shall be responsible to:

(1) Ensure that the team is fully briefed by the person responsible for the BA ECP before deployment to the risk area

(2) Ensure appropriate firefighting equipment is provided and tested before entering the risk area where there is, or is likely to be, a fire or flammable atmosphere

(3) Monitor working conditions, assess the potential physiological effects and the impact this may have on working duration

(4) Continually assess the level of risk and determine when to withdraw, based on those risk assessments

(5) Co-ordinate gauge checks and ensure that every BA wearer returns to the BA ECP before their low-pressure warning device activates

(6) Test communications equipment with the BA entry control operative or BA communications operative.

(7) Ensure that the required radio channel is selected and locked if possible

(8) Provide regular updates to the BA ECP operative on the progress of the team and any other information relevant to the incident commander, such as conditions, layout and hazards

(9) Determine when a team of four may be split into two teams of two

(10) The BA team leader is responsible for the conduct of the team in the risk area. The team leader should base decisions on:

(i) Nature of tasks being performed

(ii) Training and experience gained from previous incidents

(iii) Information received by communications from outside the risk area Sensory perception inside the risk area (e.g. noise, temperature)

(iv) Information from BA and associated equipment (e.g. gauges, whistles, alerts, thermal imaging cameras)

(v) Information from other team members

(d) The BA wearer shall be responsible for:

(1) Managing their own air at all times in accordance with their briefing Ensure that they fully understand their brief, tasks and instructions, where and how they are required to enter the risk area, any identified hazards and any limitations on the duration of wear as determined by the person responsible for the BA entry control point

(2) On instruction from the person responsible for the BA entry control point, starting up the BA set, completing required apparatus pre-entry checks and proceeding to the BA ECP Ensure an adequate face-fit seal is established in “safe air”

(3) Handing the BA tally to the BA entry control operative before entering the risk area, ensuring the tally is placed in the BA entry control board with the ‘time in’ completed

(4) Ensuring that appropriate personal protective equipment is worn correctly

(5) Testing all firefighting equipment before entering the risk area where there is, or is likely to be, a fire or flammable atmosphere

(6) Checking cylinder contents immediately before entering the risk area.

(7) Calculating and selecting the required turn-around pressure in agreement with the person responsible for the BA ECP and the BA team leader

(8) Carrying out safe movement and search and rescue techniques at all times, maintaining close personal contact

(9) Performing safe and effective firefighting where there is, or is likely to be, a fire or flammable atmosphere

(10) Monitoring the pressure gauge and prompt other members of the team to monitor theirs when in the risk area

(11) Monitoring air consumption closely to enable safe withdrawal to the BA ECP before the low-pressure warning device activates

(12) Carrying out gauge checks more frequently when working hard

(13) Maintaining contact and regular verbal communication with the BA team leader and other members of the BA team. Updating them on any relevant information, including hazards and landmarks

(14) Working as part of a team, sharing workloads to maximise working duration Memorise the route in and out of the risk area

(15) Transmitting and receiving radio messages to the BA ECP if required to do so by the BA team leader

(16) Constantly monitoring conditions and re-evaluate risk, and inform the team leader of the need to withdraw, if required

(17) Informing the BA team leader of the pressure at which the BA team will need to start exiting the risk area

(18) Immediately reporting to BA ECP on exiting the risk area. Collect the BA tally from the BA entry control operative

(19) Assisting the team leader with debriefing as required, ensuring that any information that may be of use to subsequent teams entering the risk area, or to the incident commander, is communicated to the person responsible for the BA entry control point

(20) If applicable, drawing a basic plan (or use available plans) to identify the route, hazards and location of any casualties. Clearly marking areas that have been searched to assist subsequent BA teams

(21) After wearing a BA:

(i) Ensure they, and other team members, are not suffering any effects of heat related conditions Relax personal protective clothing following a suitable and sufficient risk assessment

(ii) Cool down and hydrate

(iii) Rest and recuperate

(iv) Report any accidents, injuries or near-miss events in accordance with local aerodrome rescue and firefighting service policies and procedures

(v) As soon as possible after wearing BA, clean and wash hands to reduce the risk of contamination from the risk area. avoid contact of BA or personal protective equipment with the skin and mouth

(vi) Ensure that apparatus is thoroughly cleaned, fitted with a fresh cylinder and tested as required. Any defects found during routine testing or during use must be reported according to aerodrome rescue and firefighting service procedures.

Breathing Apparatus Entry Control Procedures

(a) BA entry control procedures are designed to provide a consistent method for the safe and effective command and control and management of BA operations and to ensure the safety of firefighters.

(b) BA entry control must be fully aligned with incident command system principles and practices. BA entry control procedures and provisions should be proportionate to the scale and complexity of the BA operations at an incident, the overall incident plan and any known or reasonably foreseeable hazards and risks to BA wearers.

(c) The BA ECP is the designated position at which BA deployment and command and control is managed and forms an integral part of the incident command structure.

(d) Disciplined adherence to BA entry control procedures, briefings and instructions is critical to the safety and effectiveness of BA operations and BA teams.

(e) The BA entry control procedure adopted will be consistent throughout the entire incident and will not vary for different BA entry control points.

(f) All relevant emergency responders should be made aware of the BA entry control procedures, and any additional procedures, in use at the incident, particularly those in a position of command.

(g) The level of BA entry control in use should be communicated to fire control rooms to enable monitoring officers to gather relevant information.

(h) Suitable and sufficient systems and processes for logging and recording all relevant BA command and control information should be established prior to deploying BA wearers. Additional operational procedures and relevant command decisions should be recorded in an incident log as soon as practicable.

(i) Establishing and maintaining effective communications between the BA ECP and the BA team is essential, as is exchanging timely and regular information throughout the command team.

(j) Personnel qualified by virtue of a suitable and sufficient local aerodrome rescue and firefighting service development process can carry out the role of BA entry control operative, although overall responsibility for BA entry control rests with the incident commander.

(k) BA entry control operatives must be nominated for each BA entry control board. The BA entry control operative will undertake specific tasks in relation to BA entry control only (BA entry control operative role and responsibilities), under the command and direction of the person responsible for the BA entry control point.

(l) The allocated tasks of BA wearers should be confirmed, communicated and recorded before deployment. BA wearers deployed into risk areas should be informed of their tasks, such as

firefighting, search and rescue, guideline laying or other specific tasks. Following a suitable and sufficient assessment of risk, tasks may be combined, for example, firefighting and search and rescue.

Designation and Siting of BA entry control points (ECP)

(a) ECP should be established in a safe position, in safe air, near the scene of operations.

(b) The working platform of an aerial appliance should not be used as a site for an ECP.

(c) ECPs should be designated and identified at the incident by means of suitable referencing using the phonetic alphabet. The first BA ECP established at the incident will be designated 'Alpha', the second 'Bravo', and so on.

(d) BA teams deployed from the ECP will be identified by a sequential numbering system. For example, at BA ECP Alpha, the first BA team will be designated 'BA team Alpha 1', the second team 'BA team Alpha 2', and so on.

Bridgehead or Forward Entry Control Point (FECP)

(a) This arrangement allows an incident to be dealt with by deploying BA wearers from a safe-air environment within a structure while being as close as practical to the scene of operations. This may be considered necessary by an incident commander where there is a need to establish a BA ECP at a distance from the first point of access to a building or risk area, such as in high-rise building or large, complex structure.

(b) The location of the BA ECP in these circumstances will be determined by the incident commander based on the incident plan and the outcome of a risk assessment.

(c) Some of the factors that should be taken into account when determining the location of a bridgehead or forward BA ECP are:

(1) The potential for an escalation of the incident

(2) The safe-air environment necessary to start up BA

(3) The best access to and egress from the scene of operations Crew safety and welfare

(4) Effective communications with BA wearers

(5) Effective communications with the incident commander

(6) The level of supervision and support necessary for the BA entry control operative The distance from the initial point of access to the BA entry control point

Stage 1 Breathing Apparatus Entry Control

(a) Stage 1 BA entry control procedures are used to monitor the safety of BA wearers at incidents where the numbers of BA wearers is small and BA operations are limited and not complex.

(b) Stage I BA entry control procedures apply where:

(1) The nature of BA operations is limited and not complex

(2) The incident requires no more than one BA entry control point

(3) The incident requires no more than six BA wearers to be deployed to the risk area at any one time

(4) BA guidelines are not required

(c) The BA team must receive and confirm their understanding of a clear briefing and instructions. The briefing should include, for example, the task to be achieved, information regarding hazards, risks and control measures, methods of communication and emergency arrangements. Under Stage 1 BA entry control, the incident commander should ensure suitable and sufficient emergency arrangements.

Stage 2 Breathing Apparatus Entry Control

(a) Stage 2 BA entry control procedures apply when a greater level of control is required to manage and monitor the safety of BA wearers in complex BA operations, or where the criteria for Stage 1 have been exceeded.

(b) Stage 2 BA entry control procedures apply where:

(1) The nature of BA operations are complex and require a greater degree of control and supervision

(2) The incident requires more than one BA entry control point

(3) The incident requires more than six wearers to be deployed to the risk area at any one-time BA guidelines are required

(c) Under Stage 2 BA entry control, the incident commander and BA entry control operatives should ensure suitable and sufficient emergency arrangements are established at all BA entry control points. See Emergency arrangements.

(d) Each ECP should establish and maintain communications with all other BA entry control points at the incident.

(e) The initial BA entry control operative should, where possible, remain in place when moving from BA Stage 1 to Stage 2. A nominated person with the appropriate level of managerial authority, training and experience should supervise the BA entry control operative.

(f) When an existing BA entry control operative at a BA entry control board is replaced, this should be done at a time when no BA wearers are committed through that particular board. A structured exchange of information should take place between BA entry control operatives under the strict supervision of the person responsible for the BA entry control point.

(g) The incident commander should determine the need for additional resources to manage the BA entry control points and associated functions.

Breathing Apparatus Entry Control Point Supervision

(a) The incident or sector commander should consider the need to implement an appropriate level of supervision as the risks and demands of the incident increase. It may therefore be necessary to appoint a manager to provide additional BA ECP supervision. This manager will be known as the BA ECP Supervisor and should have the appropriate level of managerial authority, training and experience to ensure that they can effectively manage the required resources dictated by the incident plan.

(b) The BA ECP supervisor provides a greater degree of control and co-ordination between incident command, incident sectors, additional BA entry control points and other agencies where necessary (including neighbouring fire and rescue services). In practice, the BA ECP supervisor will perform co-ordination and logistical tasks associated with BA ECP operations. This will enable the BA entry control operative to focus on the monitoring of BA wearers deployed within the risk area.

(c) The BA ECP supervisor shall be responsible to:

(1) Receive a detailed brief and implement the incident, operations or sector commander's incident plan for breathing apparatus operations

(2) Brief and debrief all BA wearers

(3) Regularly update the incident, operations or sector commander on BA operations undertaken from the BA entry control point

(4) Ensure that a co-ordinated search is carried out in liaison with the search co-ordinator and that a record is kept of areas that have been searched or require searching

(5) Ensure that sufficient, fully equipped BA emergency teams are rigged and standing by at the BA entry control point

(6) Determine the time and/or cylinder pressure at which a BA team is expected to return to the BA entry control point

(7) Supervise BA communications for the BA entry control point

Breathing Apparatus Sector

(a) The purpose of establishing a breathing apparatus sector is to provide additional support for co- ordinating BA resources and logistics, particularly where the incident is large or complex or where there is more than one Stage 2 BA entry control point.

(b) The BA sector commander should have the appropriate level of managerial authority, training and experience to ensure that they can effectively manage the logistical requirements of a BA sector. The full extent of their role will depend on the complexity of the incident and the number of BA wearers deployed. Where necessary, the BA sector commander may be supported by assistants.

(c) The location of the BA sector should be communicated to all relevant emergency responders.

(d) Where a BA sector is in place, BA entry control operatives should establish and maintain effective communications with the BA sector commander and report all relevant information, including information from BA team briefings and debriefings, and submit requests for resources and support in a timely manner.

(e) The BA sector commander will:

(1) Be appointed by, and report to, the incident commander

(2) Be clearly identified by suitable wording on their sector commander tabard

(3) Provide BA emergency team resource requirements to BA entry control points

(4) Be responsible for BA resources and logistics

(5) Be responsible for BA wearers' welfare, and establish appropriate rest and recuperation areas

(6) Operate within the command support structure and work alongside and closely with other command support colleagues

(7) Establish and maintain communications with all BA entry control points

(8) Identify the location of each BA ECP and record the name of each BA entry control operative

(9) Establish and record the availability of BA, associated equipment and personnel at the incident

(10) Take account of any time variations between BA entry control board clocks

(11) Establish and record the requirements for relief teams of BA wearers

(12) Ensure that there are sufficient BA wearers to comprise the relief teams required by each BA entry control point, and ensure they arrive at the BA ECP at least five minutes before required

(13) Maintain suitable and sufficient records

<u>Rapid/Initial Deployment Breathing Apparatus Procedures</u>

(a) Suitable and sufficient pre-planning, including task and resource analysis, will assist incident commanders in deploying the appropriate resources required to provide safe work procedures

applicable to an incident that may require breathing apparatus. In circumstances where immediately available resources are unable to deliver the full incident plan but where there is an opportunity to preserve life or take action that will prevent an incident deteriorating, rapid/initial deployment of BA may be used under strict criteria.

(b) Rapid/initial deployment will only be undertaken on the instructions of the incident commander following a suitable and sufficient assessment of the risks versus the likely benefits.

(c) Under rapid/initial deployment protocols, no more than two BA wearers will be in the risk area.

(d) The incident commander may personally adopt the role of monitoring BA wearers following a suitable and sufficient risk assessment.

(e) As soon as resources become available, Stage 1 BA entry control procedures must be implemented as a minimum level of control.

(f) In addition to duties outlined in BA Operational Procedures – all incidents, the following responsibilities apply:

(1) The incident commander will:

(i) Initiate the use of rapid/initial deployment BA procedures following a suitable and sufficient assessment of the risks versus the likely benefits.

(ii) Inform watchroom control that rapid/initial deployment procedures are in use

(iii) Request further resources to establish the appropriate level of BA entry control

(iv) Ensure arrangements for communication between BA wearers, the person monitoring BA wearers and the incident commander

(v) Implement appropriate BA entry control procedures as soon as resources allow

(2) The monitoring crew member will:

(i) Establish and maintain communications with BA wearers and the incident commander

(ii) Record ‘time in’ on the BA entry control board

(iii) Ensure that BA tallies with suitable and sufficient details are placed in the BA entry control board, automated rapid/initial deployment board, or telemetry is established

(iv) Undertake other essential duties as required

(v) Provide a handover to any subsequent BA entry control operative

(3) BA wearers will:

(i) Ensure that all BA tallies and gauges are checked and that tallies are placed in the BA entry control board, with ‘time in’ recorded by themselves or through an automated board.

Single Breathing Apparatus Wearer Procedures

(a) In certain circumstances, it may be appropriate to deploy a single breathing apparatus wearer to carry out a specific task. Stage 1 BA entry control procedures apply when deploying a single BA wearer.

(b) The use of single BA wearers is only permissible when:

(1) Operations are not inside an aircraft, building or structure

(2) Limited to perform low-risk activities only

(3) The BA wearer's gauge has been checked and their cylinder contents recorded

(4) The wearer's BA tally has been placed in a BA entry control board with suitable and sufficient details entered

(5) The BA wearer can be removed quickly from the risk area

(6) The BA wearer can always be seen by the incident commander or other nominated crew member

(c) The incident commander will:

(1) Initiate the use of Stage 1 single deployment BA procedures following a suitable and sufficient assessment of risks versus likely benefits

(2) Inform the watch/control room that Stage 1 single deployment procedures are in use

(3) Establish arrangements for communication between the BA wearer, the person monitoring BA wearer and the incident commander

(d) The BA entry control operative will:

(1) Receive the tally of the BA wearer and check that the name of the wearer and the cylinder pressure at the time they enter the risk area are correct

(2) Enter the 'time in' on the tally

(3) Record BA wearer's entry and monitor the estimated air supply

(4) Place the tally in a slot on the BA entry control board

(e) The monitoring crew member will:

(1) Maintain visual contact with the BA wearer

(2) Monitor the activities and working environment of the BA wearer

(3) Establish and maintain communications with the BA wearer and incident commander

(f) The BA wearer will:

(1) Not enter any aircraft, building or structure

(2) Remain in view of the monitoring crew member

(3) Maintain communication with the monitoring crew member

Re-entry into a Risk Area Procedure

(a) It may sometimes be necessary for breathing apparatus teams to re-enter a risk area to perform a specific task after they have withdrawn, reported to the BA ECP and closed down their sets. Re-entry will only take place for a limited and defined period to achieve a specific task or tasks within the physiological and psychological capabilities of the BA wearer.

(b) Re-entry can only be allowed where the incident commander is satisfied that:

(1) The BA team is still under the control and supervision of the BA entry control operative

(2) The re-entry is for a clearly defined, specific task which should not involve firefighting (other than to ensure personal protection of the BA wearers)

(3) The cylinder contents of all BA wearers are sufficient for the task (this does not involve fitting a fresh cylinder, which would constitute a new entry)

(4) The pressure gauges of all BA wearers register a pressure that provides a minimum of 15 minutes' working duration

(5) The fitness and well-being of the BA wearers is adequate for the task to be undertaken

(6) The BA entry control operative must record fresh details for all the BA team members involved in a re- entry procedure. This should include annotating the BA entry control board appropriately with the words 're-entry' or RE.

(7) Re-entry should not take place for team members wearing extended duration BA owing to the additional weight of the extended duration BA set, the longer durations required and the additional physiological burdens involved.

(c) The incident commander will:

(1) Determine the requirement for the identified specific task Confirm that the identified task is for a limited duration

(2) Determine, following a suitable and sufficient assessment of risk, whether any specific task is within the physiological and psychological capabilities of BA wearers

(d) The BA entry control operative will:

(1) Where a BA team re-enters a risk area, ensure that the cylinder contents of all BA wearers are sufficient for the specific task; in all cases, the cylinder should be at a pressure that provide a minimum of 15 minutes' working duration

(2) Record fresh details for all BA team members

(e) The BA wearer will:

(1) Confirm their fitness to carry out the identified task

(2) Receive and confirm their understanding of a briefing before deployment

Breathing Apparatus used in conjunction with Aerial Access Vehicles/Platforms and Ladders

(a) Where the incident commander deems it necessary for aerial access platform cage operators and personnel working on ladders to wear breathing apparatus, the appropriate BA entry control procedure must apply.

(b) When a single BA wearer is operating from a working platform or head of a ladder, they must remain in communication with the appliance operator or person footing the ladder and not leave the head of the ladder or cage to enter any building or risk area.

(c) Where a BA team uses a ladder or cage as a means of access to a building or structure, a BA entry control point should be established at ground level in a safe area.

Search and Rescue within Aircraft and Structures

(a) A primary function of aerodrome rescue and firefighting service is to save life and it may be necessary for personnel to search aircraft, buildings or structures using breathing apparatus as an essential control measure. A logical and methodical search procedure, including a retraceable route for safe egress, is essential for BA wearers progressing through buildings or structures with restricted visibility.

(b) The incident commander must establish full awareness of the working environment, including fire conditions, fire development, levels of visibility and nature of hazardous materials, to ensure that the most appropriate search plan is implemented. Wherever possible, the incident commander should obtain risk information, including aircraft, building and structural plans, which will enable operational planning for using BA at the incident.

(c) BA wearers observing the search criteria and the nature and parameters of the operational brief in a disciplined way is critical to the safety and effectiveness of search and rescue operations.

(d) Search and rescue procedures involving the use of BA should be planned following a suitable and sufficient assessment of risk. At larger and more complex incidents, the incident commander may determine a need for a strategic overview of the various search and rescue activities in each sector and at each BA entry control point. They may then appoint a dedicated search co-ordinator who will establish manageable spans of control, identify areas to be searched and produce suitable search plans.

(e) The BA entry control operative should maintain plans and search records at the BA entry control point. These and all other information relating to the operation should be duplicated at command support.

(f) BA teams should ensure that details of areas searched are communicated to the BA entry control operative, who will communicate with the incident, operations or sector commander.

A comprehensive search and rescue record can then be established at command support, which will preclude duplication of search and rescue activity. The quality and effectiveness of the BA team's debriefing processes are therefore critical to the safety and effectiveness of the overall search plan.

(g) Tactical ventilation should be considered when carrying out procedures for the search and rescue of casualties as it may significantly improve conditions for casualties and BA wearers. However, tactical ventilation must only be carried out following a suitable and sufficient risk assessment and on direct instruction from the incident commander or delegated commander.

(h) The incident commander must provide clear, unambiguous briefings and instructions to BA wearers. This will include the route to be used by BA team(s) when progressing through the building or structure and the search and rescue method or procedures to be employed. Disciplined and systematic observance of the search brief by BA wearers is essential. They must assume responsibility for confirming their understanding of the briefing and instructions and, once deployed, follow their instructions without variation, except in extreme circumstances involving life-threatening situations.

(i) A BA team will work together, remain as a team at all times and maintain close personal contact unless a larger team decides to split.

(j) In larger compartments, multiple BA teams may be committed in a co-ordinated way to ensure that the entire compartment is searched and BA team safety is maintained.

(k) BA search teams operating within a structure where there is, or is likely to be, a fire or flammable atmosphere must be equipped with suitable and sufficient firefighting media. The means by which firefighting provision is deployed may be either:

(l) Carried by each BA team deployed within the risk area

(m) Carried by a specifically nominated firefighting BA team who maintain close personal contact with the BA search team at all times

(n) The incident commander should ensure sufficient personnel are deployed to ensure that BA teams do not have to separate to manage hose lines while operating inside an aircraft or structure.

(o) When negotiating specific obstacles such as doors, chairs, stairs, walls and vertical ladders, BA team members may separate briefly but should only be separated by the distance created by the obstacle. It is imperative to maintain line of sight, close contact and/or verbal communication at all times.

(p) The BA wearer will:

(1) Confirm the search procedure to be followed

(2) Maintain regular gauge checks

(3) Remain in close personal contact with other members of the team

(4) Maintain personal protection techniques

(5) Maintain communication with the BA team leader

Briefing and Debriefing of Breathing Apparatus Team Procedures

(a) It is essential that every breathing apparatus team is fully briefed at the BA ECP by the appropriate person.

(b) The brief should at least contain:

(1) The designated BA team call sign

(2) The nature and layout of the aircraft, building or structure to be searched

(3) The specific area to be searched

(4) The hazards and risks presented

(5) Existing control measures

(6) The search procedures to be employed and equipment to be used

(7) The level of BA command and control procedures in use

(8) The location and tasks of any other BA teams

(9) Any relevant air-management criteria Communications provisions

(10) BA emergency and contingency arrangements

(11) Debriefing requirements

(12) All other relevant information

(c) The brief for a BA search team may require them to start the search at the point of entry:

(1) At a location beyond the point of entry where there is the greatest danger for casualties

(2) Where the likely seat of a fire is located

(3) At some other designated point within the building or structure.

(d) The BA team must follow all appropriate safe work procedures, search and rescue procedures and personal safety techniques in reaching the designated point for the start of the search and during the search itself.

(e) Suitable plans of the structure, annotated with areas still to be searched and those already searched, landmarks (orientation reference points) and hazards identified, should be produced wherever possible. These plans can provide additional information that may be used during briefing and debriefing BA wearers to enhance the safety and effectiveness of BA search and rescue teams.

(f) On completion of any BA deployment, the team should be fully debriefed at the BA entry control point by the nominated and appropriate person. The essential elements of the debriefing should also be recorded.

Recording

(a) Key information should be recorded appropriately. A suitable and sufficient record of search and rescue instructions and briefings to breathing apparatus teams, debrief intelligence and any other relevant operational and planning information should be maintained at the BA entry control point. This risk-critical information impacts directly on the effective command and control of any incident involving BA and the tasks allocated to subsequent BA teams.

(b) Records should be maintained, not just for the duration of the incident but for subsequent audit, training and investigation purposes. These provide a contemporaneous record of the instructions given to BA teams and information gained at the debrief on completion.

Action on Locating Casualties

(a) Information on the size, number and location of casualties in a risk area must be confirmed if possible. This will influence decisions on BA team size, suitable equipment and priorities. For example, if there are a number of casualties or a particularly large person needs rescuing, it may be necessary to deploy a larger BA search and rescue team with appropriate evacuation equipment alongside firefighting teams providing protection.

Summoning Assistance

(a) Wherever possible, radio communications should be used to summon assistance. If radio communications are not available, BA wearers may gain the attention of other team members or BA teams by slow, loud and regular handclapping. These actions do not constitute a distress signal.

Breathing Apparatus Guidelines

(a) The deployment of breathing apparatus guidelines should be determined on the basis of a suitable and sufficient assessment of risk and in accordance with the incident plan. The incident commander should also consider using alternative or simultaneous operational tactics to assist in aerodrome rescue and firefighting service operations and enhance firefighter safety. These may include adopting tactical ventilation techniques and/or additional access points.

(b) Stage 2 BA entry control procedures and appropriate BA emergency arrangements must be established before BA guideline operations can start.

(c) The term 'guideline' defines the special line which is used either as 'a main guideline' to facilitate an initial search and to indicate a route between an entry control point and the scene of operations, or, alternatively, as 'a branch guideline', where is it necessary to traverse or search more than six metres off a main guideline. The method of use of the line for either purpose is the same.

(d) The purpose of a BA guideline is to enable:

(1) BA teams to locate the scene of operations

(2) BA teams to enter and search large or complex buildings or structures

(3) Subsequent BA teams to locate other BA teams

(4) A BA team in a risk area to retrace their steps to the BA entry control point

(e) The use of BA guidelines can be divided into two operational practices:

(1) Laying guidelines

(2) Following or searching off guidelines

(f) The BA guideline laying team has sole responsibility for laying the guideline along an access or egress route; they should not be drawn into other activities. A guideline laying team should therefore be supported by a firefighting team where there is, or is likely to be, a fire or flammable atmosphere.

(g) BA guideline laying and search teams should not enter a risk area where there is, or is likely to be, a fire or flammable atmosphere, without appropriate firefighting media. This equipment may be carried by the search team themselves, or preferably by support firefighting BA teams working closely with them.

(h) The guideline laying team should not operate ahead of any firefighting BA team because the firefighting BA team will adopt fire suppression techniques to render the environment safe. If the firefighting BA teams have to withdraw, the BA guideline laying team should also withdraw.

(i) Additional support BA teams should be deployed in conjunction with a guideline laying or search and rescue BA team for actions such as:

(1) Fire fighting and gas cooling

(2) Hose management

(3) Thermal imaging camera use

(4) Protecting the BA guideline laying team's means of escape

(5) Support for casualty retrieval

(j) A main guideline leading from a BA ECP should be designated A or B, using a tally. The relevant tally must be attached securely to the line before the BA team enters the risk area. The following information must be written on a BA tally before entering the risk area:

(1) Location name

(2) Set number permanently marked

(3) Cylinder contents in litres permanently marked

(4) Space for name

(5) Space for cylinder pressure

(6) Space for time in

(7) Duration and no fresh records are required

(8) The Tally is attached to the DSU

(9) Space for dosimeter reading in and out

(k) The BA guideline should be secured to an immovable object outside the risk area in safe air before any BA team enters the risk area, unless the guideline is being used to extend an existing main guideline.

(l) Sufficient information must be communicated to subsequent BA teams to ensure they follow the correct guideline.

(m) To avoid confusion and maintain manageable lines of communication and spans of control, no more than two guideline routes are permitted to be in use at any single BA entry control point.

(n) Only one guideline may be laid along a search route. However, two guidelines may be laid near to a building or structure's entry point, either side of a route, before they split into clearly defined search areas.

(o) Guidelines should not cross over each other inside a building or structure or share tie-off points. If two guidelines converge, one of them should be terminated and secured to a tie-off point two metres or more from where the guidelines would have met.

(p) A guideline may consist of a number of lines joined together. However, consideration must always be given to how long BA wearers can work, the physiological environment, the distance to be covered (particularly if rescues are necessary) and the potential for incident escalation.

(q) Incident commanders should use building plans and/or external reconnaissance to assess the internal distances BA wearers may be required to travel.

(r) Where a guideline is being extended, the BA team leader must inform the BA entry control operative, who will then ensure a suitable and sufficient record is maintained and inform the sector/operations/incident commander as appropriate.

Branch Guidelines

(a) Branch guidelines should be used where the distance of the area of search from the main guideline is greater than the length of one personal line (6-metres). No more than four branch guidelines can be deployed from a single BA entry control point.

(b) The branch guideline should be referenced according to its main guideline and the number of the branch guideline; for example, main guideline A, branch guideline 1. Any branch guideline tally must be secured to the line before the BA team enters the risk area.

(c) If a branch guideline needs to be extended, following a suitable and sufficient risk assessment based on information from the BA team leader, a record of the extension will be made and maintained.

(d) The incident (or nominated) commander will:

(1) Determine the use of BA guidelines on the basis of a suitable and sufficient assessment of risk Consider the use of alternative or simultaneous operational tactics

(2) Ensure that Stage 2 BA entry control procedures are applied to the whole incident Regularly review the use of BA guidelines

(3) Ensure use of additional BA support teams in conjunction with guideline laying teams Inform all relevant personnel that guidelines are in use

(4) Implement appropriate BA emergency procedures as necessary.

(5) Inform watchroom control rooms that BA guidelines are in use

(e) The BA entry control operative will:

(1) Record, monitor and log guideline use, including identifying which guideline each team is laying, following or searching from

(2) Attach BA main and branch guideline tallies to the appropriate lines

(3) Ensure that all deployed BA wearers are made aware of any guidelines laid behind them.

Compartment Firefighting Activities

(a) Appropriate firefighting procedures should be employed whenever breathing apparatus teams are firefighting in compartments. Aerodrome rescue and firefighting services must provide training in appropriate firefighting techniques and media to all BA wearers.

(b) Firefighting tactics must take into account the effects and proximity of BA wearers within the risk area.

Air management

(a) Air management is essential to the safe and effective operation of breathing apparatus operations. It begins when BA wearers go under air, i.e. after they have been briefed and have confirmed receipt of instructions.

(b) It is essential that BA wearers return to the BA ECP either before the low pressure warning device or whistle activates or by a pre-determined time of return specified in the briefing and instructions. Following deployment, BA wearers are responsible for their own air management.

(c) The BA team leader will:

(1) Ensure that every BA wearer returns to the BA ECP before their low pressure warning device or whistle activates

(2) Inform the BA entry control operative immediately if they become aware that this cannot be achieved

(d) The BA wearer will:

(1) Read their own gauge and make calculations

(2) Take responsibility for informing the BA team leader of the pressure at which they will need to start exiting the risk area

(3) Make the BA team leader aware of their gauge readings on a regular basis, so that work can be shared evenly in the team to maximise the remaining working duration

(4) Inform the BA team leader of any variation in their expected air consumption rate

(e) The rate of consumption of air of open circuit breathing apparatus can vary over a wide range.

(f) This range of variation depends upon a number of factors, which include the work rate of the wearer, their physique and the environmental conditions in which they are working.

(g) To enable the duration of open circuit breathing apparatus to be estimated an average consumption rate of 40 litres per minute can be used.

- *FULL DURATION - The period during which the breathing apparatus is expected to provide respiratory protection from the moment the cylinder valve is open until the cylinder contents are exhausted.*
- *WORKING DURATION - The period during which the breathing apparatus is expected to provide respiratory protection from the moment the cylinder valve is opened until the low-pressure warning whistle sounds.*
- *SAFETY MARGIN - The period during which the low-pressure warning whistle operates.*
- *Formula for calculating the duration of breathing apparatus is as follow:*

D = P X C – 10 / **N X 40**

Where D = The remaining working duration (in minutes)

P = The pressure in the cylinder (bars)

N = The maximum filled pressure of the cylinder (bars)

C = The capacity (in litres) of the cylinder when pressurised to N bars.

Airlines

(a) An airline supplies air to the wearer from a cylinder located remotely from the wearer.

(b) Specific operating procedures apply to the command, control and deployment of airline equipment, which must only be used by properly trained and competent personnel. Aerodrome rescue and firefighting services must ensure that their procedures align with this document and any other technical procedures that are in place covering the operation of airline equipment.

(c) Subject to aerodrome rescue and firefighting service risk assessments, it may be appropriate for aerodrome rescue and firefighting services to use airline equipment as a safe means of providing a breathing apparatus capability.

(d) An airline may be appropriate:

(1) Where extended air supply to self-contained breathing apparatus wearers is required

(2) Where the use of self-contained BA may not be suitable or is less effective

(e) These incidents include but are not limited to:

(1) Incidents in the open, where airlines are used to provide a breathable atmosphere without the weight of a self-contained BA set

(2) Specialist operations that involve restricted access to the working area

(f) In accordance with the system of operating when wearing self-contained BA, airline teams will comprise a minimum of two BA wearers.

(g) Each airline team will be equipped with suitable communications that will enable each team to communicate with the airline BA entry control point.

(h) The use of airlines reduces the overall weight imposed on a BA wearer and can provide a limitless supply of air. However, the physiological limitations of the wearer should be considered whenever airline equipment is used.

(i) An airline is susceptible to mechanical damage that could compromise the air supply to the wearer. Appropriate care and protective arrangements must be maintained.

(j) The incident commander should be aware of the location of all airline BA entry control points, and while it is permissible for self-contained BA wearers to use the same BA entry control point, a separate BA entry control board with a dedicated BA entry control operative must be established and maintained.

(k) The location of the airline BA ECP should take into account the previous guidance regarding BA entry control points. The incident commander will also take account of the:

(1) Length and amount of airline required

(2) Number of personnel required to operate it

(3) Distance to the scene of operations

(l) The incident commander will:

(1) Determine the requirement for the use of airline equipment

(2) Identify the location of airline BA entry control points

(m) The BA wearer will:

(1) Manage the laying and recovery of the airline to ensure effective progress at an incident

Working in Pressurised Atmospheres

(a) There are broadly two types of environments where pressurised atmospheres may be encountered. These are referred to here as 'elevated pressures' and 'commercial workings'

(b) The task of firefighting and rescuing people in pressurised workings is principally the responsibility of the on-site contractor. The aerodrome rescue and firefighting service would continue to respond to a call to pressurised workings and might stand by to give advice and provide backup facilities if necessary. Where, subject to any prior agreement and arrangement, it is reasonably foreseeable that a aerodrome rescue and firefighting service may be requested to support a contractor's emergency arrangements, the limitations of its breathing apparatus and associated equipment must be taken into account.

Withdrawal of breathing apparatus wearers

(a) The decision on when to withdraw from a risk area is extremely important. The main aim is to ensure that all breathing apparatus teams return to the BA ECP before the estimated activation of their low-pressure warning devices.

(b) The incident commander and BA team leader's duties include ensuring that BA wearers are not exposed to an unacceptable level of risk. BA wearers are responsible for ensuring that BA team leaders are made aware of any relevant developments that might require an early withdrawal from the risk area.

(c) The timing of withdrawal from a risk area must take into account:

(1) The specific instructions of the incident commander

(2) The potential for physiological and psychological stress or distress as a result of environmental conditions or workload, including high temperatures, humidity and casualty rescue

(3) The physiological conditions or depth of penetration into the risk area, such as in aircraft fuselage, tunnels, confined spaces, etc

(4) A deteriorating situation such as fire growth or signs of collapse.

(5) Any relocation of the BA entry control point

(d) BA team leaders should not rely solely on pressure readings when reaching a decision on when to withdraw their team; they should take into account information received from all sources. BA team leaders must withdraw their team if any member:

(1) Has an uncontrolled loss of pressure

(2) Appears to be unwell, confused or in discomfort, especially when exposed to rapid temperature increase.

(3) Has a gauge that is faulty or unreadable

(4) Has been exposed to an irrespirable atmosphere due to BA failure

(5) Has a low-pressure warning device that is activating

(6) Reaches the pressure gauge reading pre-determined by the person responsible for the BA entry control point

(7) Has insufficient time for decontamination procedures to be carried out before the low-pressure warning device activates

(e) BA team leaders must also withdraw their team if:

(1) An emergency evacuation signal sound.

(2) There is a loss of firefighting media (where applicable)

(3) The BA team experiences a sustained and unexpected loss of communications

(4) Conditions in the risk area have deteriorated to the extent that BA team members are exposed to an unacceptable level of risk (following a risk assessment or on the advice of team members)

(f) The BA entry control operative should immediately be informed of any decision to withdraw prematurely from a risk area. This decision should then be relayed to the incident, operations or sector commander.

(g) BA teams should ensure that they have provision for firefighting or gas cooling where there is, or is likely to be, a fire or flammable atmosphere, as they make their way out of the risk area. Firefighting media may only be left in areas unaffected by fire or fire gases within a structure. However, BA teams may decide to leave other equipment in the hazard area to reduce the workload when withdrawing as long as this does not compromise the safety of the BA team or other teams in the hazard area.

Communications

(a) Suitable and sufficient communications procedures must be established and maintained between the command team, the BA ECP and all BA teams throughout the duration of their deployment.

(b) Communications equipment used with BA should be suitable for use within flammable environments, complying with the requisite level of intrinsic safety.

(c) Communication between BA teams and the BA entry control operative is essential to the effective command and control of an incident and the safety and welfare of BA wearers. All relevant information should be shared.

(d) The BA team briefing should be given to all team members. It should include all information relevant to the team's task and safety, including emergency procedures. Regular communication between BA team members is essential to ensure the safety of personnel and the exchange of information within the BA team.

(e) When BA teams in the risk area come into contact with each other, team leaders should exchange all relevant information.

(f) Where radio communications are used, a dedicated BA communications channel (s) should be specified and used. However, at less complex incidents where the use of BA commuincations is minimal and manageable, a general channel may be used for all hand-held radio communications.

(g) In normal circumstances, the BA team leader should instigate all communications between the BA team and the BA entry control point. However, in an emergency, any BA team member may send a message.

(h) BA team members should be debriefed as soon as practicable after leaving the risk area. Debriefing should include any information that could assist in resolving the incident or improving safety for BA teams. Essential and risk-critical information must be communicated to the incident commander as soon as possible and before debriefing.

(i) Where assistance with BA communications becomes necessary at the BA entry control point, the incident commander should make the appropriate resources available.

(j) Normally, BA communications between teams will be via the BA entry control operative. However, circumstances may arise where BA teams need to communicate directly with other teams by radio. In such cases, teams should identify themselves and the team(s) they wish to contact through their unique incident BA team call sign (see designation of BA ECP and BA teams). As long as radio traffic is kept to a minimum, this should not prevent risk-critical information from being passed between BA teams.

(k) Where communications are more complex and a greater level of control and supervision is required, the incident, operations or sector commander may need to appoint a BA communications operative. BA communications operatives should be considered under Stage 2 BA entry control.

(l) The incident commander should consider using line communications equipment:

(1) Where a high degree of intrinsic safety is required and cannot be provided through hand-held radio and electronic communications equipment

(2) Where incidents require deep penetration into structures, such as basements and tunnels Where incidents are likely to be of long duration

(3) Where BA guidelines are required

(4) Where airline equipment is in use without BA being worn

(m) The BA communications operative will:

(1) Report to, and take instruction from, the person responsible for the BA entry control point, and work alongside the BA entry control operative

(2) Send and receive messages, liaising with the BA entry control operative and the person responsible for the BA entry control point

(3) Provide appropriate communications equipment

(4) Maintain a position close to the BA entry control operative

(5) Carry out a communications check with BA teams before entering the risk area Monitor BA teams' progress in the risk area

(6) Inform and update the person responsible for the BA ECP of any unexplained breakdown in communications with BA teams

Telemetry

(a) The purpose of telemetry in aerodrome rescue and firefighting service operations is to allow live and relevant data to be transmitted and received between a remote monitoring point and the breathing apparatus wearer.

(b) To maximise the signal power of a radio frequency transmission, aerodrome rescue and firefighting services should follow the relevant guidance from telemetry system providers and may consider, where appropriate, enhancing signal strength by using a 'leaky feeder' and/or repeater units.

(c) This document is based on the minimum functionality of telemetry equipment. Individual aerodrome rescue and firefighting services will need to develop their own procedures for their equipment, and should seek to ensure that telemetry BA command and control and BA equipment procedures for using telemetry are interoperable as far as is reasonably practicable.

(d) In the event of a loss of contact or breakdown in telemetry communications, the procedures followed by individual aerodrome rescue and firefighting services must consider other ways to communicate with BA teams.

(e) Arrangements must be put in place to manage and operate the available telemetry, and to monitor information received via telemetry at the BA ECP throughout the duration of BA deployment.

(f) Depending on the scope and scale of the expected BA deployment and in accordance with the incident plan, additional support to the person responsible for the BA ECP may be considered.

(g) The incident commander will:

(1) Decide whether emergency selective evacuation is appropriate

(2) Ensure that any decision to conduct an emergency total evacuation of all personnel is communicated to all telemetry BA entry control operatives

(3) Ensure that the appropriate action, based on individual aerodrome rescue and firefighting service standard procedures, is taken in the event of an unexpected and sustained loss of telemetry

(h) The BA entry control operative will:

(1) Monitor the time to activation of the low pressure warning device

(2) Set up and operate a telemetry BA entry control board or unit in a position nominated by the incident commander

(3) Log on telemetry-equipped BA wearers who are to be committed to the risk area

(4) Monitor the displayed cylinder pressure of all telemetry radio units logged on to telemetry BA entry control boards or units

(5) Ensure that appropriate action is taken if the cylinder contents of a BA wearer do not correspond with the BA wearer's time of whistle or low-pressure warning

(6) Revert to manual BA entry control procedures if the telemetry signal is lost Initiate BA emergency procedures if appropriate

(7) Log off BA wearers leaving the risk area through the BA ECP from their telemetry BA entry control boards/units

(i) The BA team leader will:

(1) Test telemetry equipment with the BA entry control operative

(2) Ensure that the appropriate telemetry signal is transmitted by each member of the BA team when leaving the risk area

(3) Ensure that the whole BA team is withdrawn if any member of the team receives an emergency evacuation signal (total or selective)

(4) Ensure that each BA wearer acknowledges receipt of the evacuation signal (depending on the telemetry system employed)

(j) The BA wearer will:

(1) Shut down the BA set and collect the BA tally from the BA entry control operative

Welfare of Breathing Apparatus Wearers

(a) Research has established that heat-related conditions are the greatest single source of performance limitation and physiological threat to firefighters' wellbeing when undertaking firefighting and search and rescue activities in a built environment. The ability of BA wearers to make critical decisions and sound judgements based on risk assessment may also be affected by heat-related conditions.

(b) BA wearer welfare, safety and effectiveness should be addressed before, during and post-deployment.

(c) Wearing breathing apparatus and personal protective equipment restricts the body's ability to regulate body temperature. This situation is exacerbated when the BA wearer is working in hot and humid conditions. Apart from general tiredness associated with fatigue in an operational environment, it could also result in:

(1) Poor judgement

(2) Reduced capacity for effective communication Poor co-ordination

(3) Reduced visual perception Reduced vigilance

(4) Slower reaction times Lack of concentration

(d) Incident commanders, anyone with delegated responsibility for BA wearer welfare and all BA wearers must be alert to the signs and symptoms of heat-related conditions. Recognising these signs and symptoms is part of the risk assessment process that helps determine whether a person is fit to be deployed in BA at an incident. In addition, all personnel have a responsibility to ensure that they arrive fit for duty.

(e) Further research has shown that regular training in BA increases an individual's ability to cope with the additional physiological demands that may be involved. However, the effects of heat-

related conditions on an individual cannot be completely removed by training alone, and aerodrome rescue and firefighting services should therefore adopt the following guidance.

(f) Personnel have a responsibility to ensure that they are physiologically and psychologically fit to wear BA. The welfare of BA wearers should be addressed and appropriately resourced on every occasion that BA is deployed.

(g) Where possible, firefighters selected as BA wearers should not carry out other functions requiring high levels of physiological effort, such as transporting equipment upstairs during high-rise incidents. If personnel have already worked with BA at an incident and are to be redeployed in BA, they should be given time to rest and recuperate.

(h) Where possible, action should be taken to improve the working conditions of BA teams deployed in risk areas, for example, by using tactical ventilation or cooling techniques to reduce temperatures.

(i) Recognising the physiological load and psychological effects imposed on BA teams and their need for rest and recovery, plans should be made for relief BA teams. Incident commanders should be aware of the hazards associated with wearers being recommitted.

(j) At an incident where BA operations are likely to be arduous or of long duration, establishing a rest and recovery area should be considered, supervised by a manager who will be responsible for managing rest, recuperation and refreshments for BA wearers. The rest and recovery area should be in a safe and suitable location that is clean, dry, cool and remote from the immediate scene of operations.

(k) Where refreshments are provided for crews at hazardous materials incidents, eating and drinking is only permitted under the direction of the hazardous materials adviser or scientific adviser where available.

(l) Appropriate health and safety recording systems must be maintained for BA wearers who have experienced heat-related illness and injury.

(m) Incident commanders should consider the physiological and psychological effects those previous activities may have on an individual or team's wellbeing and their ability to undertake their tasks safely when deployed to use BA.

(n) Individuals should be aware of their own personal fluid requirements and consume adequate amounts of water throughout the day to remain hydrated.

(o) Where possible, all BA team members should share tasks, roles and functions and, where appropriate, BA team leaders should consider team and task rotation. The designated BA team leader should always maintain a leadership role within the BA team.

(p) All BA wearers should monitor team members for signs of heat-related conditions such as dizziness, nausea, abdominal pain or a burning sensation of the skin. Under such circumstances, the whole BA team should immediately withdraw from the risk area.

(q) Where appropriate and following a suitable and sufficient risk assessment, dressing down of personal protective equipment should take place away from the scene of operations to allow body heat to vent, reducing the physiological burden. This should be a standard pre- and post-deployment procedure.

(r) To optimise recovery between BA deployments and maximise performance and safety before being redeployed, BA wearers should be given a period of time to rest and rehydrate. Table 43 (below) offers guidance on rest and rehydration periods; however, the time given should be based on the task undertaken, duration and conditions encountered by wearers.

Table 43: Breathing apparatus ideal rest and recovery procedures

INITIAL BA DEPLOYMENT CONDITIONS	REST PERIOD	WATER TO BE CONSUMED
Ambient	30 minutes	500ml
Hot and humid	60 minutes	1,000ml

(s) Particular attention should be given to firefighters who have been working in confined spaces with limited ventilation, such as basements or ships' holds. If the work has been particularly arduous, recovery time should be extended.

(t) Once the recovery period has elapsed or clearance has been given to leave the rest area, BA wearers should report to the incident, operations or sector commander for redeployment.

(u) The incident commander will:

(1) Consider the physiological and psychological effects that previous activities may have on an individual or BA team's wellbeing and their ability to safely undertake their task when deployed to use BA

(v) The BA entry control operative will:

(1) Acting on the instructions of the incident commander, restrict the length of exposure in difficult or strenuous conditions and determine an earlier time of exit from the risk area

(2) Monitor BA team members for signs of heat-related conditions such as dizziness, nausea, abdominal pain or a burning sensation of the skin following their withdrawal from the risk area.

(w) The BA team leader will:

(1) Monitor working conditions and be aware of potential physiological effects that may cause a heat-related condition to team members

(2) Monitor team members for signs of a heat related condition such as dizziness, nausea, abdominal pain, or a burning sensation of the skin

(3) In the event of any of these symptoms being observed, initiate the immediate withdrawal of the whole team from the risk area

(x) The BA wearer will:

(1) Monitor themselves and other BA team members for signs of a heat-related condition such as dizziness, nausea, abdominal pain or a burning sensation of the skin.

(2) Inform the BA team leader should they display any of the symptoms of a heat-related condition

Emergency Arrangements

(a) Emergency procedures provide effective arrangements for prompt and effective emergency assistance to breathing apparatus wearers in distress.

(b) Consideration must be given to providing suitable and sufficient emergency arrangements whenever BA is deployed at incidents. The full nature and extent of those emergency arrangements should be proportionate to all reasonably foreseeable risks to BA wearers.

(c) The need for emergency teams will depend on the nature of the risk and the situation that is being dealt with which may result in additional resource implications. During the initial stages of operations, as part of their incident plan, incident commanders must consider whether BA

emergency arrangements (including the potential need for BA emergency teams) will be required.

(d) Establishing BA entry control should include considering and providing emergency arrangements. Minimum emergency arrangements are detailed for Stage 2 BA entry control, but their nature and extent must be determined in line with the incident plan and be suitable, sufficient and proportionate to the risks and foreseeable emergency events at the incident.

(e) Where BA emergency teams are deemed necessary under BA entry control procedures (excluding Stage 2), steps should be taken to ensure their availability as soon as possible. The nature and extent of emergency arrangements will be dictated by circumstances and determined on the basis of risk.

Table 44: Summary of Minimum BA Emergency Arrangements

SUMMARY OF MINIMUM BA EMERGENCY ARRANGEMENTS
STAGE 1 BA ENTRY CONTROL (a) The full extent of the BA emergency arrangements must be determined on the basis of a risk assessment (b) Arrangements may or may not involve the provision of BA emergency team(s) (c) Where the provision of BA emergency teams is considered necessary but resources are not immediately available, the incident commander should consider restricting BA operations pending their arrival
STAGE 2 BA ENTRY CONTROL (a) The full extent of BA emergency arrangements must be determined on the basis of a risk assessment (b) The minimum provision under Stage 2 is one BA emergency team per BA entry control point, rigged and standing by throughout the time BA is in use (c) A separate BA entry control/telemetry board should be provided to accommodate the deployment of BA teams acting as additional BA emergency teams; they should be marked accordingly at the BA entry control point (d) Where additional resources are not immediately available, the incident commander should restrict BA operations pending their arrival

(f) In situations where BA emergency teams are in place, their deployment should be considered when any of the following conditions arise, or have the potential to arise, subject to a suitable and sufficient assessment of risk by the person responsible for the BA entry control point:

(1) A wearer fails to return to the BA ECP before the pre-determined activation time of their low-pressure warning device or whistle and cannot be contacted to confirm their safety and wellbeing

(2) A distress signal is heard or received by a telemetry device (unless it can be established immediately that this is an accidental activation)

(3) When audible or visual indicators suggest that a BA wearer is in distress or imminent distress or danger: for example, owing to structural collapse or fire conditions

(4) Prolonged and unexplained breakdown in communications

(5) At the request of a BA wearer in the risk area

(6) Depending on the nature of the BA emergency, and to ensure suitable protection of the BA emergency team, the person responsible for the BA ECP may identify the need to deploy firefighting, hose management and casualty handling BA teams in addition to the first BA emergency search and rescue team.

(7) Where BA wearers require – or appear to require – emergency assistance, the person responsible for supervising the BA ECP should take immediate steps to contact all BA teams in the risk area who may be affected. Other BA teams in the risk area should be given information that may allow them to help affected wearers exit the risk area safely. Radios, telemetry and other means of electronic communication, where available, may assist in identifying the team and wearers.

Note: None of the above precludes anyone with responsibilities or duties at the BA ECP from initiating a BA emergency radio message where necessary.

(8) Once a BA emergency has been declared, watchroom control room must be informed immediately. The radio message must include the phrase '**BA emergency'**.

(9) Contingency arrangements should include suitable protection for BA emergency teams entering risk areas containing potentially flammable, explosive or other hazardous materials. Consideration should be given to support arrangements for deployed BA emergency teams, taking into account the extreme physiological demands placed on BA wearers tasked with assisting or rescuing colleagues in distress.

(10) The level and type of personal protective equipment provided for the BA emergency team will be determined by the requirements of the incident and the risk assessment.

(11) The cylinder capacity and duration of the BA sets allocated to emergency teams must be at least equivalent to the highest capacity and duration of those of the BA wearers to whom the emergency arrangements relate.

(12) BA emergency teams standing by should be close to the BA ECP and receive regular and relevant updates, such as briefings to BA teams, information on hazards and the layout of the risk area, and details of areas searched.

(13) BA emergency teams should rig, but not don or start up, in BA and stand by at the BA ECP ready for immediate deployment until instructed otherwise.

(14) A separate BA entry control/telemetry board should be provided at the BA ECP to record the deployment of BA emergency teams.

(15) The person responsible for the BA ECP should ensure the provision of any additional equipment that might be needed by BA emergency teams and ensure that it is ready for immediate use.

(16) The BA emergency team must be provided with the equipment considered to be suitable and sufficient to meet the needs of all reasonably foreseeable emergency events, including:

(i) Radio communications

(ii) Means of providing a supplementary air supply to a BA wearer

(iii) Any other specialist equipment

(iv) Drag mats

(v) Breaking-in gear

(17) As part of ensuring BA wearers' welfare and physiological readiness for deployment, account should be taken of ambient temperatures and weather conditions when deciding on the standard of dress and other provisions necessary for the BA emergency team on standby.

(18) There must be at least as many BA wearers in BA emergency teams as in the largest team deployed or likely to be deployed from the BA ECP to the risk area.

(19) Minimum requirements for each BA emergency team:

(i) Two BA wearers

(20) Consideration must be given to:

(i) Numbers in the BA emergency team, taking into account the working environment

(ii) Distance from the BA entry control point

(iii) Size of the BA team requiring assistance

(21) The person responsible for the BA ECP is responsible for activating emergency procedures and the deployment of emergency teams, including BA emergency team support arrangements. This person is also responsible for all other BA entry control procedures relating to BA emergency team deployment, including:

(i) Briefing and debriefing BA emergency teams

(ii) Maintaining a suitable record of all relevant operational and risk information, decisions made and tasks given to BA emergency teams

(22) BA emergency team call signs must identify the BA ECP they are being deployed from and their emergency team status. For example, emergency BA team, Alpha 1, emergency BA team, Alpha 2, etc.

(23) Before deployment to the risk area, the person responsible for the BA ECP should brief BA emergency teams, providing:

(i) Any relevant information, for example the BA team size, route, tasks, last known location

(ii) All hazards identified during the risk assessment process

(iii) Control measures to be used for the protection of BA emergency teams

(iv) Specific details of their tasks

(24) The brief should be repeated by the BA emergency team leader and acknowledged by the person giving the briefing to ensure that the whole BA team understands the details.

(25) Following the deployment of any BA emergency team, arrangements must be made immediately for replacement BA emergency teams.

(26) Breathing apparatus wearers should indicate that they are in distress by activating their distress signal unit. When in distress the BA wearer or the BA team leader should carry out the following actions:

(i) Inform the BA entry control point, including the phrase ‘BA emergency’, of the nature of the distress, current location and intentions

(ii) Retrace steps to the BA entry control point. If this is not possible, locate an alternative exit (for example window or door) in the immediate vicinity, then attempt to attract attention or decide to remain at the current location or relocate to a safe waiting area

(iii) Inform the BA entry control operative of each BA wearer’s cylinder pressures; in some cases, telemetry equipment will deliver this information automatically

(iv) Where necessary, adopt ‘entrapped procedures’ to conserve air while awaiting rescue Activate the distress signal unit of the affected BA wearer; in the unlikely

event that a distress signal unit fails to activate, the device of another BA team member should be activated

(v) Where a distress signal unit has activated accidentally, the BA team leader should inform the BA entry control point. A decision should then be made on whether the BA team should return to the BA ECP or whether another BA team should be deployed to the risk area to reset the unit with a distress signal unit key.

(27) BA teams will:

(i) Inform the BA ECP that a distress signal unit alarm is audible

(ii) Follow the revised brief issued by the person responsible for the BA ECP (rendering assistance to a BA team in distress should take precedence over existing tasks unless the tasks are risk-critical and could compromise the safety of other BA wearers if not carried out)

(iii) Not take unnecessary risks, such as entering large or complex areas if unable to retrace their steps

(28) BA emergency teams will:

(i) If possible, confirm the nature of the emergency with distressed BA wearers

(ii) Inform the BA entry control operative that distressed BA wearers have been located and request further assistance (if required)

(iii) Take gauge readings of distressed BA wearers' cylinders Take gauge readings of BA emergency team cylinders Render any required on-scene emergency assistance

(iv) Implement a safe rescue plan to remove distressed BA wearers from the risk area following a risk assessment

(29) The incident commander will:

(i) Ensure that a BA emergency message is communicated to the aerodrome rescue and firefighting service control room at the earliest opportunity

(ii) Request the resources required to resolve the emergency situation

(30) On receipt of a BA emergency message, watchroom control will:

(i) Mobilise a minimum of one further pumping appliance

(ii) Arrange for the ambulance service to attend

(31) The BA entry control operative will:

(i) Immediately inform the person responsible for the BA entry control point; if unavailable, they will notify the incident commander and aerodrome rescue and firefighting service control room

(ii) Take whatever practicable action possible in the circumstances

(iii) If Stage 2 BA entry control procedures are in use, inform all other BA entry control points

Entrapped procedure

(a) The aim of the entrapped procedure is to maximise the duration of available air in BA sets where BA wearers are trapped or unable to withdraw from the risk area.

(b) Partial breathing apparatus set removal is an additional technique for self-rescue available to BA wearers in extreme circumstances where no safe means of egress from the risk area is available or where adopting entrapped procedure presents an intolerable risk to the safety of the BA team.

(c) In those rare circumstances where a BA wearer has become trapped and the dangers are too great to await rescue, partial BA set removal may be deemed the only technique available.

(d) Before commencing partial BA set removal to negotiate any obstruction or restriction on egress from a risk area, the BA team leader should seek further guidance, additional instructions and details of other actions being undertaken from the BA entry control point. The BA team leader should also investigate the availability of any safe alternative exit routes and consider adopting the entrapped procedure.

(e) Partial BA set removal is a technique available to BA wearers for self-rescue in extreme circumstances, where:

(1) Egress is through a restricted opening and no other safe means of egress is available

(2) Adopting entrapped procedures presents an intolerable risk to the safety of the BA team

(f) The technique is carried out systematically under supervision and with assistance from other BA wearers

(g) The BA team leader should consider the physiological and psychological effects of the environment and the increased air consumption of wearers during partial BA set removal. Frequent gauge checks must be undertaken and, where possible, communicated to the BA entry control point.

(h) The BA team leader should:

(1) Consider the physiological and psychological effects of the environment and the increased air consumption of wearers during partial BA set removal

(2) Carry out frequent gauge checks and communicate with the BA entry control operative

(3) Consider the availability of safe alternative exit routes and adopting entrapped procedure

(4) Ask the BA entry control operative for further guidance and details of other actions being undertaken from the BA entry control point

(i) The BA wearer should:

(1) Ask the BA team leader for further guidance and details of other actions being undertaken from the BA entry control point

Breathing Apparatus set failure and reporting procedure

(a) Incidents may occur when a breathing apparatus set fails, resulting in distress to the wearer.

(b) The term malfunction does not include leakage into a facemask due to poor face fit or a failure arising from an external source such as falling debris or entanglement.

(c) All 'distress to wearer' situations should be properly investigated.

(d) When impounding a BA set, the incident commander must:

(1) Impound the BA set

(2) Record the cylinder pressure before closing the cylinder valve

(3) Record the exact number of turns required to close the cylinder valve

(4) The time the wearer entered the incident

(5) Record the time the wearer left the incident

(6) Record all other information from the BA entry control board

(7) Record any other obvious information regarding the condition of the set without carrying out a detailed inspection

(8) Record any remarks made by the wearer or other members of the BA team

(9) Record witness statements

(10) Place the BA set, BA tally, facemask, cylinder, service log book into a plastic bag which should then be sealed, labelled and secured in a safe place

(11) Inform the watch/control room

(12) Complete any administration relevant to the investigation

(13) Ensure a full investigation is carried out by a competent person

Interoperability and intraoperability

(a) There will be occasions when breathing apparatus wearers from aerodrome rescue and firefighting services are required to work alongside teams from other fire and rescue services and with personnel from other mutual-aid emergency services.

(b) The BA command and control procedures of aerodrome rescue and firefighting services should provide a common framework for safe and effective systems of work when working with other mutual-aid emergency services and, where necessary, other public, private and commercial fire and rescue organisations.

(c) Subject to prior arrangement, planning, exercising and validation of arrangements between fire and rescue services, BA teams may work together where:

(1) Methods for identifying BA entry control points are compatible

(2) BA wearers from different fire and rescue services are wearing the same specification BA equipment and follow the same procedures

(3) BA wearers ensure that the person responsible for the BA ECP is fully informed of their maximum cylinder capacity and duration, to ensure the correct duration table is used to plan the time of whistle or low-pressure warning device

(4) Radio communications are compatible between all BA wearers in a BA team and the BA entry control point, and at least between the BA team leader and the BA entry control point.

(5) BA wearers from different fire and rescue services using the same specification BA sets and associated equipment may insert their BA tallies (where used) into each other's BA entry control boards at an incident.

(d) Aerodrome rescue and firefighting services should comply with appropriate locally agreed protocols for safe work procedures based on this guidance and developed for interoperability with the other fire and rescue services.

5. OPERATIONAL TECHNIQUES

Air Management

(a) Breathing Apparatus wearers should return to the BA entry control point:

(1) Before their low pressure warning device or whistle activates

(2) Before the pre-determined return time specified in the BA team briefing

(3) Where a BA team member displays symptoms likely to affect their welfare, such as a heat- related condition.

(b) The only exceptions are in the event of a:

(1) Set malfunction

(2) BA wearer becoming trapped

(3) Situation where a BA wearer's air supply has to be augmented

(c) Air consumption rate tables should be used to provide a predicted exit time for BA wearers. However, the person responsible for the BA ECP should be aware that BA wearers consume air at different rates.

(d) Each wearer will consume air at a different rate. These differences will be determined by a number of factors including:

(1) Body mass

(2) Individual levels of fitness Work rate

(3) Tasks undertaken Environmental conditions

(4) Personal protective equipment in use

(5) Psychological stress

(e) To maintain an accurate record of air consumption each BA wearer must read their own gauge, make their own calculations, and inform the BA team leader of the pressure at which they will need to start exiting the risk area.

(f) BA team leaders should regularly update the BA entry control operative about the air consumption of the BA team.

Calculating Turn-around Pressure

(a) Where the use of a turn-around pressure might be appropriate, the following methods may be considered:

(1) Method 1: Making progress. This is used for tasks such as making steady progress into a hazard area. The wearer notes their gauge pressure as they book in with the BA ECP and start up their BA set. They then calculate their turn-around pressure by dividing their full duration by two, then adding half the safety margin. This is a basic calculation but will ensure that, if they begin to exit when this pressure is reached, they will exit before their low-pressure warning device or whistle activates. For example:

Method 1 example: Making progress
Entry pressure = 200 bar Divide by two = 100 bar
Half safety margin (60÷2) = 30 bar Add the two = 100 + 30
Turn-around pressure = 130 bar

(2) Method 2: Working at a location. This is a more accurate method and can be used when a BA team enters a risk area and will be working for some time. For example, if team 1 were sent into a risk area to relieve team 2, they would need to calculate the initial turn-around pressure on entry and take gauge readings regularly along the route. Once team 1 reached team 2, they would take another reading and calculate the pressure they had used to reach that point. Team 1 can then safely stay with the branch until the pressure drops to the point where they have sufficient air to exit back along the same route without entering their safety margin.

(3) When using Method 2, the BA team will have more time to complete a task. This can make fire and rescue operations more effective and may mean that fewer BA wearers will be required.

Method 2 example: Working at a location
Entry pressure = 200 bar
Gauge reading on reaching objective = 160 bar Air used to reach objective = 40 bar
Air required to exit = 40 bar + safety margin (i.e. 60 bar) Turn-around pressure = 100 bar

Landmarking

(a) While navigating through the risk area, identifiable locations such as a change of level or direction, doorways and large obstacles, can act as prompts for gauge checks. By checking at regular intervals using these landmarks, any unexpectedly high levels of air consumption or loss of air should be identified. In particular, the team will be able to determine the amount of air and the pace required to exit the risk area.

Rescue of a Casualty

(a) Where a BA team plans to exit with a casualty, it is essential that a gauge reading is taken and a calculation made on the air required to leave the incident unless they are already close to an exit. If there is an insufficient air supply to exit with the casualty, the team should request additional assistance from the BA entry control operative.

(b) On exiting the risk area, further gauge readings should be taken when reaching familiar landmarks. By referring to earlier calculations, team members will be able to determine whether they can leave the incident with the casualty or progress as far as possible before having to leave the casualty with another BA team. The team must remain in communication with the BA entry control operative so that appropriate support and additional risk control measures can be introduced where necessary.

Close Personal Contact

(a) Close personal contact is defined as maintaining visual, verbal communication and/or physical contact (touching distance) with breathing apparatus team member/s at all times within the risk area to ensure the safety of personnel and for the exchange of information within the BA team. This can be achieved in a number of ways, including:

(1) Attachment by short personal line

(2) Constant physical contact between each BA team member

(3) Remaining within touching distance

(b) In circumstances where all BA team members are in contact with a hose reel, delivery hose or casualty, personnel are deemed to be in physical contact, providing they maintain visual (line of sight) and verbal contact (not radio communication).

(c) BA team members will maintain close personal contact when performing personal safety techniques, such as hand and foot sweeping.

Entrapped Procedure

(a) When the breathing apparatus wearer is unable to escape from the risk area, they should:

(1) Contact the BA ECP by radio (if possible)

(2) Operate the distress signal unit

(3) Relax as much as possible in the circumstances by assuming a reclined or seated posture

(4) Breathe calmly and gently to minimise air usage.

(b) Any supplementary air supply should not be operated and the cylinder valve should not be adjusted other than to check that it is fully open.

(c) Once the safety margin has been reached, the low-pressure warning device or whistle will activate. In the case of an air-operated whistle device, the air consumed is minimal; electronic low pressure warning devices do not use any air.

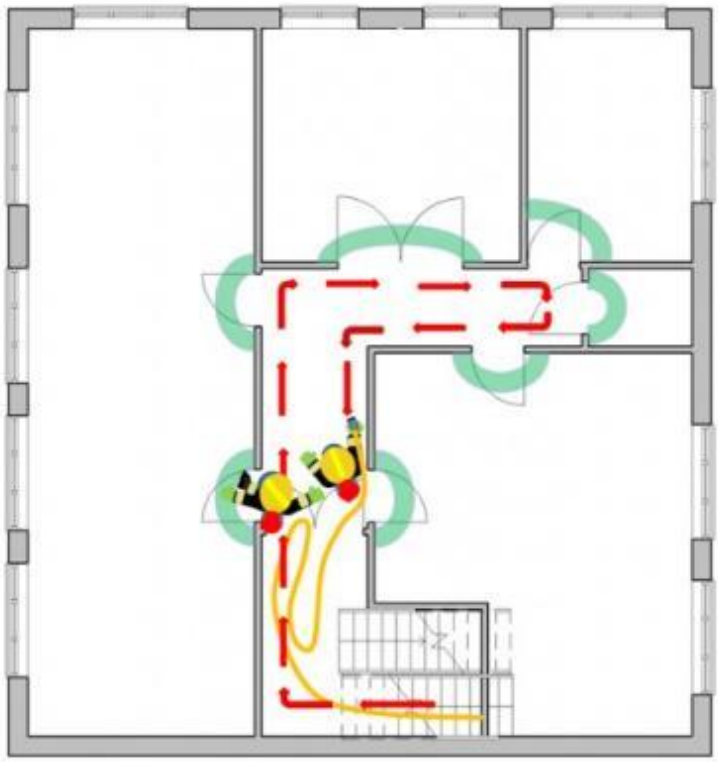
Compartment Search and Rescue Procedures

(a) With this method of search, each compartment is mapped out systematically as the breathing apparatus search and rescue teams' progress. The team progresses around the room using either a left or right hand search pattern (identified to the BA team as part of their brief prior to entry). As they do so each door encountered is checked and swept for casualties, immediately visible or within touching distance, from the doorway.

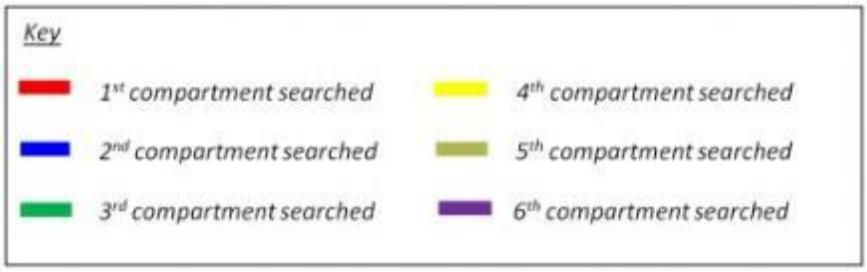
(b) Once a full circuit of the compartment has been carried out the team progresses into the first door they encountered on their search to carry out this procedure again. This promotes the concept of fully searching compartments before progressing on to the next identified compartment, enabling accurate recording of the search and assists crews with orientation whist operating in low visibility conditions. Compartment search procedures can also assist with the efficient management of firefighting hose due to the fact that hose is always returned to the initial compartment after subsequent compartment searches have been carried out.

(c) This procedure is suitable for a range of structures, particularly multi-compartmented structures which may have interconnecting rooms.

Below is an example of a BA team performing an initial entry into the first compartment, checking and sweeping doorways, using the compartment search procedure.



Below is a progressive example of a BA team performing a left-hand compartment search

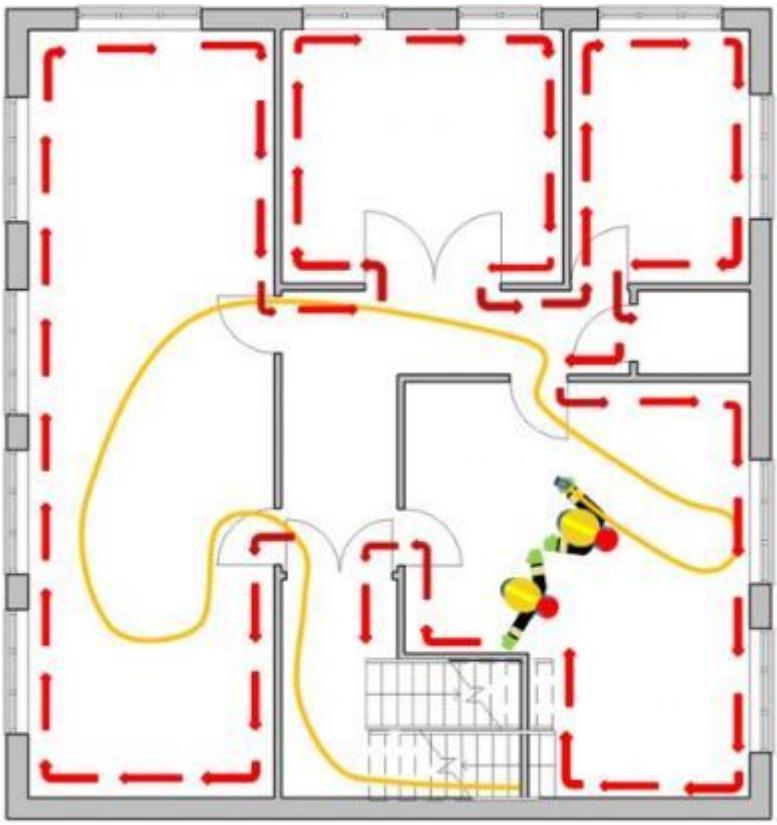


Directional Search Procedure

(d) This method of search is particularly suitable for smaller buildings, where compartments have standard and recognisable layouts; the procedure is practical to adopt and compartments can be cleared as the directional search progresses, often making the procedure time efficient.

(e) This procedure is easier to perform as a BA wearer, however there is an increased risk of BA teams inadvertently missing a fire compartment or risk area (depending upon the building layout), which could compromise their means of escape should the incident develop. Additionally, firefighting hose management may be more difficult due to the fact that steps must be retraced throughout the search route to retrieve it or to exit. Search and rescue operations should therefore be comprehensively co- ordinated, with an effective search plan and recording process.

Below is a progressive example of a BA team performing as left-hand directional search

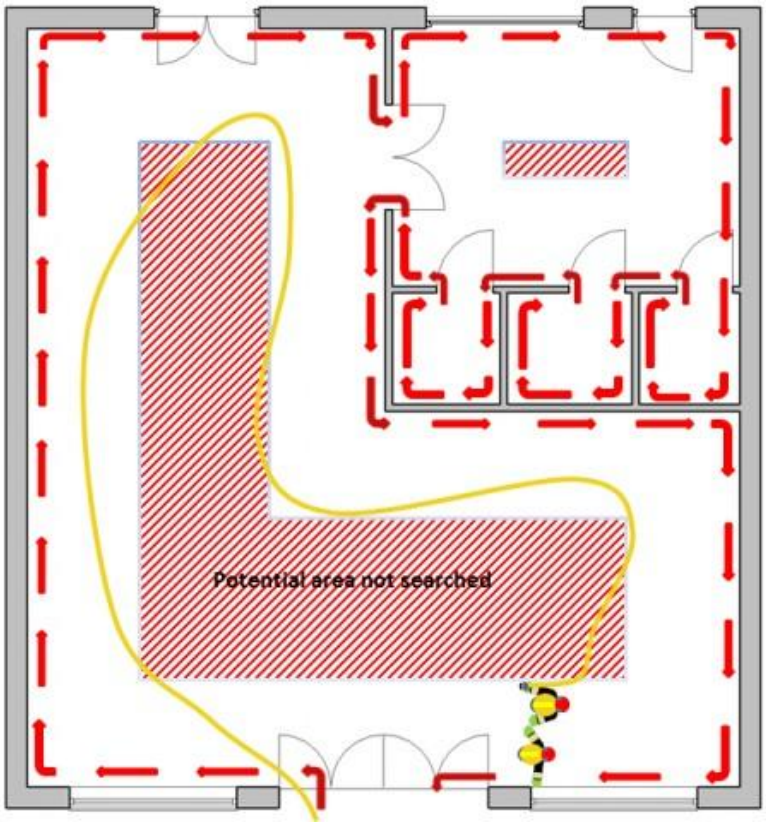


Searching Large Compartment

(a) In larger compartments, multiple teams will need to be committed in a co-ordinated way to ensure the compartment is thoroughly searched and team safety is maintained. The directional search procedure does not necessarily mean that a team will clear a compartment before moving on to the next compartment.

(b) It may not be possible to search large compartments entirely using conventional search procedures, as BA teams may not be able to access the centre of the compartment safely, whilst maintaining contact with a fixed reference point. When large compartments are encountered, additional control measures may need to be implemented to enable a complete search. This may include the use of thermal imaging equipment, tactical ventilation and BA guidelines.

Below is a progressive example of a BA team performing a left-hand directional search of large compartments



Left/right-hand Orientation

(a) Both compartment and directional search procedures will employ a left- or right-hand orientation. This means that in larger compartments, multiple teams will need to be committed in a co-ordinated way to ensure the compartment is thoroughly searched and team safety is maintained. The directional search procedure does not necessarily mean that a team will clear a compartment before moving on to the next compartment.

(b) It may not be possible to search large compartments entirely using conventional search procedures, as BA teams may not be able to access the centre of the compartment safely, whilst maintaining contact with a fixed reference point. When large compartments are encountered, additional control measures may need to be implemented to enable a complete search. This may include the use of thermal imaging equipment, tactical ventilation and BA guidelines.

(c) The team leader will use and follow the left- or right-hand wall as their fixed reference point to ensure the search is orientated and systematic. This left- or right-hand orientation will apply as soon as a BA team passes through the point of entry and throughout their time in the risk area.

(d) Other than under the most extreme and exceptional circumstances, when visibility is poor or deteriorating the BA team leader should remain in contact with the wall or with fittings integral to the wall at all times. Maintaining the wall as a fixed reference point, either by touch or vision, is a cornerstone of the safety and effectiveness of these procedures.

Breathing Apparatus Guideline

(a) The term 'guideline' refers to a special line that is used either as a main guideline, to carry out an initial search and indicate a route between an BA ECP and the scene of operations, or as a branch guideline, used where is it necessary to traverse or search more than 6 metres off a main guideline. The same methods and guidance apply to both types of line.

(b) BA guideline containers should be securely fitted to the set of the BA team leader, in a way that allows them to be detached easily in an emergency. When extended penetration into a large or complex structure is required, the team should carry an additional BA guideline.

(c) BA guideline must be stowed so that the running end pays out first.

(d) A main guideline leading from a BA ECP should be designated 'A' or 'B' using the tallies provided for this purpose. Any main guideline tally must be attached securely to the line before the BA team enters the risk area.

(e) Unless the BA guideline is to be used to extend a main guideline or form a branch guideline, it should be secured to an immovable object outside the risk area in safe air, before the BA team enters the risk area.

(f) No more than one guideline may be laid along a search side (i.e. two BA guidelines cannot be laid along the same wall). However, two lines may be laid near to the point of entry to a structure, either side of a route, before they split into defined left/right search patterns.

(g) Guidelines should not cross over each other inside a structure or share tie-off points. Should two guidelines converge, one should be terminated and secured to a tie-off point a minimum of two metres from where the lines would have met.

(h) When the guideline is being extended, the BA team leader must inform the BA entry control operative, who will then inform the sector, operations or incident commander. This will ensure a suitable and sufficient record is maintained.

Securing a Breathing Apparatus Guideline

(a) The BA guideline containers should be securely fitted to the set of the BA Team Leader in a way that allows them to be detached easily in the event of an emergency. Examples are set out in the following photographs:

Example of securing a BA guideline

The BA guideline must be secured at intervals to suitable objects along the route by members of the BA team (not the team leader). The guideline should be kept as taut as possible using as few tie-off points as necessary. The line should be kept off the floor, preferably between shoulder and waist height, and secured to the side of the search area. Where no other means of securing the line are available, the following methods may be considered.

Using the door jamb

(b) A half-metre loop is created in the line using an overhand knot, then a second knot is tied in the loop

(c) The loop is slid between the door and the jamb with a knot on both sides of the hinge

(d) The door can now be closed and the line held above the hinge

Example of using the door jamb

Using a high tie-off point

(a) A loop is created by tying an overhand knot in the line

(b) The loop is tied off around the high object using a round turn and two half-hitches

(c) The length of the loop will vary with the height involved.

Example of using a high tIe-off point

Negotiating a vertical ladder:

(a) When a guideline route involves a vertical ladder, a tie-off point must be created at the bottom and the top of the ladder. BA teams should take into account the position of these points when tying off to avoid hindering subsequent BA wearers using the ladder.

Example of negotiating a vertical ladder

Encountering doorways and openings

(a) When laying a guideline, teams should not pass closed doors without first investigating around the doorway. The door sweep procedure may be adopted following an appropriate dynamic risk assessment and in conjunction with normal fire fighting and /or fire-gas suppression techniques for protecting BA teams. The firefighting BA teams supporting the guideline-laying team should undertake these checks and techniques.

(b) As well as establishing landmark features for the BA team and checking for casualties behind doorways, these techniques will:

(1) Contribute to maintaining safe access and egress for that team and subsequent BA teams

(2) Assist in identifying and dealing with any fire compartments.

Encountering small rooms/compartments

(a) Tying off the guideline unnecessarily consumes a significant amount of time. When searching rooms that are known or discovered to be small, the guideline should therefore be gathered up and taken out of the room. The advantage here is that:

(1) The guideline can be used more effectively for extending further into the incident

(2) Time will be saved when exiting as only the most direct route will be marked

(3) If exiting carrying casualties, there will be fewer tie-off points and doorways to negotiate

Extending a guideline

(a) A BA guideline can be extended by clipping the snap-hook of another line onto the looped end, then unclipping it from the container.

Example of extending a guideline

(1) When the first line has been fully run out…

(2) The snap hook from the second line can be attached to the looped end of the first line…

(3) The first line can then be unclipped from the container.

Withdrawing from the risk area

(a) If a BA team laying a guideline needs to withdraw before they reach their target, the BA team leader should first ensure that they are clipped to a secured section (between the last two tie-off points) of the guideline by their personal line before releasing the guideline container. The BA team can then retrace their steps from the risk area by following the guideline. This procedure should also be adopted for emergency withdrawals.

(b) If possible, the guideline container should be secured to a tie-off point before withdrawal. BA teams can either create a new tie-off point or retrace their steps to the last tie-off point, gathering the slack line. Their decision will be based on the distance they have travelled from the last tie-off point and the length of line to be gathered. Any gathered slack line should be attached to the container with a half- hitch, and the container should be secured to the nearest tie-off point so subsequent teams can find it.

(c) Where it is not possible to secure the guideline container to a tie-off point before withdrawal, the withdrawing BA team should inform the BA entry control operative.

BA teams meeting on a guideline

(a) BA teams leaving the incident area always take precedence over incoming teams because the exiting team leader will have calculated turn-around pressure to ensure exit before activation of the team's low pressure warning devices or whistles.

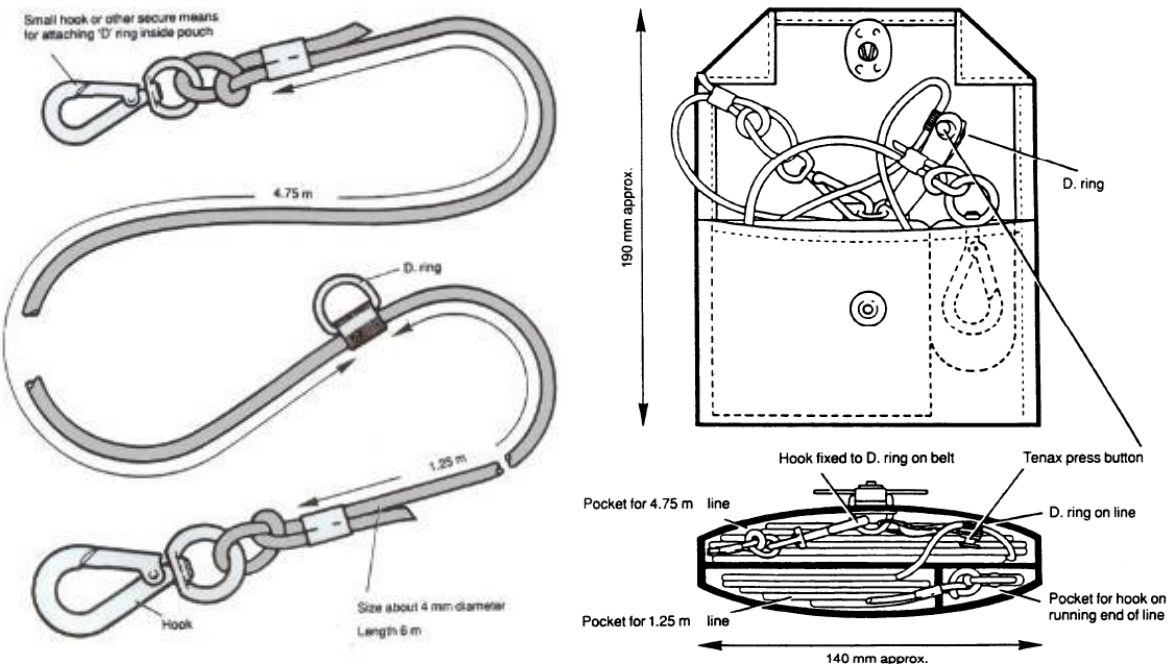
(b) To pass on a BA guideline, incoming teams should kneel as close to the guideline as possible, with the team leader holding their personal line karabiners. If individual team members are clipped to the line, their karabiners will need to be pushed together. The outgoing team leader can then negotiate the incoming team's karabiners as they would a tie-off point.

Example of passing on a BA guideline

Purpose of a personal line

(a) A personal line is a special line, a maximum of six metres in length, secured to the breathing apparatus set of the wearer. The personal line allows all members of a BA team to either attach themselves individually to a guideline or for team members to attach to each other with the standard 1.25m length of line. A BA team member may attach their personal line to a BA guideline (main or branch) to so they can search up to 1.25 metres off it or up to the extended limit of six metres.

Below is an example of personal line and pouch.



Branch guidelines

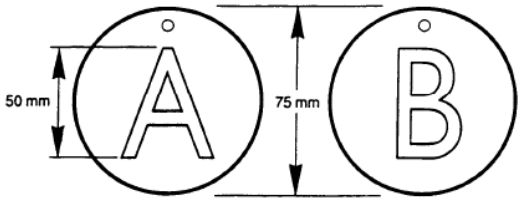
(a) Branch guidelines are used where the distance of the search area from the main guideline is greater than the length of one personal line.

(b) Branch guidelines are designated numerically, '1', '2', '3' or '4', by the BA entry control operative, with the number of holes in the tally representing the branch guideline number. It is essential that once deployed, all references to branch guidelines are related to their tally number, not to their numerical position in relation to the BA entry control point.

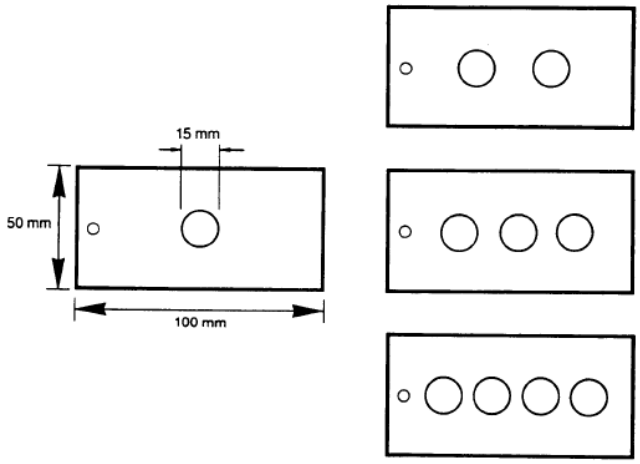
(c) One method of attaching the tally is to tie an overhand knot on the bight, approximately one metre from the snap-hook, and attach the branch guideline tally to the loop created by the knot. This should be done before the BA team enters the risk area.

Below are examples of main and branch guidelines

A MAIN GUIDE LINE (2 TALLIES)



B BRANCH GUIDE LINE (4 TALLIES)



Attaching and laying a branch guideline

(a) A branch guideline must be securely attached to the main guideline, away from any tie-off points.

(b) The branch guideline should be tied off as soon as possible after attaching it to the main guideline. This prevents the main guideline being deflected down the route of the branch guideline.

(c) To avoid potential confusion, branch guidelines are not normally extended. However, an extension may be required in certain circumstances following a risk assessment. The BA team leader should seek permission from the incident commander to extend a branch guideline where this is necessary.

(d) When leaving a main guideline and joining a branch guideline, the BA team leader should inform the BA ECP to record that this transition has occurred.

(e) When re-joining a main guideline from a branch guideline, the BA team leader should check the first set of tabs encountered to make sure they are travelling in the correct direction and then, for recording purposes, inform the BA ECP that this transition has occurred.

(f) At all times, the BA team leader must maintain close communication with the BA entry control point.

Example of attaching a branchline tally to the line

Example of attachment of branchline to the main guideline

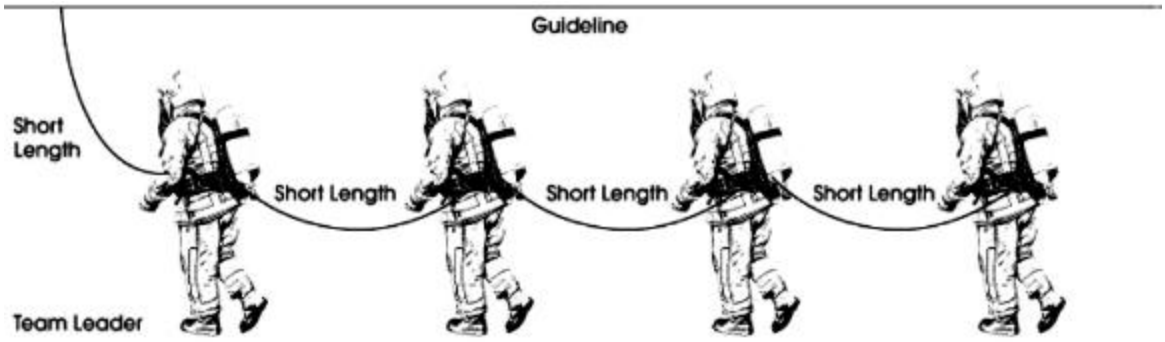
<u>Traversing a guideline</u>

(a) Method 1: BA team leader attached to guideline only

(1) When laying a BA guideline, it is good practice wherever possible for all BA team members (apart from the team leader, who will be attached to the guideline) to attach to the wearer in front by their 1.25 metre personal lines.

(2) However, this technique may not apply in certain circumstances, such as when negotiating shafts or vertical ladders, etc. Under these circumstances, it is permissible for each member of the team to clip individually to the guideline to traverse the hazard and to resume the original technique once the hazard has been negotiated.

Example of a BA Team Leader attached to guideline only

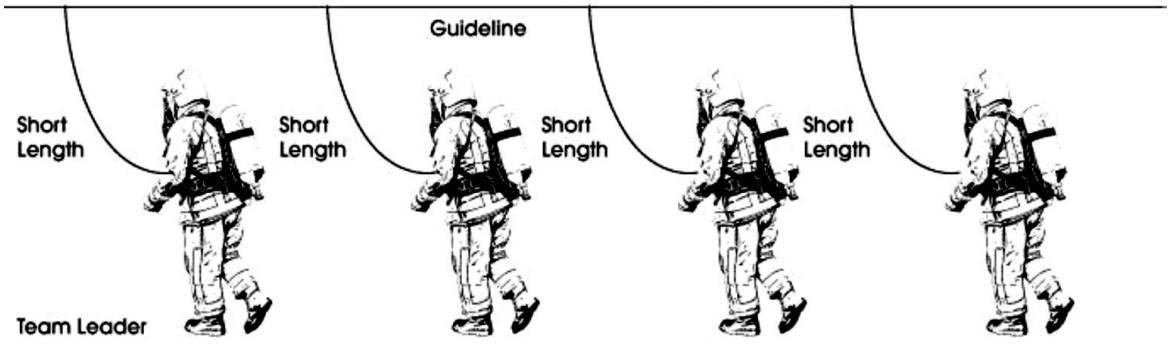


After a guideline has been laid, the leader of any subsequent following teams must be attached to it by the short length of personal line. The other members of the team must be attached by the short length of their personal lines to the member in front. The benefit of this method is that only the team leader has to unclip to negotiate tie off points or other teams on the line.

(b) Method 2: Each BA member attached to guideline

(1) With this method, each member of the BA team is attached to the BA guideline and remains within physical contact distance of their BA team colleagues, unless traversing a specific hazard such as a vertical ladder.

Example of each member of the BA team attached to guideline

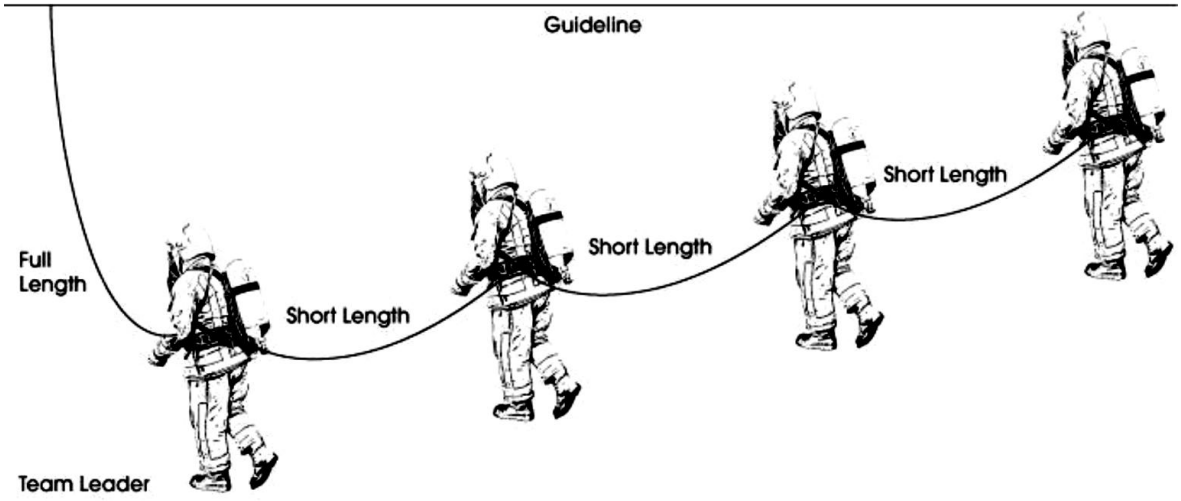


Individual attachment of the personal line to the guideline is generally more suitable where shafts or steep ladders may be encountered, as it allows more freedom of movement for individual wearers.

Searching off guidelines

(a) When searching off a BA guideline, the BA team leader will attach their personal line to the guideline and all other members of the team will attach themselves to the team member immediately in front of them, using their 1.25 metre personal lines. Only the BA team leader should extend their personal line to six metres; all other team members should remain between the team leader and the guideline.

Example of searching off guidelines



To search off a guideline, the personal line of the team leader may be deployed to the limit of its length and all the other team members should search inside the team leader. Using this method no one should stray further than 6m from the guideline.

6. HEAT-RELATED CONDITIONS

Hyperthermia

(a) Hyperthermia results from an elevated body temperature caused by external or internal heat stress and/or heat loading. This leads to failure of the body's thermoregulatory systems and can be categorised into the following six conditions:

(1) Heat exhaustion

(2) Heat faint

(3) Heat oedema

(4) Heat rash (prickly heat)

(5) Heat cramp

(6) Heat stroke

Heat Exhaustion

(a) Heat exhaustion is a mild response to exposure to hot environments. It results from a combination of thermal and cardiovascular strain, where the body is unable to maintain normal function owing to loss of fluids and salts. Symptoms include:

(1) A feeling of being unwell

(2) Tiredness/irritability

(3) Headaches

(4) Dizziness

(5) Nausea

(6) Vomiting

(7) Breathing difficulties (shallow, rapid respiration)

(8) Rapid pulse, which may be bounding or weak

(9) Extreme thirst and mouth dryness

(10) Muscle cramps, particularly affecting the stomach and legs

(11) Poor control over movements/stumbling/weakness

(b) This leads to two forms of heat exhaustion: salt depletion and, more likely in firefighting situations, water depletion. Heat exhaustion usually responds positively to prompt treatment but may predispose the firefighter to heat stroke.

Heat faint (Syncope)

(a) Heat faint is caused by a reduction in blood flow to the brain. It is more likely to occur in non-acclimatized people during early exposure to heat. Symptoms include:

(1) Headache

(2) Dizziness

(3) Weakness

(4) Tunnel vision/blurring of vision

(5) Pale, sweaty skin

(6) Weak, slow pulse

(7) Loss of consciousness

Heat Oedema

(a) Oedema usually occurs among those not acclimatised to heat. It is unlikely to be encountered in the sporadic exposure conditions of firefighting. Symptoms include swelling of the hands, feet and ankles

Heat rash (Prickly heat)

(a) Prickly heat appears in red papules on the skin, usually in areas where clothing is restrictive. It gives rise to a prickling sensation, particularly as sweating increases. It occurs in skin that is persistently wetted by unevaporated sweat, possibly because the sweat ducts become blocked.

(b) The papules may become infected unless they are treated. Heat rash is not dangerous. However, it may result in patchy areas of skin that are temporarily unable to produce sweat, which may adversely affect evaporative heat loss and thermoregulation. Prickly heat has been shown to decrease tolerance to heat and to reduce work capacity. Sweating capacity has been to shown to recover within three to four weeks. If heat rash is likely, the individual should be referred for a medical opinion.

Heat cramp

(a) Heat cramps (painful muscle spasms) may occur in individuals working in the heat. These are caused by salt deficiency, when salt is lost during severe sweating and large amounts of water are taken in without replacing the salt. The condition may have a delayed onset and is most likely in people who are unacclimatised to hot work or have a low dietary salt intake. Cramps usually occur in the muscles principally used during work (limbs) or stomach. Adequate salt intake with food should prevent this occurring.

Heat stroke

(a) If the total heat load (environmental conditions and metabolic heat generation) is such that sufficient body heat cannot be lost to the environment, core temperature will rise. If this continues, body temperature may exceed its controllable limits.

(b) In wet humid conditions, sweating may reduce due to the sweat glands swelling and blocking sweat glands. Although normally associated with humid external environments, the humid microclimate inside a firefighter's clothing can also create the conditions for heat stroke. Alternatively, sweating may cease because of depletion of body water. This decrease in sweating promotes a further, often rapid, rise in core temperature to beyond 38-39°C, where collapse may occur, and to above 41°C (rectal temperature) where heat stroke may occur.

(c) With heat stroke, there is a major disruption of the central nervous function. At body temperatures above about 40°C, a person's mental functions are disturbed and sweating often stops. Normal temperature control mechanisms are lost and a further rapid temperature rise occurs.

(d) The condition can have a sudden onset with no warning, or may be preceded by headache, dizziness, confusion, faintness, restlessness or vomiting (symptoms of heat exhaustion). The

change from normal aches or tiredness to serious symptoms may not be obvious to the casual observer.

(e) The transition from moderately elevated body temperature to heat stroke can be very rapid. For this reason, no one should work alone or unsupervised in potential heat stress conditions. If work performance deteriorates, this is usually a reliable indication that significant physiological strain has already occurred. This is a life-threatening emergency. Symptoms may include:

(1) Headache Dizziness

(2) Muscle weakness/cramps

(3) Being hot, dry and flushed with a high pulse and a core temperature probably in excess of 41°C

(4) Failure of central nervous thermoregulation and sweating

(5) Mental confusion

(6) Convulsions Unconsciousness

Treatment

(a) After a period of heat exposure, a significant amount of heat will be trapped in the body and clothing of the firefighter. Their highly insulated clothing will now act to retain that heat, preventing its dissipation into the environment. The simple act of unfastening a tunic can help to speed up the cooling process. In some circumstances, without this, body temperature can continue to rise as heat in working muscles continues to be distributed around the body.

(b) Where appropriate, and following a dynamic risk assessment and review, 'dressing down' of personal protective equipment to allow body heat to vent and reduce the resulting physiological burden, should be a normal procedure pre- and post-deployment

(c) Where a heat related condition is identified or likely, the individual(s) should dress down and drink cool water. If possible, warm, not cold, water should be sprayed onto the affected individual(s) and they should be fanned to aid the process of cooling by evaporation.

(d) Managing hyperthermia by carrying out the following steps should be considered:

(1) Moving the casualty to a cool (shaded) environment

(2) Cooling: this can be rapid but monitor temperature to prevent hypothermia

(3) Removing heavy clothing

(e) If heat stroke is likely, urgent medical assistance must be sought, stating clearly that this is a likely case of heat stroke. The individual should then be treated following the guidance contained within this section, and the incident should be reported according to service policy.

(f) Faints (syncope) can be helped if the person lies down with their legs raised above the level of their head.

(g) Special consideration should be paid to head cooling. Wrist cooling with cool water using plunge buckets will also aid core temperature cooling but acts more slowly than the methods identified above.

(h) Rehydration reverses most of the adverse effects of heat exposure, which stem from dehydration as the body loses copious quantities of sweat in an attempt to regulate its temperature. Fluid replacement is therefore an important aspect of restoring the thermal and physiological equilibrium.

(i) Similarly, although a few mouthfuls of water may be enough to remove the immediate sensation of thirst, it is not sufficient to restore thermal balance. Adequate fluid replacement is particularly important for those who may be exposed to elevated temperatures for longer periods.

(j) Only still water should be permitted for rehydration purposes. Cool (10-15°C) rather than cold water is preferable. The direct cooling effect of any fluid is minimal and, if a drink is too cold, it may cause local vasoconstriction of the blood vessels in the stomach resulting in a slower rate of absorption.

(k) Despite the importance of fluid, firefighters should be discouraged from drinking copious quantities too rapidly. Rapid absorption of large volumes of water can result in excessive dilution of blood ions (salts), with adverse effects.

(l) If in any doubt, seek medical advice.

(m) Further considerations

(1) Heat intolerance can be caused and exacerbated by a number of factors including medication, diet and general wellbeing. These will influence a person's ability to deal with heat-related conditions.

7. WELFARE RESOURCES

(a) The following resources, in line with the conditions encountered by BA teams and prevailing weather conditions (including those forecast), may be considered in a BA team rest and recovery area:

(1) Covered structure

(2) A means to provide cooling assistance to BA wearers Thermal blankets

(3) Benches and tables Lighting

(4) First-aid kit Resuscitation equipment Automatic defibrillator Dry clothing

(5) Drinking water and cups Toilets

(6) Positive Pressure Ventilation Fans Medical assistance

(7) The above list is not exhaustive

8. BREATHING APPARATUS TELEMETRY SYSTEM

(a) Breathing apparatus telemetry system equipment should comply with relevant national and international standards.

(b) The power of a radio frequency signal diminishes over distance. It will also be affected as the radio wave passes through solid objects such as walls and floors of buildings, natural terrain, basements tunnels, etc.

(c) To maximise the signal power of a radio frequency transmission, aerodrome rescue and firefighting services should follow telemetry system provider guidance and may consider, where appropriate, enhancing signal strength by using a leaky feeder and/or repeater units.

(d) Siting of the telemetry BA entry control board or unit should take into account the optimal position for maximising the effective range of telemetry. It will therefore have a bearing on the location of the BA ECP (BA entry control point).

(e) The procedures to be followed by individual aerodrome rescue and firefighting services in the event of a loss of contact or breakdown in telemetry communications must take into account the availability of other means of communication with BA teams, such as radio, thermal image camera feed, cable communications and even direct speech.

<u>Emergency total evacuation procedures</u>

(a) Where two or more telemetry BA entry control boards or units are in use at the same incident and an emergency total evacuation is required, each telemetry BA entry control board or unit at the scene will initiate this level of evacuation.

(b) After transmitting an emergency total evacuation signal, an acknowledgement signal must be sent from each telemetry radio unit to the telemetry BA entry control board or unit. In the event of the acknowledgement signal not being received by the telemetry BA entry control board or unit, the emergency total evacuation signal must be repeated.

(c) After sending an emergency total evacuation signal, it is imperative that the person responsible for the BA ECP checks to ensure that all BA wearers committed to the risk area through their BA entry control board are in telemetry. If this is not the case, the person responsible for the BA ECP should try to establish radio communications with all BA wearers committed to the risk area.

(d) If it is not possible to establish communications with BA crews, BA emergency procedures should be considered.

Emergency Selective Evacuation Procedures

(a) Emergency selective evacuation is an integral emergency feature available when telemetry is employed. It allows the person responsible for the BA ECP to evacuate specific BA teams in an emergency while leaving other BA teams in place. For example, in certain circumstances it may be necessary to ensure that an escape route remains protected while an evacuation takes place, or to evacuate a BA team/s from an unacceptably hazardous situation.

(b) An emergency selective evacuation signal is an emergency procedure and must not be used for any other purpose.

(c) Only those in specific command roles may decide that it is necessary to implement the emergency selective evacuation procedure. The nominated person, under the overall command of the incident commander, should decide which BA teams should be evacuated by this method.

(d) After transmitting an emergency selective evacuation signal, an acknowledgement signal must be sent from each telemetry radio unit to the telemetry BA entry control board or unit. In the event of the acknowledgement signal not being received by the telemetry BA entry control board or unit, the emergency selective evacuation signal must be repeated.

(e) After sending an emergency selective evacuation signal, it is imperative that the person responsible for the BA ECP checks to ensure that all BA wearers committed to the risk area through their BA entry control board are in telemetry. If this is not the case, the person responsible for the BA ECP should try to establish radio communications with BA wearers committed to the risk area.

(f) If it is not possible to establish communications with BA crews, BA emergency procedures should be considered

BA Wearer Emergency-initiated Withdrawal in relation to BA Telemetry System

(a) BA Telemetry system gives each BA wearer the ability to initiate a signal indicating that they are withdrawing from the risk area. The decision on whether or not to signal that withdrawal rests with the BA wearer. When that withdrawal signal is activated, all members of that BA team must withdraw from the risk area together.

(b) If the BA entry control operative receives a withdrawal signal from a BA wearer or wearers committed to the risk area, they will acknowledge receipt of the signal and report this directly to the person responsible for the BA entry control point. An immediate assessment of risk should be undertaken to identify the subsequent actions to be taken.

Distress Alarm – Automatic and Manual in relation to BA Telemetry System

(a) In the event of a distress alarm (either manual or automatic) being sounded, as a minimum, a signal will be transmitted to the relevant telemetry BA entry control board or unit.

(b) Only wearers in distress should activate a manual distress alarm. This will allow the BA ECP to determine how many BA wearers require assistance.

(c) Note: In circumstances where the alarm of a BA wearer in distress cannot be activated, the distress alarm belonging to another member of the team should be operated.

(d) If the BA entry control operative receives a distress signal (automatic or manual) from a BA wearer committed to the risk area, they will acknowledge receipt of the signal and report this through the command line to the incident commander or sector commander and other BA entry control points.

(e) Following acknowledgement of the distress signal (automatic or manual), the person responsible for the BA ECP will be expected to follow normal procedures on whether to commit a BA emergency team immediately.

(f) If enquiries indicate that a distress signal (automatic or manual) does not originate from a telemetry radio unit that is logged on, the incident commander must be notified, with a view to passing the information to watchroom control so that checks can be initiated with neighbouring incidents or fire and rescue services.

BA Telemetry System Communications Signal Failure

(a) There are various reasons for a loss of telemetry. The most likely is that the telemetry radio unit is temporarily out of range of the telemetry BA entry control board or unit.

(b) Users of telemetry should be aware that, like any device that relies on radio transmissions, telemetry radio units could be out of range because of their distance from the control board or unit or owing to physiological conditions at the incident inhibiting effective radio broadcast.

(c) There may be locations where a Site-Specific Risk Assessment indicates that signal broadcast, and therefore telemetry, will not be achieved. At these locations and/or risk premises, aerodrome rescue and firefighting services should establish alternative control measures to maintain effective BA command and control in the absence of telemetry.

7. BREATHING APPARATUS FACEMASK DONNING PROCEDURE AND SEAL TESTING

Facemask donning procedure

(a) This donning procedure is appropriate to all occasions that BA is worn, including training, operational incidents and when taking over a set at the start of a shift or other time as appropriate.

(b) Correct facemask fit is essential if the best possible face seal is to be achieved. The ideal fit is achieved when all straps are tensioned and the chin and temple straps of the mask run in the direction of the mask strap tongues. In order to get the best possible fit the following points should be taken into account.

(c) Loosen all head harness straps, including the centre head strap, to their full extent.

(d) Place the facemask against the face by sliding it up to ensure that the chin is securely placed in the chin cup. Ensure that hair does not compromise the facemask seal area. This may be more easily achieved if the wearer leans forward whilst fitting the mask.

(e) Where multiple adjustable straps are fitted, adjust the bottom and middle straps progressively and evenly in pairs to ensure that the head harness is 'square' on the back of the head, finishing with the top strap. The fit should be secure and comfortable but not over-tight.

(f) BA wearers should visually check that each team members' head harness is positioned correctly on the head, with the straps in line with the mask tongues and evenly tensioned, before fire hoods and helmets are donned. Repeat steps (c) to (e) if necessary.

<u>Facemask seal test</u>

(a) It is appropriate that the effectiveness of the facemask seal is tested on every occasion that BA is donned with the intention of breathing from it. However, in some operational situations it may be necessary to conduct an assessment of risk to establish the practicality of carrying out the full-face seal test.

(b) The rigorous application of this test when taking over a set at the start of a shift, or other time as appropriate, will ensure that the wearer is satisfied that they can achieve an effective seal with that particular facemask.

(c) Procedures for testing the facemask seal are as follows:

(1) Hold breath and turn off the air supply to the mask keeping a hand on the cylinder

(2) valve.

(3) Observe the pressure gauge for approximately eight seconds whilst moving the head up and down and side to side. There should be no discernible movement of the pressure gauge. (The purpose of this is to ensure that the mask is properly fitted to the face.)

NOTE: Extreme movement of the head may cause some leakage, but this should cease once the head is returned to a more central position and/or the head movement is less severe.

(4) Breathe steadily to exhaust the residual air in the system while observing the pressure gauge until the gauge shows empty and noting the activation of the low-pressure warning whistle/device.

(5) Turn the cylinder valve back on and take two or three normal breaths.

(6) Hold breath and again turn off the air supply to the mask keeping a hand on the cylinder valve.

(7) Breathe steadily until the air is exhausted and inhale to cause the mask to collapse onto the face.

(8) Hold the breath for approximately eight seconds to ensure that the facemask remains firmly 'sucked down' onto the face. If there is a defect with the facemask or a poor fit between the face and the mask, the wearer will be unable to generate a vacuum inside the mask, thereby preventing the continued collapse onto the face.

(9) Turn on the air supply and breathe normally.

(d) If a leak is identified during any part of these tests, the facemask should be re-fitted with particular attention to correct adjustment of the harness but without over-tightening the harness and the tests re-applied.

Positive pressure protection

(a) Provided that BA facemasks are donned correctly and the facemask seal test are fully applied, positive pressure can be expected to provide compensation for any slight mismatch between the face seal and the face during use and will thus ensure adequate protection to the wearer.

(b) In the event that a gross facemask seal leak is identified, despite rigorous application of the above procedures, aerodrome rescue and firefighting services should seek to provide an alternative mask (e.g. different model, size, design, etc) that provides an adequate fit for the individual.

(c) If a suitable alternative mask is not readily available, aerodrome rescue and firefighting services should consult with their BA supplier to seek a suitable modification to the mask (e.g. alteration to the mould, insert, etc). Should this option prove necessary, quantitative fit testing of the individual, using appropriate apparatus is recommended to demonstrate the improvement in fit.

Monitoring

(a) All existing BA wearers should be assessed to ensure that they can achieve an effective face fit.

(b) It is recommended that a suitable record of completing this donning procedure, and gaining a satisfactory facemask seal test result, be made on the first occasion that it is formally undertaken by each employee and whenever the wearer experiences facial changes (weight change, surgery, etc).

(c) Aerodrome rescue and firefighting services must ensure that appropriate systems are in place to establish that the above procedures are fully applied on every occasion that BA is donned with the intention of breathing from it.

New BA Wearer

(a) For the purpose of this guidance, new BA wearers are considered to be new employees, inter-service transfers, personnel returning to operational duties after a significant period of time involved in non- BA duties, personnel whose facial features have altered significantly through weight change, dental work or similar and where the Aerodrome rescue and firefighting service's BA supplier changes.

(b) Sufficient training shall be provided to ensure that individuals can apply the facemask donning procedure correctly. Each individual shall then complete the facemask seal test identified in this guidance. All such training shall be recorded in the individual's personal training record.

(c) Should a gross facemask seal leak remain despite rigorous application of the above procedures the process as detailed in 9.11 and 9.12 (Positive pressure protection) must be applied.

Training

(a) The guidance provided on facemask donning procedures and facemask seal testing must be formally incorporated into initial, refresher and BA instructor training.

8. WORKING ABBREVIATINS FOR USE ON BREATHING APPARATUS ENTRY CONTROL BOARDS

(b) It is recommended that aerodrome rescue and firefighting services use the following abbreviations on breathing apparatus entry control boards to achieve consistency across BA entry control points and fire and rescue authorities. All personnel at an incident should use the same abbreviations.

(c) It is important to note that whilst working abbreviations may be deemed appropriate for use on the BA entry control board at an incident, for brevity, speed of completion in time-critical situations and due to space constraints on the BA board, any additional BA records maintained at the BA ECP or at BA sector command should be written in full.

BGL	Branch guideline (1, 2, 3, 4)
CFFT	Compartment firefighting team
CL	Casualty located
COMMS	Communication equipment; including handheld radio, line communications and integral BA set communications

CSP	Compartment search procedure
DSP	Directional search procedure
FFT	Firefighting team
HM	Hose management
HRJ	Hose reel jet
J	Main jet/branch (45mm, 51mm, 70mm)
LH	Left-hand (denoting orientation of search)
MGL	Main guideline (A, B)
RE	Re-entry
RH	Right-hand (denoting orientation of search)
SRT	Search and rescue team
TIC	Thermal image camera
TL	Team leader
TOW	Time of warning device
TTW	Time to whistle

Below are some examples on BA team communication with BA entry control

Working Example 1: Multi-deck aircraft internal fire (Stage 1)
BA team Alpha-1: FFT 45mm J RH DSP main deck BA team Alpha-1: firefighting team, 45mm jet, right-hand, directional search procedure, main deck forward BA team Alpha-2: HM for Alpha-1 RH DSP upper deck rear BA team Alpha- 2: hose management for BA team Alpha-1, right-hand directional search procedure, upper deck rear

Working Example 2: Commercial Structure (Stage 2, Multiple BA entry control points and BA guidelines in use)
BA team Alpha-3: CFFT for Alpha-4, 45mm J RH MGLA ground floor BA team Alpha 3: compartment firefighting team, supporting BA team Alpha-4, 45mm jet, following main guideline ‘A’. BA team Alpha-4: MGLA, RH-lay ground floor BA team Alpha-4 laying main guideline ‘A’ on right-hand lay ground floor BA team Alpha-5: HM for Alpha-3, 45mm J RH MGLA ground floor

BA team Alpha-5: hose management for BA team Alpha-3, 45mm jet, right hand, following main guideline 'A'.

BA team Bravo-1: SRT LH CSP 45mm J 1st floor

BA team Bravo-1: search and rescue team, left-hand, Compartment search procedure, 45mm jet on 1st floor.

BA team Bravo-2: HM for Bravo 1 LH 45mm J CSP first floor

BA team Bravo-2: hose management for BA team Bravo-1, left-hand, 45mm jet, Compartment search procedure on 1st floor

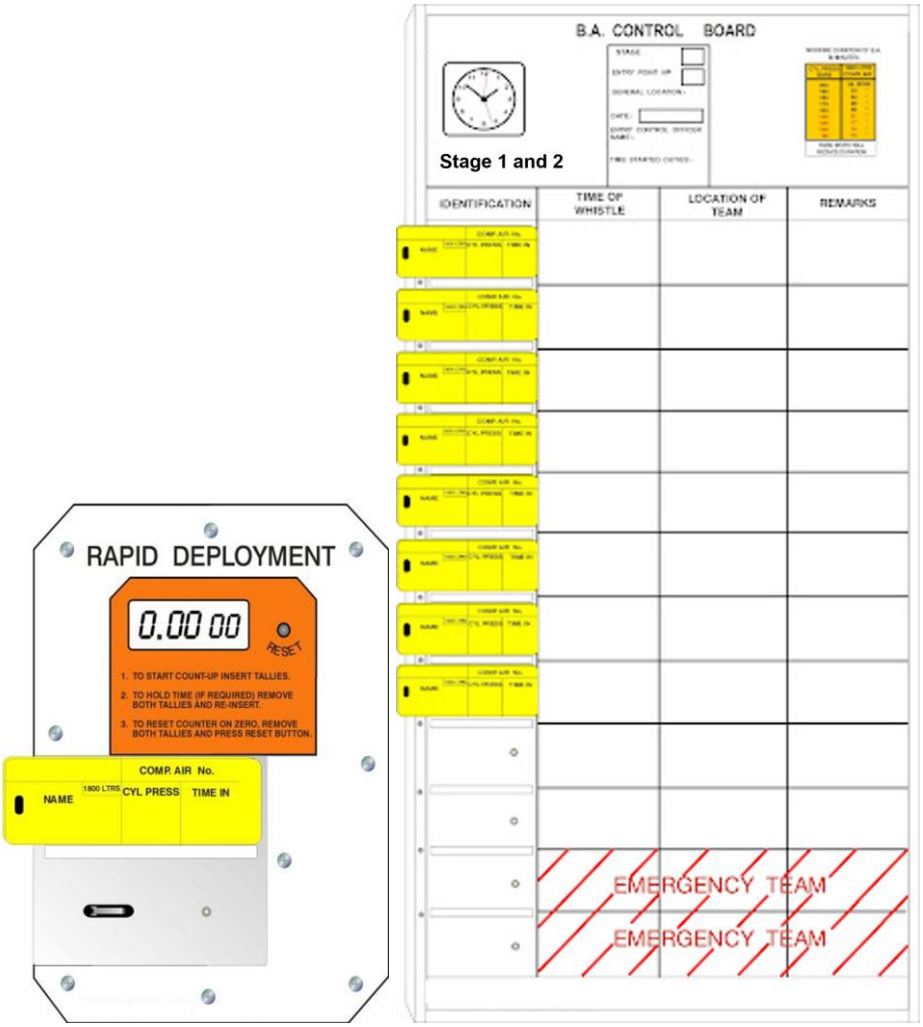


Figure-27: Breathing apparatus control boards

SECTION F – FIRE PREVENTION

ACM.OPS.CERT.F.005 Fire prevention

AERODROME FIRE PREVENTION

(a) An aerodrome operator shall establish and implement a power of entry for rescue and firefighting service for the sole purpose of preventing or extinguishing a fire or protecting life or property in a building, facility or aircraft at an aerodrome;

(b) An airside fire prevention programme shall be implemented at the aerodrome including:

(1) implementation of fire prevention measures during aircraft fuelling operations;

(2) prohibition of smoking within the aircraft movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material is stored;

(3) prohibition of display of an open flame or undertaking of an activity that would create a fire hazard within:

(i) areas of the aerodrome where fuel operation takes place or other flammable material is stored; and

(ii) the movement area or other operational areas of the aerodrome, unless authorised by the aerodrome certificate holder;

(4) provision of sufficient fire extinguishing equipment suitable for an initial intervention in the event of fuel fire including personnel trained in its use, are readily available during the ground servicing of an aircraft;

(5) provision of a means of quickly summoning the rescue and firefighting service in the event of a fire or fuel spillage is provided on the apron areas; and

(c) A landside fire prevention programme shall be implemented including terminal buildings and other facilities at the aerodrome.

AMC1 ACM.OPS.CERT.F.005(a) Fire prevention

1. POWER OF ENTRY

(a) An officer of an aerodrome rescue and firefighting service should be authorised, in writing, for the officer to do anything the officer reasonably believes to be absolute necessary within the aerodrome boundary, to take the following actions:

(1) if the officer reasonably believes a fire to have broken out or to be about to break out, for the purpose of extinguishing or preventing the fire or protecting life or property;

(2) if the officer reasonably believes a road traffic accident to have occurred, for the purpose of rescuing people or protecting them from serious harm;

(3) if the officer reasonably believes an emergency of another kind to have occurred, for the purpose of discharging any function conferred on the rescue and firefighting service in relation to the emergency;

(4) for the purpose of preventing or limiting damage to property resulting from action taken as mentioned in paragraph (1), (2) or (3).

(b) The authorised officer of the rescue and firefighting service, operating within the aerodrome boundary, should consider the following actions:

(1) enter premises or a place, by force, if necessary, without the consent of the owner or occupier of the premises, place or aircraft;

(2) move or break into a vehicle in airside without the consent of its owner;

(3) close an airside roadway, baggage tunnel or a premise;

(4) stop and regulate airside traffic; and

(5) restrict the access of unauthorised persons to premises, place or aircraft.

2. GATHERING INFORMATION AND CONDUCTING SAFETY INVESTIGATION

(a) When entering a building, facility or aircraft within the aerodrome boundary at any reasonable time, the authorised officer may take the following actions:

(1) for the purpose of obtaining information needed for the discharge of an aerodrome rescue and firefighting service's functions under this section; or

(2) if there has been a fire in the building, facility or aircraft, for the purpose of conducting a safety investigation for determining the root cause, corrective and preventive actions.

3. SUPPLEMENTARY POWERS

(a) When exercising a power of entry, the authorised officer may:

(1) take any other persons, and any equipment, that the officer considers necessary; and

(2) require any person present on the building, facility or aircraft to provide the officer with any facilities, information, documents or records, or other assistance, that the officer may reasonably request.

(3) inspect any documents or records on the building, facility or aircraft; and

(4) carry out any inspections, measurements and testing in relation to the building, facility or aircraft, that the officer considers necessary.

GM AMC1 ACM.OPS.CERT.F.005(a) Fire prevention

PROVISION OF POWER OF ENTRY

1. INTRODUCTION

(a) The establishment and implementation of a formal power of entry for authorized officers of the Aerodrome Rescue and Firefighting Service (ARFFS) is a critical requirement for ensuring effective emergency response and operational readiness. Due to the statutory nature of aerodrome operations, ARFFS officers must have the legal authority to enter all areas of the aerodrome, and, where necessary, offsite locations, to perform their duties.

(b) This guidance document provides aerodrome operators with a structured approach to establishing this power of entry. This includes formal agreements with local fire, police, and security agencies, and the creation of robust internal policies and procedures to support ARFFS operations. The guidance ensures that ARFFS officers can act swiftly and lawfully in emergency situations, inspections, and other operational activities while adhering to the highest standards of safety, security, and legal compliance.

2. REGULATORY AUTHORITY AND LEGAL CONSIDERATIONS

(a) Aerodrome operators are responsible for ensuring that the power of entry granted to ARFFS officers is legally grounded in civil aviation regulations. This includes compliance with relevant public safety legislation that governs emergency response and security protocols at aerodromes. Operators must review statutory provisions to identify the specific legal basis for granting ARFFS personnel the authority to enter restricted areas, both during emergencies and in routine operations.

(b) This power of entry is essential for carrying out rescue, firefighting, and fire safety inspections, as well as responding to hazardous situations. However, this power must be exercised in strict accordance with legal guidelines to avoid misuse. Aerodrome operators must also ensure that ARFFS officers are trained in the scope and limitations of their power of entry and that appropriate oversight mechanisms are in place.

3. FORMAL AGREEMENTS WITH EXTERNAL AGENCIES

(a) To facilitate the effective exercise of power of entry, aerodrome operators must establish formal agreements with relevant external agencies, including local fire services, police, and security forces.

(b) These agreements should clearly define the conditions under which ARFFS personnel can enter secured or restricted areas, ensuring that their legal authority is recognized and supported by all stakeholders. For instance, agreements with local fire services should outline protocols for joint emergency responses and access to offsite areas that may be necessary during certain incidents. Similarly, police and security agencies must agree on procedures for ARFFS officers

to gain access to secure areas quickly during emergencies, without undue delays caused by security protocols.

(c) These agreements should also establish communication channels and joint operational procedures to ensure seamless coordination during incidents requiring interagency cooperation.

4. ESTABLISHING INTERNAL POLICIES AND PROCEDURES

(a) Aerodrome operators must develop and implement comprehensive internal policies that govern the exercise of power of entry by ARFFS personnel. These policies should clearly articulate the situations in which entry may be required, including during emergency responses, safety inspections, and hazard assessments. Additionally, operators must establish clear procedural guidelines for notifying relevant stakeholders, such as air traffic control or aerodrome management, when ARFFS officers exercise their power of entry. Every instance of entry must be documented, recording the purpose of the entry, the personnel involved, and any actions taken. This ensures accountability and provides a basis for auditing and compliance checks. To avoid compromising aerodrome security, ARFFS personnel must carry identification that verifies their authority to enter restricted areas and follow all relevant safety and security protocols.

(b) Furthermore, aerodrome operators must ensure that all ARFFS personnel authorized to exercise the power of entry are properly trained. This training should cover both the legal framework that governs their authority and the operational procedures that they must follow when entering restricted areas. Competency assessments should be conducted regularly to ensure that officers remain fully qualified to exercise their powers, particularly in high-pressure emergency situations where swift action is required.

5. MONITORING AND COMPLIANCE MECHANISMS

(a) To ensure that the power of entry is exercised responsibly and within the confines of the regulations, aerodrome operators must implement rigorous monitoring and compliance mechanisms. Regular audits should be conducted to review the use of power of entry by ARFFS personnel, ensuring that each instance is properly documented and that statutory provisions are adhered to. Aerodrome management should also establish a system for reviewing all reports related to the exercise of power of entry, enabling them to identify any areas where improvements are necessary.

(b) In the event of any misuse or failure to comply with established procedures, a formal investigation must be conducted to determine the root cause and take appropriate corrective

action. This may include disciplinary measures for personnel involved, as well as revisions to existing policies or procedures to prevent future occurrences. Incident reviews should be part of a broader effort to continuously improve operational efficiency and safety at the aerodrome.

6. REVIEW OF PROVISIONS

(a) The power of entry for ARFFS personnel is a vital component of aerodrome emergency management and operational readiness. It enables authorized officers to carry out their duties effectively, ensuring the safety of aerodrome operations and responding rapidly to emergencies. To support this authority, aerodrome operators must establish formal agreements with external agencies, develop robust internal policies, and implement comprehensive training and oversight procedures. By doing so, they will ensure that ARFFS officers are empowered to act within the bounds of the law, while maintaining the highest standards of safety, security, and operational effectiveness.

(b) All aerodrome operators are urged to review their current practices and ensure that they are in compliance with this regulatory guidance to enhance their emergency response capabilities and maintain legal compliance.

AMC1 ACM.OPS.CERT.F.005(b) Fire prevention

FIRE PREVENTION PLANNING ARRANGEMENTS

(a) A competent person should be appointed with the authority and responsibility to manage the fire prevention programme at the aerodrome.

(b) A fire prevention planning committee administered by the aerodrome operator should be established with the following responsibilities:

(1) oversee all aspects of fire prevention programme within the aerodrome;

(2) review the effectiveness of the programme in compliance with relevant fire safety regulations;

(3) develop appropriate strategies, policies and procedures to manage fire risks and hazards; and

(4) review results of fire prevention inspection and fire investigation for improvements to the programme.

GM1 AMC1 ACM.OPS.CERT.F.005(b) Fire prevention

COMPETENT PERSON

1. INTRODUCTION

(a) The objective of this guidance material is to ensure that aerodrome operators appoint a competent person who possesses the appropriate knowledge, skills, experience, and delegated authority to effectively manage the aerodrome's fire prevention programme. The appointed individual is responsible for leading fire risk assessments, developing and maintaining fire safety controls, ensuring compliance with applicable codes, and promoting a culture of fire safety across all operational areas of the aerodrome.

(b) Due to the size and complexity of aerodrome operations, it may be necessary for aerodrome operators to form a dedicated fire prevention team lead by the competent person.

2. DESIGNATION AND AUTHORITY OF THE COMPETENT PERSON

(a) The Aerodrome Fire Prevention Programme Manager (AFPPM) or equivalent, is responsible for the development, implementation, and continual improvement of the aerodrome's fire prevention programme. The designation will be issued in writing, signed by the accountable manager or equivalent executive authority, and clearly state the scope of responsibilities, reporting structure, and delegated authority of the individual.

(b) The appointed competent person is integrated within the aerodrome's operational safety framework and be granted sufficient autonomy and access to enforce fire prevention protocols. This includes the authority to conduct inspections, halt unsafe operations, mandate corrective actions, and liaise directly with RFFS, engineering and maintenance, airside operations, and tenant organizations.

3. COMPETENCY AND QUALIFICATION CRITERIA

(a) The competent person must meet minimum competency requirements to ensure they are capable of discharging their fire prevention duties in a safe, effective, and compliant manner. The minimum qualifications include:

(1) A recognized qualification or certification in fire safety engineering, fire science, or fire prevention;

(2) Completion of formal training in fire risk assessment, hazard identification, and control strategies applicable to aerodrome environments;

(3) Demonstrated knowledge of fire safety guidance, national codes, and fire risk scenarios unique to airport operations;

(4) At least three (3) years of relevant experience in fire safety or fire risk management, with preference for aviation-related contexts.

(b) The competent person must demonstrate key competencies in hazard recognition, risk mitigation, incident analysis, and emergency planning. The ability to prepare detailed fire risk

reports, conduct stakeholder briefings, and participate in the safety management system (SMS) functions is essential. Ongoing professional development shall be encouraged to ensure the individual remains informed of new fire prevention technologies and evolving risk profiles.

4. ROLES AND RESPONSIBILITIES

(a) The competent person must develop, implement, and regularly update a formal Fire Prevention Programme (FPP) for the aerodrome. This programme must be risk-based, scalable to the complexity of the aerodrome, and integrated with the overall safety and emergency preparedness frameworks.

(b) The key responsibilities of the competent person must include, but are not limited to:

(1) Conducting systematic fire risk assessments across all operational areas of the aerodrome;

(2) Inspecting facilities, infrastructure, equipment, and operational practices to identify potential fire hazards;

(3) Recommending and verifying the implementation of corrective or preventive fire safety measures;

(4) Coordinating fire drills, awareness programmes, and tenant engagement activities on fire prevention;

(5) Monitoring compliance with fire safety requirements and preparing periodic reports for aerodrome management;

(6) Supporting investigations into fire incidents or near misses and tracking follow-up actions;

(7) Liaising with the Rescue and Firefighting Services to ensure alignment between fire prevention and emergency response strategies.

5. ORGANISATIONAL INTEGRATION

(a) The competent person must ensure the fire prevention programme integrates into the aerodrome's Safety Management System (SMS) and may serve as a member of the Aerodrome Safety Committee or Emergency Planning Committee. They should maintain regular coordination with the accountable manager, the safety manager, and the chief of the RFFS.

(b) The competent person also acts as a focal point for interactions with national fire authorities, civil defense departments, and other regulatory entities to ensure alignment with statutory fire safety obligations.

GM2 AMC1 ACM.OPS.CERT.F.005(b) Fire prevention

FIRE PREVENTION PLANNING COMMITTEE

1. INTRODUCTION

(a) This guidance material provides aerodrome operators with structured approach on the establishment of an Aerodrome Fire Prevention Planning Committee (FPPC) to enhance oversight, coordination, and continual improvement of the aerodrome's fire prevention programme. The committee is a strategic mechanism that brings together relevant internal and external stakeholders to ensure that fire risks are effectively managed, and fire safety objectives are consistently achieved in alignment with national regulations and provisions.

(b) The complexity of modern aerodrome facilities and environments necessitates a collaborative and integrated approach to fire prevention. The FPPC provides a formal platform for oversight, decision-making, and performance review concerning fire safety matters affecting the entire aerodrome, including airside, terminal, landside, cargo, maintenance, fueling, and tenant areas.

2. PURPOSE AND SCOPE

(a) The purpose of the FPPC is to serve as the primary governance structure responsible for the strategic direction and operational oversight of the fire prevention programme at the aerodrome. The committee functions as a sub-body of the aerodrome's overall safety governance framework and report to the Safety Management Review Board or equivalent forum.

(b) The scope of the committee encompasses all aerodrome-controlled infrastructure and tenant operations where fire hazards may arise. This includes oversight of compliance with applicable fire safety legislation, codes of practice, regulatory guidance, and the aerodrome operator's fire safety policies and procedures.

3. COMMITTEE ESTABLISHMENT AND ADMINISTRATION

(a) The Fire Prevention Planning Committee is established by formal directive of the aerodrome operator. The committee is chaired by a senior management representative from the aerodrome's operations, safety, or engineering division. The Fire Prevention Programme Manager (FPPM) acts as the Secretary to the committee and is responsible for agenda preparation, records of decisions, and follow-up actions.

(b) Membership of the committee should be multidisciplinary and may include representatives from:

(1) Rescue and Firefighting Services (RFFS)

(2) Aerodrome Safety Management Unit

(3) Engineering and Maintenance Services

(4) Terminal or Facilities Management

(5) Airside and Apron Operations

(6) Fuel Handling and Storage Operators

(7) Cargo and Ground Handling Agents

(8) Tenant Safety Representatives

(9) Third-party or contracted organizations

(10) National or Local Fire Authority (where applicable)

(c) The committee convenes on a bi-annually basis, or more frequently as required by operational needs or regulatory findings. Meeting records are retained in accordance with the aerodrome's documentation retention policy.

4. RESPONSIBILITIES OF THE COMMITTEE

(a) The Fire Prevention Planning Committee is responsible for the following core functions:

(1) Oversight of Fire Prevention Programme

(i) The committee provides strategic oversight over all aspects of the aerodrome's fire prevention programme. This includes reviewing programme design, risk prioritization, implementation effectiveness, and alignment with organizational safety objectives.

(ii) The committee ensures that sufficient resources, personnel, training, and monitoring mechanisms are in place to support the ongoing implementation of the fire prevention programme.

(2) Review of Programme Effectiveness and Regulatory Compliance

(i) The committee monitors the performance of the fire prevention programme in terms of compliance with national fire safety legislation, and aerodrome operator policies.

(ii) This includes ensuring that corrective actions arising from fire inspections, internal audits, or external authority reviews are tracked, implemented, and closed within acceptable timelines.

(3) Strategy and Policy Development

(i) The committee develops and updates appropriate strategies, policies, and procedures to manage fire hazards and reduce fire risk across aerodrome operations.

(ii) These strategies are informed by fire risk assessments, operational feedback, emerging hazards, new technologies, and industry best practices.

(4) Review of Fire Inspections and Investigations

(i) The committee reviews the results of all scheduled and unscheduled fire prevention inspections, including visits, facilities inspections, and tenant premises walkthroughs.

(ii) The committee also reviews findings of fire-related safety investigations and ensure that systemic lessons learned are applied to enhance the fire prevention programme and related emergency preparedness measures.

5. PERFORMANCE MONITORING AND CONTINUOUS IMPROVEMENT

(a) The committee must establish key performance indicators (KPIs) and fire safety performance targets to measure the effectiveness of the fire prevention programme. Regular trend analyses of inspection findings, near misses, incident reports, and audit outcomes must be conducted.

(b) Opportunities for improvement must be identified and included in a rolling action plan. The committee also support the development of fire safety awareness campaigns and training initiatives across the aerodrome community.

6. COORDINATION WITH THE SAFETY MANAGEMENT SYSTEM

(a) The FPPC functions within the framework of the aerodrome's Safety Management System (SMS), supporting hazard identification, safety risk management, safety assurance, and safety promotion in the domain of fire safety and fire prevention.

(b) The committee contributes to the safety reporting culture by promoting the open and timely reporting of fire hazards, unsafe conditions, and non-compliances.

AMC2 ACM.OPS.CERT.F.005(b) Fire prevention

AIRSIDE FIRE PREVENTION PROGRAMME

(a) A fire prevention programme for the control of smoking or other operational activities that may cause fire hazards at airside should be established and implemented at the aerodrome, including:

(1) provision of adequate procedures, personnel, resources and equipment to implement the plan;

(2) adoption and use of mitigating measures, when necessary, activities (e.g. maintenance, fuelling, hot works, etc.) which might involve fire hazards need to be authorised;

(3) authorisation of activities that may not include smoking within the movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material are stored;

(4) precautionary measures during fuelling operations and when passengers remain on board or embark/disembark during refuelling operations;

(5) fire prevention inspection plans and procedures;

(6) fire prevention promotional plans and procedures to educate airside community;

(7) fire investigation plans and procedures to identify the cause/s, and prevent re-occurrence; and

(8) quality assurance plans and procedures to promote continuous improvements to the programme.

(b) The fire prevention programme at the airside should comply with the applicable requirements of the UAE fire code regulations, where necessary,

GM AMC2 ACM.OPS.CERT.F.005(b) Fire prevention

AIRCRAFT FUELLING PRACTICES

1. INTRODUCTION

(a) The aerodrome operator, the aircraft operator and the fuel supplier have respective responsibilities in respect of the safety measures to be taken during fuelling operations. Some guidance on these safety measures is given below. It is important to note that this material is not intended to replace fuel supplier operator procedures which are usually developed to meet requirements imposed by special equipment, national regulations, etc. The material includes the following subjects:

(1) general precautionary measures to be taken during fuelling operations; and

(2) additional precautionary measures to be taken when passengers remain on board or embark/disembark during refuelling operations.

(b) The term fuelling encompasses both refuelling and defueling operations at airside.

(c) Further information on internationally accepted petroleum and aviation industry fuel practices, including fuel quality control and operations, can be found in the Manual on Civil Aviation Jet Fuel Supply (Doc 9977).

2. GENERAL PRECAUTIONARY MEASURES TO BE TAKEN DURING AIRCRAFT FUELLING OPERATIONS

(a) The following general precautionary measures should be taken during aircraft fuelling operations:

(1) aircraft fuelling operations should be done outdoors; and

(2) bonding and/or grounding, as appropriate, should be done;

(3) aircraft fuelling vehicles should be positioned so that:

(i) accessibility to aircraft by RFF vehicles is not interrupted;

(ii) a cleared path is maintained to permit rapid removal of fuelling vehicles from an aircraft in an emergency;

(iii) they do not obstruct evacuation from occupied portions of the aircraft in the event of a fire; and

(iv) the vehicle engines are not under the wing;

(4) all vehicles performing aircraft servicing functions other than fuel servicing (e.g. baggage trucks, etc.) should not be driven or be parked under aircraft wings while fuelling is in progress;

(5) open flames and lighted open flame devices should be prohibited on the apron and in other locations within 15 m of any aircraft fuelling operation. Included in the category of open flames and lighted open flame devices are the following:

(i) lighted cigarettes, cigars, pipes;

(ii) exposed flame heaters;

(iii) welding or cutting torches, etc.; and

(iv) flare pots or other open flame lights;

(6) cigarette lighters or matches should not be carried or used by anyone while engaged in aircraft fuelling operations;

(7) extreme caution should be used when fuelling during lightning and electrical storms. The fuelling operations should be suspended during severe lightning disturbances in the immediate vicinity of the aerodrome;

(8) when any part of an aircraft undercarriage is abnormally heated, the aerodrome rescue and firefighting service should be immediately notified and fuelling should not take place until the heat has dissipated; and

(9) portable fire extinguishing equipment suitable for at least initial intervention in the event of fuel fire and personnel trained in its use shall be readily available, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill. It should be ensured by regular inspection and maintenance that this equipment is maintained in a fully serviceable condition.

3. ADDITIONAL PRECAUTIONARY MEASURES TO BE TAKEN WHEN PASSENGERS REMAIN ON BOARD OR EMBARK/DISEMBARK DURING REFUELLING OPERATIONS

(a) Because of the importance of reducing transit times and for security reasons, aerodrome operator in consultation with the aircraft operator, after conducting a fire risk assessment, may

allow passengers to remain on board during refuelling operations while others allow passengers to embark and disembark. However, an aircraft should not be refuelled when passengers are embarking, on board or disembarking unless it is properly staffed by qualified personnel ready to initiate and direct an evacuation of the aircraft by the most practical and expeditious means available.

(b) When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment should be positioned so as to allow:

(1) the use of a sufficient number of exits for expeditious evacuation; and

(2) a ready escape route from each of the exits to be used in an emergency.

(3) The following additional precautions should be observed during refuelling operations while passengers remain on board or embarking/disembarking:

(4) passengers should be warned that refuelling will take place and that they should not smoke, operate switches or otherwise produce sources of ignition;

(5) the illuminated “No smoking” signs and exit lighting should be switched on;

(6) aircraft equipped with integral stairs should have them deployed, or if aircraft stairways are used, these should be positioned at each of the main doors normally used for passenger embarkation or disembarkation which should be open or ajar and free from obstruction.

(7) if, during refuelling, the presence of fuel vapour is detected in the aircraft interior, or any other hazard arises, refuelling and all cleaning activities using electrical equipment within the aircraft should be immediately stopped until safe conditions permit resumption; and

(8) where passengers are embarking or disembarking during refuelling, their route should avoid areas where fuel vapours are likely to be present and this movement should be under the supervision of a responsible person.

AMC1 ACM.OPS.CERT.F.005(c) Fire prevention

LANDSIDE FIRE PREVENTION PROGRAMME

(a) A landside fire prevention programme at the aerodrome should include but not limited to:

(1) terminal buildings, cargo facilities, maintenance hangars and other ancillary structures located within the aerodrome,

(2) identification on the types of fire risks and hazards present at these buildings and facilities;

(3) control of hot works procedures and any types of works that may affect fire safety;

(4) provision of fire prevention equipment commensurate with the types of fire risks and hazards;

(5) implementation of fire prevention inspection plans and procedures, commensurate with the types of fire risks and hazards;

(6) provision of sufficient personnel to implement the programme;

(7) implementation of fire prevention promotional plans and procedures to educate aerodrome community;

(8) implementation of fire investigation plans and procedures to identify the cause/s, and prevent re-occurrence; and

(9) implementation of quality assurance plans and procedures to promote continuous improvements to the programme.

(b) The fire prevention programme at the landside should comply with the applicable requirements of the UAE fire code regulations, where necessary,

GM1 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention

LANDSIDE FIRE PREVENTION PROGRAMME

Where the fire prevention programme for the buildings and facilities at the aerodrome comes under direct oversight of the local fire authority, the requirements specified in **AMC4 ACM.OPS.CERT.F.005 Fire prevention** may be omitted.

GM2 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention

LANDSIDE FIRE PREVENTION PROGRAMME

1. GENERAL.

(a) The intent of this guidance material is to help the aerodrome operator in establishing and implementing minimum requirements to prevent fires and to protect aerodrome employees and public from the hazards of fires, and establishes the Aerodrome Fire Prevention Programme (AFPP).

(b) This guidance acts as a complementary material and does not supersede the UAE Fire and Life Safety Code of Practice (UAE Fire Code). Where there is a doubt or conflict, the UAE Fire Code takes precedence.

2. AIM AND OBJECTIVES.

(a) The aim of the Aerodrome Fire Prevention Programme (AFPP) is first to prevent fires, and, second, should fire break out, to ensure that fires create no threat to the public or hazards to

employees. Property damage from fire should be held to a minimum, as should the impact of fire and related perils on the programme.

(b) The primary objective of the AFPP is to allow critical aerodrome building or facility to continue during a fire emergency for a sufficient time to safely transition prior to a facility becoming inoperable or untenable for human occupancy. In order to achieve this objective, specific operations will require additional protection to that specified by applicable laws, regulations or standards. Such operations will rely on early detection of a fire incident, effective protection for critical operations, as well as planning and training of aerodrome personnel to accomplish this objective. As a minimum, all critical aerodrome buildings and facilities should be designed and operated to achieve the objective of the AFPP.

(c) The AFPP requires adherence to and compliance with all applicable UAE laws, orders, regulations, codes, standards, guidelines, policies, and good practices pertaining to fire prevention and protection. In many cases, local fire regulations will require the major attention.

(d) To ensure the efficacy of the AFPP in meeting its intended aim and objectives, it may be necessary for the aerodrome operator or a delegated suitable competent service provider/person to be designated as an Authority Having Jurisdiction (AHJ) for all fire and life safety prevention programmes within the aerodrome. An AHJ status may require an acceptance or authorisation from the national fire authority or other relevant government agency.

(e) A sample aerodrome fire prevention manual template is provided below.

INTRODUCTION

The purpose of this template is to provide a sample for developing a comprehensive airport fire prevention manual. Each section should be elaborated with specific details relevant to the particular airport, its operations, and infrastructure. Regular updates and adherence to local UAE fire code regulations and align with key NFPA standards such as NFPA 409 (Aircraft Hangars), NFPA 407 (Aircraft Fuel Servicing), and NFPA 403 (Aircraft Rescue and Fire-Fighting Services at Airports). The framework should be comprehensive, covering everything from risk assessment to emergency response and training.

AIRPORT FIRE PREVENTION MANUAL
SECTION 1: INTRODUCTION • **Strategic policy:** A high-level commitment statement from Accountable Manager or a delegated senior person.

- **Roles and responsibilities of an Authority Having Jurisdiction:** Define the roles and responsibilities as an Authority Having Jurisdiction for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.
- **Purpose of the Manual:** Outline the manual's objectives and its importance in ensuring airport safety.
- **Scope:** Define the areas and operations of the airport the manual covers.

SECTION 2: COMPLIANCE AND LEGAL FRAMEWORK

- **Local and Federal Regulations:** Discuss additional regulations specific to the airport's location.
- **Compliance with NFPA Standards:** Detail how the airport adheres to NFPA 409, 407, and 403.
- **Record-Keeping Requirements:** Outline the documentation process for compliance and audits.

SECTION 3: AIRPORT LAYOUT AND INFRASTRUCTURE

- **Airport Map and Critical Areas:** Provide a detailed map highlighting fire-prone areas like fuel storage, hangars, and terminals.
- **Fire Safety Infrastructure:** Describe the fire safety systems in place (e.g., sprinklers, extinguishers, fire hydrants).

SECTION 4: FIRE RISK ASSESSMENT

- **Fire Risk Identification:** Process for identifying fire risks in different airport zones.
- **Risk Evaluation and Mitigation Strategies:** How risks are evaluated and mitigated.
- **Regular Review and Updates:** Schedule for ongoing risk assessment updates.

SECTION 5: FIRE PREVENTION REQUIREMENTS

- **General Fire Safety Rules:** Outline basic fire safety rules applicable across the airport.
- **Area-Specific Policies:** Detail policies tailored to high-risk areas like refuelling stations.
- **Safe work procedures:** Safe work procedures for new buildings, changes to infrastructures, control of hot works, etc.
- **Maintenance and Housekeeping:** Procedures to prevent fire through proper maintenance and housekeeping.

SECTION 6: FIRE DETECTION AND ALARM SYSTEMS

- **System Types and Locations:** Overview of the fire detection systems used and their locations.
- **Maintenance and Testing:** Schedule and procedures for system maintenance and testing.
- **Fire Emergency Communication Protocols:** Guidelines on how to respond when alarms are triggered.

SECTION 7: FIRE SUPPRESSION SYSTEMS

- **Types of Suppression Systems:** Detail different fire suppression systems used (e.g., water, foam, gas-based systems).
- **Inspection and Maintenance:** Regular inspection and maintenance schedules.
- **Usage Training:** Training provided to staff on using various fire suppression systems.

SECTION 8: FIRE EVACUATION PLANS

- **Evacuation Procedures:** Detailed evacuation plans for different scenarios and areas.
- **Role Assignments:** Specific roles and responsibilities during a fire emergency.
- **Coordination with External Agencies:** Procedures for coordinating with external fire and rescue services.

SECTION 9: TRAINING AND EDUCATION

- **Employee Training Programs:** Schedule and content of fire safety training for airport staff.
- **Drills and Exercises:** Frequency and nature of fire drills and emergency exercises.
- **Public Awareness Initiatives:** Programs to educate the public using the airport about fire safety.

SECTION 10: INSPECTION, TESTING, AND MAINTENANCE

- **Regular Inspections:** Schedule and procedures for regular fire safety inspections.
- **Testing Protocols:** Protocols for testing fire safety equipment and systems.
- **Maintenance Records:** Keeping detailed records of inspections, tests, and maintenance activities.

SECTION 11: INCIDENT REPORTING AND ANALYSIS

- **Reporting Procedures:** Steps to follow when reporting a fire incident.
- **Incident Investigation:** Process for investigating fire incidents to identify causes and prevent recurrence.

• **Feedback Loop:** Mechanism for incorporating lessons learned from incidents into future safety planning.
SECTION 12: CONTINUOUS IMPROVEMENT AND REVIEW • **Regular Manual Review:** Schedule for reviewing and updating the fire prevention manual. • **Incorporating Changes:** Process for incorporating new fire safety technologies, regulations, and best practices. • **Feedback Mechanisms:** Channels for staff and Stakeholder feedback on fire safety practices.
SECTION 13: APPENDICES • **Emergency Contact Information:** List of essential contacts (civil defense, ARFFS, management). • **Forms and Checklists:** Standard forms for reporting, risk assessments, and inspections. • **Reference Materials:** Additional resources for in-depth understanding of specific topics.

DEFINITIONS.

(a) **Authority Having Jurisdiction.** An AHJ is an organization, office, or individual who is responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

(b) **Automatic fire detection device.** A device designed to detect automatically the presence of fire by heat, flame, light, smoke or other products of combustion.

(c) **Fire emergency plan.** A plan for a workplace, or parts thereof, describing what procedures the employer and employees should take to ensure employee safety from fire or other emergencies.

(d) **Emergency exit route.** The route that employees are directed to follow in the event they are required to evacuate the workplace or seek a designated refuge area.

(e) **Fire extinguishing system.** A permanently installed system that either extinguishes or controls a fire at the location of the system.

(f) **Hazardous materials.** Those materials presenting dangers beyond the fire problems relating to flash point and boiling point. These dangers can arise from, but are not limited to, toxicity, reactivity, instability, or corrosivity.

(g) **Means of egress.** A continuous and unobstructed way of exit travel from any point in a building or structure to a public way and consists of three separate and distinct parts: the way of exit

access, the exit, and the way of exit discharge. A means of egress comprises the vertical and horizontal ways of travel and shall include all intervening room spaces, doorways, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts, and yards.

(h) **National Fire Codes.** National Fire Codes are published by the National Fire Protection Association (NFPA), and provide guidance on fire safety issues (e.g., NFPA 101). UAE Fire and Life Safety Code of Practice also adopted these National Fire Codes, although they may supplement them where local circumstances so warrant.

(i) **Sprinkler system.** A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an sufficient and reliable water supply and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

BASIC ELEMENTS OF AN AERODROME FIRE PREVENTION PROGRAMME.

(a) The aerodrome operator should ensure an AFPP is developed which includes the appointment in writing of an Aerodrome Fire Prevention Programme Manager (AFPPM) – a competent person responsible to oversee and manage the AFPP. Depending on the size and complexity of the aerodrome, the AFPPM should be supported by a team of professionals who have responsibilities dealing with the application of fire safety, protection, prevention, and suppression technologies, which may include:

(1) facility managers;

(2) fire risk managers,

(3) loss control specialists,

(4) fire marshals,

(5) fire safety inspectors / investigators,

(6) fire protection designers,

(7) fire protection engineers, and

(8) fire code enforcers.

(b) The AFPP should be coordinated with the aerodrome emergency plan, and it should be consistent with the provisions of the aerodrome emergency plan. The use of other contingency plans (e.g., the business continuity plan) is acceptable provided that all relevant elements of the AFPP are included. The AFPP should contain the following elements as a minimum:

(1) **Fire Protection Plan**. There shall be a written fire protection plan for all aerodrome facilities. Individual and specific plans shall be developed for normally staffed facilities. Facilities that are not normally staffed can be included in a more generic fire protection plan developed by AFPPM or facility type. Each facility shall develop a list of the major fuel source fire hazards and applicable storage and handling procedures. The plan shall also identify potential ignition sources (such as welding and smoking) and the appropriate fire protection procedures and equipment that will control a fire involving these sources. Where the aerodrome operator has leased space or facilities, or facilities with joint or multi-occupancies, every effort shall be made to determine all fuel source fire hazards and ignition sources, including those outside of aerodrome operator ownership and control. In addition, where the aerodrome operator has leased space, responsibility for fire prevention shall be negotiated with the building owner as appropriate and expressed in writing. The names or regular job titles of those aerodrome personnel responsible for maintenance of equipment and systems used to prevent or control ignitions or fires should be listed, as well as the names of those responsible for fuel source hazards.

(2) **Emergency Procedures.** Responsible organizations within each facility should establish a written emergency action plan that addresses the types of personnel evacuation to be used in emergency circumstances, and the alarm system that is to be used to notify occupants of the evacuation. The written plan should be kept at the workplace and made available for employee review.

(3) **Fire emergency plan (FEP).** A FEP addresses those specific actions aerodrome employees and contract personnel should take to ensure safety from fire and other emergencies. The following elements, at a minimum, should be included in the FEP:

(i) Emergency escape procedures and emergency exit route assignments.

(ii) Procedures to be followed by employees who are to remain at their duties to operate critical operations before they evacuate.

(iii) Procedures to locate and account for all employees and contract employees after emergency evacuation has been completed.

(iv) Rescue and medical duties for those employees or other employees (by contract or other agreement) who may be requested as volunteers or required to perform them.

(v) The preferred means of reporting fires and other emergencies.

(vi) Procedures to be followed to assist disabled employees during evacuation.

(vii) Names or regular job titles of persons or organizational units who can be contacted for further information or explanation of duties under the FEP.

(4) **Evacuation Procedures and Means of Egress.** The FEP should address the methods and routes of evacuation to be used by employees in emergency circumstances and be coordinated with existing emergency plans and orders. All such exits should never be used for storage of any materials, and have non-combustible surface finishes with appropriate surface burning and flame-spread classification. The plan should reflect the following requirements:

(i) Every building or structure designed for human occupancy should be provided with sufficient exits to permit the prompt and safe escape of occupants, including persons with disabilities (PWD), in case of fire or other emergency.

(ii) In every building or structure, exits should be so arranged and maintained as to provide free and unobstructed egress from all parts of the building or structure at all times when it is occupied. Special accommodations should be made for PWD's.

(iii) Every exit should be clearly visible or the route to reach it should be conspicuously indicated so that every occupant of the building or facility knows the direction of escape. Any door, passage, or stairway that is neither an exit nor a way of exit access, and that is located or arranged so that it is likely to be mistaken for an exit, should be identified by a sign reading "NO EXIT."

(iv) Means of egress in buildings or structures should, as a minimum, meet the requirements of the UAE Fire Codes.

(5) **Training**. Before implementing the FEP, the aerodrome operator should ensure sufficient personnel are trained and designated to assist in the safe and orderly emergency evacuation of employees, and should review the plan with each employee covered by the plan initially when the plan is developed, at least annually thereafter, and whenever the plan or the employee's responsibilities or designated actions under the plan change.

(6) **Housekeeping.** Sufficient responsible personnel are assigned to control accumulations of flammable and combustible waste materials and residues so that they do not contribute to a fire emergency. The housekeeping procedures should be included in the written fire prevention plan.

(7) **Maintenance.** Sufficient responsible personnel are assigned to regularly and properly maintain, according to established procedures, all equipment, fire, and life safety systems. The maintenance procedures should be included in the written fire prevention plan.

FIRE PROTECTION EQUIPMENT.

(a) **Fire Extinguishing Equipment.** Three basic options exist at the time of a fire emergency. First, office holders may choose to evacuate all employees from the workplace at the time of a fire

emergency. In this case, requirements regarding manual fire extinguishing equipment are mainly not applicable. Second, there are those workplaces where office holders have chosen to permit certain employees to fight fires with portable fire extinguishers, and to evacuate all other non-essential employees at the time of a fire emergency. Third, there may be those workplaces where office holders have chosen to permit all employees in the workplace to use portable fire extinguishers to fight fires.

(1) **Portable Fire Extinguishers.** Where the office holders have chosen to partially evacuate the workplace or the affected area at the time of a fire emergency, and has permitted certain designated employees to remain behind to operate critical operations or to fight fires with extinguishers, those employees who will be remaining to perform incipient stage firefighting should be trained in the principles of fire extinguisher use and the hazards involved with incipient stage firefighting. The AFPPM is responsible for the proper selection and distribution of fire extinguishers. The selection and distribution of fire extinguishers should reflect the type and class of fire hazards associated with a particular workplace or facility.

(2) **Standpipe Systems (Fire Hoses).** Fire hoses may be substituted for portable fire extinguishers. Any substitution should provide the same coverage that portable fire extinguishers provide, and should be readily accessible with the hose attached and ready for service.

(b) **Fire Detection, Suppression, and Alarm Systems**. Fire detection systems should be designed by knowledgeable engineers or other professionals with expertise in fire detection systems, and should be maintained in compliance with UAE Fire Codes in an operable condition except during repairs or maintenance. When systems are out of service for repair or maintenance, an alternate means of detection and alarm should be provided (e.g., fire watch). A trained person knowledgeable in the operations and functions of the system should perform maintenance and testing of fire detection systems, including cleaning and necessary sensitivity adjustments.

(c) **Automatic Sprinkler Systems.** Automatic sprinkler systems are the best fire protection system for the workplace.

(1) All automatic sprinkler designs in aerodrome facilities should provide the necessary discharge patterns, densities, and water flow characteristics for complete coverage in a particular workplace or zoned subdivision of the workplace.

(2) The AFPPM should assure that only code and systems-accepted equipment and devices are used in the design and installation of automatic sprinkler systems.

(d) **Evacuation Alarms.** If required by code, an alarm system should be installed to provide warning for necessary emergency action as called for in the FEP, or for reaction time for safe escape of employees from the workplace or the immediate work area, or both. All alarm systems should be

maintained in operating condition except when undergoing repairs or maintenance, and should be tested for reliability and adequacy at least monthly. When systems are going to be down for repair or maintenance, an alternate system is required.

AERODROME FACILITIES & OPERATIONS.

(a) **Facility Control.** Managers of facilities should ensure the following:

(1) That employees have been trained and understand their fire prevention and protection responsibilities within the work environment.

(2) That the facility is in a fire safe condition at all times.

(3) That occupant load information for assembly facilities is maintained in the AFPPM's office. Every room constituting assembly occupancy and not having fixed seats should have the occupant load of the room posted in a conspicuous location near the main exit from the room.

(b) **Aerodrome Traffic Control Towers (ATCT).** Requirements for plans concerning emergency action, fire prevention, and fire drills should be referred to US Standard 29 CFR 1960.20, Alternate Standard for Fire Safety in Aerodrome Traffic Control Towers (ATCT).

(c) **Aircraft Ground Operations.** Aircraft ground operations should meet the requirements of the NFPA 407, Aircraft Fuel Servicing; NFPA 409, Aircraft Hangars; and NFPA 410, Aircraft Maintenance.

GM3 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention

FIRE RISK ASSESSMENT

1. INTRODUCTION

(a) The purpose of an aerodrome fire risk assessment is to identify the fire hazards, identify people at risk, evaluate, remove or reduce the risks, record findings, prepare an emergency plan and provide training and review and update regularly.

(b) The qualified fire risk assessor will reference a question template when completing the assessment, the completed report or survey can document the following examples.

(2) Electrical sources of ignition

(3) Smoking

(4) Arson/wilful fire raising

(5) Portable heaters and heating installations

(6) Cooking

(7) Lightning

(8) Housekeeping

(9) Hazards introduced by outside contractors and builders

(10) Dangerous substances

(11) Other significant fire hazards

(12) Means of escape from fire

(13) Measures to limit fire spread and development

(14) Emergency escape lighting

(15) Fire safety signs and notices

(16) Means of giving warning in case of fire

(17) Manual fire extinguishing appliances

(18) Relevant automatic fire extinguishing systems

(19) Other relevant fixed systems and equipment

(20) Management of fire safety procedures and arrangements

(21) Training and drills

(22) Testing and maintenance

(23) Records

1. DETAILS OF THE BUILDING

(a) Including responsible person, competent persons, floors, lifts, basements and stairwells.

2. FIRE PROTECTION

(a) Including firefighting facilities, fire alarm system, extinguishers, fire blankets, fire hoses, sprinkler systems and extract systems.

3. FIRE HAZARDS

(a) Including sources of ignition, sources of fuel and sources of oxygen.

4. PEOPLE AT RISK

(a) Including numbers of employees, guests, visitors, customers, contractors, patients and tenants and considerations made for mobility impairment, vision impairment, hearing impairment, lone workers, elderly persons, language, substance abuse, cognitive disability and young persons

5. MEANS OF ESCAPE

(a) Including measurements and travel distances.

6. RISK RATINGS

(a) It is common for an assessor to use a matrix for calculating risk in their report.

7. SIGNIFICANT FINDINGS

(a) Including any problems identified and recommendations for fixing.

8. PHOTOGRAPHS AND SUPPORTING EVIDENCE

(a) A fire risk assessor may ask for documents or take pictures while on your premises.

(b) For fire risk assessment guidance and recommended methodology, aerodrome operator may refer to BS PAS 79 Fire Risk Assessment or NFPA 551, Guide for the Evaluation of Fire Risk Assessments.

9. FIRE SAFETY RISK ASSESSMENT

The risk assessment process involves an inspection of the premises to identify potential fire hazards, to ensure adequate measures to stop fire starting and that adequate fire protection measures are in place to protect everyone in the building. See Figure-28 on the 5 key steps and fill in the checklist. See Table 45 on sample fire safety risk assessment checklist template.

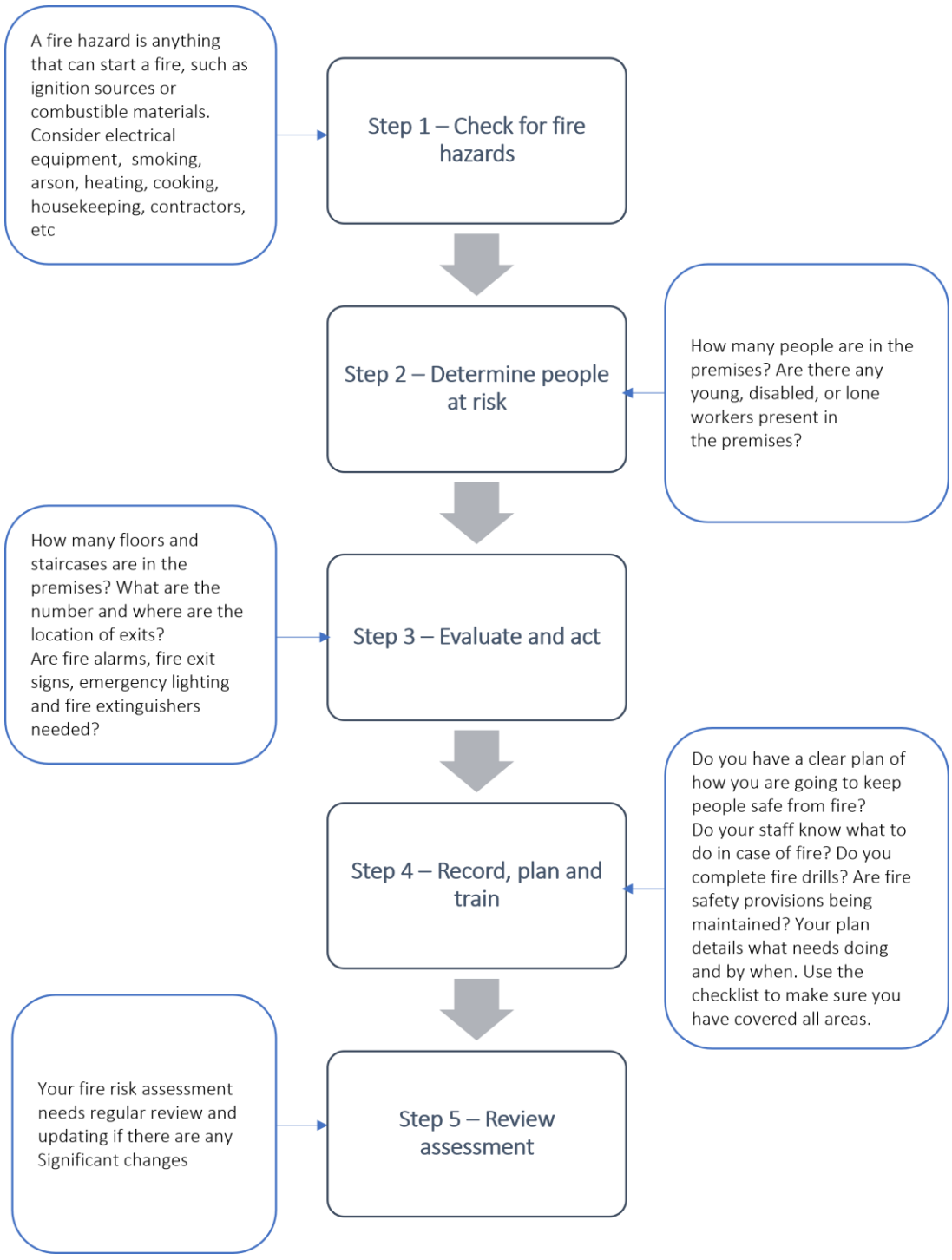


Figure-28: Fire safety risk assessment process flow

Table 45: Fire risk assessment checklist template

AERODROME FIRE RISK ASSESSMENT CHECKLIST TEMPLATE

This generic template is provided to assist the aerodrome operator or service provider with the preparation of a Fire Risk Assessment. Specific and additional details may be needed for some large or complex premises. Fire risk assessment should be conducted by a competent fire risk assessor.

Aerodrome fire risk assessment template sample

AERODROME FIRE RISK ASSESSMENT	
PREMISE INFORMATION	
Responsible person (employer or person having control of premises):	
Address of premises:	
Assessor:	
Date of assessment:	
Use of premises:	
Number of floors:	
Construction:	
Maximum number of employees/visitors:	
ELECTRICAL INSTALLATIONS AND EQUIPMENT	
Are fixed installations periodically inspected and tested every five years?	YES ☐ NO ☐ N/A ☐
Are electrical equipment and appliances periodically inspected and tested?	YES ☐ NO ☐ N/A ☐
Is the use of trailing leads and adaptors avoided, where possible?	YES ☐ NO ☐ N/A ☐
SMOKING	
Are sufficient measures in place to stop people from smoking on the premises?	YES ☐ NO ☐ N/A ☐
Are 'No smoking' signs provided?	YES ☐ NO ☐ N/A ☐
Are suitable arrangements in place for those who wish to smoke outside the premises?	YES ☐ NO ☐ N/A ☐
ARSON	
Are the premises sufficiently secured to prevent unauthorised access?	YES ☐ NO ☐ N/A ☐

Are combustible materials, waste and refuse Bins stored safely clear of the premises or in purpose-built compounds/rooms?	YES ☐ NO ☐ N/A ☐
HEATING SYSTEMS AND PORTABLE HEATERS	
Are fixed heating systems subject to periodic maintenance?	YES ☐ NO ☐ N/A ☐
Are portable heaters subject to periodic inspection and used safely?	YES ☐ NO ☐ N/A ☐
COOKING	
Are sufficient measures taken to prevent fires from cooking?	YES ☐ NO ☐ N/A ☐
Are filters and ductwork subject to regular cleaning?	YES ☐ NO ☐ N/A ☐
HOUSEKEEPING	
Is the standard of housekeeping sufficient to avoid the accumulation of combustible materials and waste?	YES ☐ NO ☐ N/A ☐
Are combustible materials kept separate from ignition and heat sources?	YES ☐ NO ☐ N/A ☐
Is it ensured that all contractors who undertake work on the premises are competent and qualified?	YES ☐ NO ☐ N/A ☐
DANGEROUS GOODS / HAZARDOUS MATERIALS	
Are suitable measures in place to address the fire hazards associated with the use and storage of dangerous goods / hazardous materials?	YES ☐ NO ☐ N/A ☐
OTHER SIGNIFICANT FIRE HAZARDS	
Are there any other significant fire hazards in the premises?	YES ☐ NO ☐ N/A ☐
If the answer to the above questions is "YES", please list each hazard and any control measures to reduce the likelihood of fire in the box below. If the answer to any question is "NO", include suitable action within the Action Plan.	
BRIEF DETAILS / ACTION PLAN:	
MEANS OF ESCAPE	

Are all escape routes kept clear of obstructions to enable people to escape safely?	YES ☐ NO ☐ N/A ☐
Are all fire exits easily and immediately openable?	YES ☐ NO ☐ N/A ☐
Are distances of travel considered reasonable?	YES ☐ NO ☐ N/A ☐
Are suitable precautions in place for all inner rooms?	YES ☐ NO ☐ N/A ☐
Is sufficient fire protection provided to stairways, including the provision of self-closing, fire-resisting doors?	YES ☐ NO ☐ N/A ☐
Are reasonable arrangements in place for the safe evacuation of disabled employees and other disabled persons on the premises?	YES ☐ NO ☐ N/A ☐
Record brief details of the above measures in the box below. If the answer to any question is no, include suitable action within the action plan	
BRIEF DETAILS / ACTION PLAN:	
MEANS OF GIVING WARNING IN CASE OF FIRE	
Is there a suitable electrical fire alarm system?	YES ☐ NO ☐ N/A ☐
Are automatic smoke/heat detectors provided and is the extent and coverage considered sufficient?	YES ☐ NO ☐ N/A ☐
Record brief details of the above measures in the box below. If the answer to any question is no, include suitable action within the action plan	
BRIEF DETAILS / ACTION PLAN:	
MANUAL FIRE EXTINGUISHERS	
is there reasonable provision of fire extinguishers?	YES ☐ NO ☐ N/A ☐
EMERGENCY ESCAPE LIGHTING	
Is there a reasonable standard of emergency escape lighting to illuminate escape routes and areas without natural lighting?	YES ☐ NO ☐ N/A ☐
Record brief details of the above measures in the box below. If the answer to any question is no, include suitable action within the action plan	
BRIEF DETAILS / ACTION PLAN:	

FIRE SAFETY SIGNS AND NOTICES	
Is there a reasonable standard of fire exit signage and fire safety signs?	YES ☐ NO ☐ N/A ☐
Are general fire notices, detailing the action to take in the event of a fire, provided and sited in prominent locations?	YES ☐ NO ☐ N/A ☐
Record brief details of the above measures in the box below. If the answer to any question is no, include suitable action within the action plan	
BRIEF DETAILS / ACTION PLAN:	
MANAGEMENT OF FIRE SAFETY	
Has someone been appointed to manage fire safety?	YES ☐ NO ☐ N/A ☐
Are procedures in the event of fire appropriate and properly documented?	YES ☐ NO ☐ N/A ☐
Are all employees / contractors given regular instruction and training on the action to take in the event of a fire?	YES ☐ NO ☐ N/A ☐
Are employees / contractors with additional responsibilities, such as fire wardens, given additional training to carry out their roles?	YES ☐ NO ☐ N/A ☐
Are daily checks carried out to ensure exit routes are kept clear and fire exits remain easily openable?	YES ☐ NO ☐ N/A ☐
Are monthly and annual testing routines in place for the emergency escape lighting?	YES ☐ NO ☐ N/A ☐
Are weekly testing and periodic maintenance and servicing routines in place for the fire alarm system and any automatic detectors?	YES ☐ NO ☐ N/A ☐
Are fire extinguishers subject to annual maintenance?	YES ☐ NO ☐ N/A ☐
Are records of testing and maintenance maintained?	YES ☐ NO ☐ N/A ☐
Record brief details of the above measures in the box below. If the answer to any question is no, include suitable action within the action plan	
BRIEF DETAILS / ACTION PLAN:	

ACTION PLAN				
If any of the above boxes are ticked with a 'No', the deficiencies should be described below, along with proposed action for rectification.				
Item	**Deficiency**	**Proposed action**	**Timescale**	**Responsible person**
(1)				
(2)				

SECTION G – AERODROME WORKS SAFETY

ACM.OPS.CERT.G.005 Aerodrome works safety

AERODROME WORKS SAFETY

(a) In accordance with **CAR AGA PART ADR ADR.OPS.B.070,** an aerodrome operator shall establish and implement procedures to ensure that:

(1) aircraft safety is not affected by aerodrome works;

(2) aerodrome works safety is not affected by aerodrome operational activities; and

(3) airfield work permit system is established and implemented involving all relevant stake holders.

AMC1 ACM.OPS.CERT.G.005(a) Aerodrome works safety

GENERAL REQUIREMENTS

(a) General requirements on aerodrome works safety is detailed in **CAR AGA AMC1 ADR.OPS.B.070**

AMC2 ACM.OPS.CERT.G.005(a) Aerodrome works safety

RFFS RESPONSE CAPABILITY ASSESSMENT

(a) An assessment should be conducted, as part of the initial design study of the aerodrome works, to determine the extent to which aerodrome works is likely to affect the response capability or operational performance of the rescue and firefighting service and other emergency services in the event of emergencies at an aerodrome or work site.

(b) Suitable mitigation measures including notification of all relevant agencies of the measures should be developed, where the proposed aerodrome works may impact the response capability of the rescue and firefighting service and other emergency services.

(c) Where necessary, changes to the aerodrome emergency plan and/or operational procedures should be made, prior to the commencement of the aerodrome works

GM AMC2 ACM.OPS.CERT.G.005(a) Aerodrome works safety

RFFS RESPONSE CAPABILITY ASSESSMENT

The guidance on assessment of RFFS response capability can refer to **GM AMC4 ACM.OPS.CERT.E.020(a) Rescue and firefighting**.

AMC3 ACM.OPS.CERT.G.005(a) Aerodrome works safety

SUPPLEMENTARY WATER SUPPLY ASSESSMENT

(a) Notwithstanding the requirements mentioned in **AMC2 ACM.OPS.CERT.E.020(a) Rescue and firefighting**, an assessment should be conducted to determine impact to supplementary water supply requirements at an aerodrome arising from the aerodrome works.

(b) Where there is an impact to the airport supplementary water supply, additional requirements to support the aerodrome works in case of emergencies should be determined.

(c) Where required, additional supplementary water supply systems, facilities and equipment should be provided.

(d) Where there are changes to the supplementary water supply systems, facilities and equipment at the aerodrome, the following actions should be taken:

(1) notify rescue and firefighting service and/or other emergency services; and

(2) develop appropriate contingency measures.

GM AMC3 ACM.OPS.CERT.G.005(a) Aerodrome works safety

SUPPLEMENTARY WATER SUPPLY ASSESSMENT

For provision of additional supplementary water supply, refer to **GM ACM.OPS.CERT.E.025(a) Supplementary water supply systems, facilities and equipment** for guidance.

AMC4 ACM.OPS.CERT.G.005(a) Aerodrome works safety

FIRE RISK ASSESSMENT

(a) Fire risk assessments of the aerodrome works should be conducted, reviewed and maintained.

(b) Suitable fire prevention measures should be established including control of no-smoking, hot works, use of flammable/combustible materials, fuelling, emergency response and evacuation, etc;

(c) A fire prevention programme of the aerodrome works should be established and implemented.

(d) Where necessary, changes to the aerodrome emergency plan and/or operational procedures prior to the commencement of the aerodrome works should be developed.

GM AMC4 ACM.OPS.CERT.G.005 Aerodrome works safety

FIRE RISK ASSESSMENT

Guidance on fire prevention programme and fire risk assessment can refer to the applicable UAE fire codes or **GM1 AMC ACM.OPS.CERT.F.005 Aerodrome fire prevention programme** and **GM2 AMC ACM.OPS.CERT.F.005 Fire risk assessment**

SUBPART – OPERATIONAL REQUIREMENTS FOR AERODROME LANDING AREA ACCEPTANCE HOLDERS (ACM.OPS.LAA)

SECTION A – PROVISION OF SERVICES AND/OR ACTIVITIES

ACM.OPS.LAA.C.005 Provision of services and/or activities

PROVISION OF SERVICES AND/OR ACTIVITIES

(a) The services and/or activities under this SUBPART shall be provided at the aerodrome by the aerodrome operator either directly or indirectly.

(b) Where the services contained in this SUBPART are provided by a third party either fully or partially, an aerodrome operator shall establish and implement safety oversight of the provisions, in accordance with the aerodrome operator's safety management system, to ensure compliance with the requirements contained in this Regulation.

GM ACM.OPS.LAA.A.005(a) Provision of services and/or activities

PROVISION OF SERVICES AND/OR ACTIVITIES

(a) The services and/or activities contained in this SUBPART need to be provided at an aerodrome. In some cases, these services and/or activities are not directly provided by the aerodrome operator, but by a third-party organisation or combination of both. However, the aerodrome operator, being responsible for the operation of the aerodrome should have arrangements and interfaces with the third party to ensure that these services and/or activities are provided according to the legal requirements. The method described above meets with the intention of an integrated Safety Management System that helps the aerodrome operator to ensure the safety objective of the provision is being met.

AMC1 ACM.OPS.LAA.A.005(b) Provision of services and/or activities

THIRD PARTY

(a) Safety oversight of a third party should be conducted as part of the holder's safety management system, at least, including:

(1) establishing a formal agreement with the third party on the types and duration of the contracted services and/or activities;

(2) administering a committee for the planning, monitoring and evaluating the contracted services and/or activities;

(3) implementing risk management of the contracted services and/or activities;

(4) implementing performance monitoring of the contracted services and/or activities; and

(5) conducting audits and inspections of the contracted services and/or activities.

GM AMC1 ACM.OPS.LAA.C.005(b) Provision of services and/or activities

ESTABLISHING AND IMPLEMENTING SAFETY OVERSIGHT

(a) Guidance on establishing and implementing safety oversight can refer to CAR SMS.

SECTION B – EMERGENCY PLANNING

ACM.OPS.LAA.B.005(a) Emergency planning

AERODROME EMERGENCY PLANNING

(a) An aerodrome operator shall:

(1) establish and implement an aerodrome emergency plan that is in accordance with aerodrome certification requirements stated in **CAR AGA PART ADR**;

(2) ensure the emergency plan commensurate with the aircraft operations and other activities conducted at the aerodrome;

(3) ensure the emergency plan provide for the coordination of the actions to be taken in an emergency occurring at an aerodrome or in its vicinity;

(4) ensure the emergency plan coordinate the response or participation of all existing agencies which, in the opinion of the aerodrome operator, could be of assistance in responding to an emergency; and

(5) ensure the emergency plan observe human factors principles to ensure optimum response by all existing agencies participating in emergency operations.

GM ACM.OPS.LAA.B.005(a) Emergency planning

AIM AND OBJECTIVES

(a) Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity.

(b) The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations.

(c) The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency.

(d) Guidance in establishing aerodrome emergency plan can refer to **GM1 ACM.OPS.CERT.D.005(a) Emergency plan document.**

AMC1 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY PLAN DOCUMENT

(a) Emergency plan document should be submitted to the GCAA for initial certification, at least, with the following information:

(1) incident command structure;

(2) types of emergencies planned for;

(3) agencies involved in the plan;

(4) responsibility and role of each agency, the emergency operations centre and the command post, for each type of emergency;

(5) information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency; and

(6) a grid map of the aerodrome and its immediate vicinity.

(b) Procedures should be implemented to ensure the emergency plan document is managed according to the aerodrome operator's safety management system, including:

(1) reviewing and updating the plan at least every two-years;

(2) the plan is approved by the Accountable Manager;

(3) ensuring quality assurance of the plan; and

(4) an updated copy is submitted to the GCAA.

GM1 AMC1 ACM.OPS.LAA.B.005(a) Emergency planning

AERODROME INCIDENT MANAGEMENT

(a) Guidance on establishing and implementing an aerodrome incident management can refer to **GM ACM.OPS.CERT.D.005 Aerodrome incident management**

GM2 AMC1 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY PLAN DOCUMENT

(a) Examples of emergencies are: aircraft emergencies, sabotage including bomb threats, unlawfully seized aircraft, dangerous goods occurrences, building fires, natural disaster and public health emergencies.

(b) Examples of public health emergencies are increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport and severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

(c) Guidance in developing aerodrome emergency plan document can refer to **GM1 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning. . GM2 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning, GM3 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning, GM4 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning, GM5 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning, GM6 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning, and GM7 AMC2 ACM.OPS.CERT.D.005(a) Emergency planning.**

AMC2 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY COMMAND FACILITIES

(a) A fixed emergency operations centre and a mobile command post should be available for use during an emergency at the aerodrome.

(b) The emergency operations centre should be part of the aerodrome facilities and is responsible for the overall coordination and general direction of the response to an emergency.

(c) The mobile command post is a facility capable of being moved rapidly to the site of an emergency, and should undertake the local coordination of those agencies responding to the emergency;

(d) A person should be assigned to assume control of the emergency operations centre and another person at the mobile command post.

GM AMC2 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY OPERATIONS CENTRE AND MOBILE COMMAND POST

(a) Guidance on emergency operations centre and mobile command post can refer to **GM1 AMC4 ACM.OPS.CERT.D.005(a) Emergency planning,** and **GM2 AMC4 ACM.OPS.CERT.D.005(a) Emergency planning.**

AMC3 ACM.OPS.LAA.B.005(a) Emergency planning

COMMUNICATION SYSTEM

(a) Adequate communication systems linking the mobile command post and the emergency operations centre with each other and with the participating agencies should be provided in accordance with the emergency plan and consistent with the particular requirements of the aerodrome.

GM AMC3 ACM.OPS.LAA.B.005(a) Emergency planning

COMMUNICATION SYSTEM

(a) Guidance on communication system can refer to **GM AMC5 ACM.OPS.CERT.D.005(a) Emergency planning.**

AMC4 ACM.OPS.LAA.B.005(a) Emergency planning

COORDINATION WITH RESCUE COORDINATION CENTRE

(a) The emergency plan should provide for cooperation and coordination with the rescue coordination centre, as necessary.

GM AMC4 ACM.OPS.LAA.B.005(a) Emergency planning

COORDINATION WITH RESCUE COORDINATION CENTRE

(a) Contact information of the relevant rescue coordination centre should be included in the emergency plan, kept at the emergency operations centre and periodically tested, where necessary.

AMC5 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY MEDICAL SERVICES, FACILITIES AND EQUIPMENT

(a) Emergency medical services, facilities and equipment for the removal and after-care of casualties arising from an aircraft accident should be available at the aerodrome.

GM AMC5 ACM.OPS.LAA.B.005(a) Emergency planning

EMERGENCY MEDICAL SERVICES, FACILITIES AND EQUIPMENT

(a) Guidance on the provision of Emergency medical services, facilities and equipment can refer to **GM1 AMC6 ACM.OPS.CERT.D.005(a) Emergency planning.**

AMC6 ACM.OPS.LAA.B.005(a) Emergency planning

HUMAN FACTOR PRINCIPLES IN EMERGENCY PLANNING

(a) Human factors principles should be considered in the emergency plan to achieve optimum response by all existing agencies participating in emergency operations.

GM AMC6 ACM.OPS.LAA.B.005(a) Emergency planning

HUMAN FACTOR PRINCIPLES IN EMERGENCY PLANNING

(a) Guidance on human factor principles in emergency planning can refer to **GM AMC11 ACM.OPS.CERT.D.005(a) Emergency planning.**

ACM.OPS.LAA.B.010 Emergency planning

EMERGENCY EXERCISES

An aerodrome operator shall:

(a) ensure the emergency plan contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

(b) ensure the emergency plan is tested by conducting:

(1) a full-scale aerodrome emergency exercise at intervals not exceeding three years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; or

(2) a series of modular tests commencing in the first year and concluding in a full-scale aerodrome emergency exercise at intervals not exceeding four years; and

(3) reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency.

AMC1 ACM.OPS.LAA.B.010(a) Emergency planning

PLANNING AND CONDUCTING EMERGENCY EXERCISES

(a) Procedures for planning and conducting aerodrome emergency exercises should be established and implemented.

(b) Results of emergency exercises should be reviewed and addressed in order to improve the effectiveness of the emergency plan.

GM AMC1 ACM.OPS.LAA.B.010(a) Emergency planning

AERODROME EMERGENCY EXERCISES

(a) Guidance on establishing and implementing aerodrome emergency exercises, an aerodrome operator can refer to **GM1 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning, GM2 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning**, and **GM3 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning.**

AMC1 ACM.OPS.LAA.B.010(b) Emergency planning

FULL-SCALE AND PARTIAL EMERGENCY EXERCISES

(a) Testing and exercising the emergency plan should commensurate with the types of aircraft operations and operational activities.

(b) Emergency exercises should be sufficiently planned and managed with clear aims and objectives.

(c) Participation of on and off aerodrome agencies and its associated personnel and resources as per emergency plan should be included.

(d) Where an aerodrome operates aircraft movement and other major operational activities at night, emergency exercises should be conducted during the hours of darkness.

(e) Records of emergency exercises should be maintained and readily available for audit and inspection by the GCAA.

(f) The GCAA should be notified, at least, 1-month before the planned full-scale emergency exercise.

GM1 AMC1 ACM.OPS.LAA.B.010(b) Emergency planning

FULL-SCALE AND PARTIAL EMERGENCY EXERCISES

(a) It may be appropriate to test some parts of the emergency plan in isolation, provided satisfactory assurance of overall effectiveness of the emergency plan can be achieved.

(b) The GCAA may attend exercise pre-briefing, testing or debriefing, or choose to attend emergency exercises conducted at the aerodrome.

GM2 AMC1 ACM.OPS.LAA.B.010(b) Emergency planning

PURPOSES OF EMERGENCY EXERCISES

(a) The purpose of a full emergency exercise is to ensure the adequacy of the plan to cope with different types of emergencies.

(b) The purpose of a partial emergency exercise is to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.

(c) The purpose of a table-top emergency exercise is to test the integration and capability of emergency response resources without the expense and disruption of services incurred by a partial and full emergency exercise.

(d) Guidance on planning and managing aerodrome emergency exercises refer to **GM3 AMC1 ACM.OPS.CERT.D.010(a) Emergency planning.**

AMC2 ACM.OPS.LAA.B.010(b) Emergency planning

MODULAR TESTING

(a) A modular testing approach should consider the following modules:

(1) emergency alerting and notification;

(2) rendezvous point management;

(3) mobile command post/operational command;

(4) emergency operations centre/tactical command;

(5) crisis management centre/strategic command;

(6) triage and medical care protocols;

(7) emergency reception centres/facilities;

(8) post-accident/preservation of evidence;

(9) business continuity/recovery operations; and

(10) full-scale emergency exercise.

GM AMC2 ACM.OPS.LAA.B.010(b) Emergency planning

MODULAR TESTING

(a) The purpose of modular tests is to enable concentrated effort on specific components of established emergency plans.

(b) Guidance on planning and conducting a modular test can refer to **GM AMC2 ACM.OPS.CERT.D.010(a) Emergency planning.**

AMC3 ACM.OPS.LAA.B.010(b) Emergency planning

REVIEWING EMERGENCY PLAN AFTER EXERCISE OR ACCIDENT

(a) The emergency plan should be reviewed after emergency exercises and aircraft accident at the aerodrome.

(b) Findings and improvement areas resulting from emergency exercises and aircraft accident should be recorded and addressed for the purpose of continuous improvements to the emergency plan.

(c) Records of emergency exercises should be retained for at least five years for audit and inspection by the GCAA.

GM AMC3 ACM.OPS.LAA.B.010(b) Emergency planning

REVIEWING EMERGENCY PLAN AFTER EXERCISE OR ACCIDENT

(a) For guidance in reviewing an emergency plan after an exercise or accident can refer to **GM1 AMC3 ACM.OPS.CERT.D.010(a) Emergency planning**, and **GM2 AMC3 ACM.OPS.CERT.D.010(a) Emergency planning.**

AMC4 ACM.OPS.LAA.B.010(b) Emergency planning

DEFERRING EMERGENCY EXERCISE AFTER AIRCRAFT ACCIDENT

(a) Following an aircraft accident or serious incident at the aerodrome, the aerodrome operator may request for a deferment of the planned emergency exercises. Any deferment request should be submitted, in writing to the GCAA by providing an assessment of all actions taken during the accident against the relevant emergency orders and instructions contained in the emergency plan.

(b) Where a deferment is successful, partial and full-scale emergency exercises should be conducted no later than 24-months or as determined by the GCAA.

GM AMC4 ACM.OPS.LAA.B.010(b) Emergency planning

DEFERMENT OF EMERGENCY EXERCISE AFTER ACCIDENT/INCIDENT

(a) An assessment for exercise deferment includes all actions taken during the aircraft accident against the applicable references of the emergency plan and supporting evidences i.e., incident reports, transcripts, recordings, logs, etc.

ACM.OPS.LAA.B.015 Emergency planning

EMERGENCIES IN DIFFICULT ENVIRONMENTS

(a) An aerodrome operator shall ensure the emergency plan include the ready availability of, and coordination with, appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water and/or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

AMC1 ACM.OPS.LAA.B.015(a) Emergency planning

EMERGENCIES IN DIFFICULT ENVIRONMENTS

(a) At those aerodromes located close to water, and/or swampy areas, or difficult terrain, the emergency plan should include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

(b) For a water aerodrome, the emergency plan should consider the particular hazards associated with seaplane operations, including:

(1) passenger evacuation into a further life-threatening environment, e.g., deep water; the onset of hypothermia, and its associated effects, during and following prolonged immersion in cold water; and

(2) the immediate toxicity and respiratory effects on survivors in the water following the ingestion of floating fuel and oils and their associated vapours, and fire suppressant foams, powders and gases;

(3) contain sufficient provisions for water rescue and fire response; and

(c) An assessment of the approach and departure areas within 1 000 m of the runway threshold should be carried out to determine the options available for intervention.

GM1 AMC1 ACM.OPS.LAA.B.015(a) Emergency planning

AIRCRAFT ACCIDENTS IN THE WATER

(a) Guidance on responding to emergencies in difficult environments refer to **GM1 AMC1 ACM.OPS.CERT.D.015 Emergency planning.**

GM2 AMC1 ACM.OPS.LAA.B.015(a) Emergency planning

ASSESSMENTS FOR ACCIDENTS BEYOND RUNWAY THRESHOLDS (1 000 METRES RESPONSE AREA)

(a) Guidance on assessing approach and departure areas within 1 000 m of runway thresholds refer to **GM2 AMC1 ACM.OPS.CERT.D.015 Emergency planning**.

SECTION C – RESCUE AND FIREFIGHTING

ACM.OPS.LAA.C.005 Rescue and firefighting

PROVISION OF SERVICES AND/OR ACTIVITIES

(a) No person or organisation shall provide rescue and firefighting services, activities, facilities and equipment to civil aviation within the United Arab Emirates except under the authority of the GCAA and in accordance with the provisions contained under this Regulation.

(b) An aerodrome operator shall ensure rescue and firefighting services, activities, facilities and equipment are provided at the aerodrome.

(c) Where an aerodrome is located close to water/swampy areas, or difficult terrain, and where a significant portion of approach or departure operations takes place over these areas, an aerodrome operator shall ensure specialist rescue services and firefighting equipment appropriate to the hazard and risk are made available.

AMC1 ACM.OPS.LAA.C.005(b) Rescue and firefighting

PROVISION OF RESCUE AND FIREFIGHTING SERVICE

(a) Rescue and firefighting service should come under the administrative control of the aerodrome operator, that is responsible for ensuring that the service provided is organised, equipped, staffed, trained and operated in such a manner as to fulfil its proper function and achieve compliance with this regulation.

(b) Additional quantities of extinguishing agents, personnel and equipment should be determined accordingly if rescue and firefighting service is required to response to domestic and non-aircraft related incidents at an aerodrome, where required.

(c) Information on the provision of rescue and firefighting services, facilities and equipment should be provided in the Aerodrome Manual.

(d) The GCAA should be immediately notified of any changes to the provision of rescue and firefighting services, facilities and equipment.

GM AMC1 ACM.OPS.LAA.C.005(b) Rescue and firefighting

PROVISION OF SERVICES AND/OR ACTIVITIES

(a) Public or private organizations, suitably located and equipped, may be designated to provide the rescue and firefighting service if the requirements contained in this Regulation are complied with.

(b) It is intended that the fire station housing these organizations be normally located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.

(c) Requirements for a rescue and firefighting service to deal with domestic incidents involving building, fuel storage facility and other non-aircraft related emergencies at an aerodrome are not included in this Regulation.

AMC2 ACM.OPS.LAA.C.005(b) Rescue and firefighting

RESCUE EQUIPMENT

(a) Minimum rescue equipment commensurate with the level of aircraft operations should be provided on the rescue and firefighting vehicle(s).

GM1 AMC2 ACM.OPS.LAA.C.005(b) Rescue and firefighting

RESCUE EQUIPMENT

(a) Table 46 provides guidance on types and quantities of rescue equipment commensurate with the level of aircraft operations on the rescue and firefighting vehicle(s).

Table 46: Minimum rescue equipment to be provided at LAA aerodromes

Equipment scope	Equipment item	Aerodrome RFF Category			
		1 - 2	3 - 5	6 - 7	8 - 10
Forcible entry tools	Prying tool (hooligan, biel type)	1	1	1	2
	Crowbar 95 cm	1	1	1	2
	Crowbar 1.65 m	1	1	1	2
	Axe, rescue large non-wedge type	1	1	1	2
	Axe, rescue small non-wedge or aircraft type	1	2	2	4
	Cutter bolt 61 cm	1	1	2	2
	Hammer 1.8 kg – lump or club type	1	1	2	2
	Chisel cold 2.5 cm	1	1	2	2
A suitable range of rescue / cut-in equipment including powered rescue tools	Hydraulic/electrical (or combination) portable rescue equipment	1	1	1	2
	Powered rescue saw complete with minimum 406 mm diameter spare blades	1	1	1	2
	Reciprocating/oscillating saw	1	1	1	2
A range of equipment for the delivery of firefighting agent	Delivery hoses 30 m lengths x 50 and 64 mm diameters	6	10	16	22
	Foam branches (nozzles)	1	1	2	3
	Water branches (nozzles)	1	2	4	6
	Coupling adaptors	1	1	2	3
	Portable fire extinguisher - CO^2	1	1	2	3

	Portable fire extinguisher - DCP	1	1	2	3
Self-contained breathing apparatus – sufficient to maintain prolonged internal operations	Full breathing apparatus (BA) set complete with facemask and air cylinder	1 per duty personnel			
	BA spare air cylinder				
	BA spare facemask				
Respirators	Full faced respirators complete with filters	1 per duty personnel			
Ladders	Extension ladder, rescue and suitable for largest aircraft	-	1	2	3
	Ladder general purpose – rescue capable	1	1	2	2
Personal protective clothing	Structural/proximity firefighting suit (2-piece), helmet, boots, gloves and flash hood as a minimum	1 set per duty personnel plus sufficient reserve stock			
Additional items for personal protection	Protective goggles	1	1	2	3
	Surgical gloves	1 box			
	Blanket fire resisting	1	1	2	2
Rope lines	Rope line rescue 45 m	1	1	2	2
	Rope line general use 30 m	1	1	2	2
	Rope line pocket 6 m	1	1	2	2
Communication equipment	Portable transceivers (hand held and intrinsically safe)	1	2	2	3
	Mobile transceivers (vehicle)	1 per vehicle			
A range of handheld/ portable lighting equipment	Hand-held flashlight (intrinsically safe)	1 per duty personnel			
	Portable lighting – spot or flood (intrinsically safe)	1	1	2	3
Rescue tool box and contents	Hammer, claw 0.6 kg Cutters, cable 1.6 cm Socket set Hacksaw, heavy duty complete with spare blades Wrecking bar 30 cm Screwdriver set – slotted and Phillips heads Pliers, insulated Combination 20 cm Side cutting 20 cm Slip joint – multi-grip 25 cm Seat belt/harness cutting tool Wrench, adjustable 30 cm Spanners, combination 10 mm – 21 mm	1	1	2	3
First aid equipment	Medical first-aid kit	1	1	2	3
	Automated External Defibrillator (AED)	1	1	2	3
	Oxygen Resuscitation Equipment (ORE)	1	1	2	3

Miscellaneous equipment	Chocks and wedges – various sizes (set)	1	1	2	3
	Tarpaulin – lightweight	1	1	2	3
	Thermal imaging camera		1	2	3

GM2 AMC2 ACM.OPS.LAA.C.005(b) Rescue and firefighting

SPECIAL RESCUE AND FIREFIGHTING EQUIPMENT

(a) Special rescue and firefighting equipment need not be provided for water areas; this does not prevent the provision of such equipment if it would be of practical use, such as when the areas concerned include reefs or islands.

(b) The objective is to plan and deploy the necessary life-saving flotation equipment as expeditiously as possible in a number commensurate with the largest aeroplane normally using the aerodrome.

ACM.OPS.LAA.C.010 Rescue and firefighting

LEVEL OF PROTECTION

(a) An aerodrome operator shall:

(1) provide the level of protection at an aerodrome for rescue and firefighting appropriate to the aerodrome category irrespective of the number of aircraft movements;

(2) determine the aerodrome category based on the longest aeroplanes using the aerodrome and their fuselage width;

(3) ensure, if after selecting the category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is greater than the maximum width in Table 47, column 3, for that category, then the category for that aeroplane is one category higher; and

(4) ensure, during anticipated periods of reduced activity, the level of protection available is no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements.

Table 47: Aerodrome rescue and firefighting category for LAA aerodromes

Aerodrome category (1)	**Aircraft overall length (2)**	**Maximum fuselage width (3)**
1	0 m up to but not including 9 m	2 m
2	9 m up to but not including 12 m	2 m
3	12 m up to but not including 18 m	3 m
4	18 m up to but not including 24 m	4 m

5	24 m up to but not including 28 m	4 m
6	28 m up to but not including 39 m	5 m
7	39 m up to but not including 49 m	5 m
8	49 m up to but not including 61 m	7 m
9	61 m up to but not including 76 m	7 m
10	76 m up to but not including 90 m	8 m

GM ACM.OPS.LAA.C.010(a) Rescue and firefighting

DETERMINING LEVEL OF PROTECTION

(a) Either a take-off or a landing constitutes a movement.

(b) To categorize the aeroplanes using the aerodrome, first evaluate their overall length and second, their fuselage width.

(c) Guidance on determining the appropriate level of protection at the aerodrome can refer to **GM AMC1 ACM.OPS.CERT.E.010(a) Rescue and firefighting.**

AMC1 ACM.OPS.LAA.C.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION

(a) Changes in level of protection should be expressed in terms of the new category of the rescue and firefighting service available at an aerodrome.

(b) Where there is a permanent change in the level of protection, the GCAA should be notified and a management of change should be conducted.

GM AMC1 ACM.OPS.LAA.C.010(a) Rescue and firefighting

CHANGES IN LEVEL OF PROTECTION

(a) Changes in the level of protection from that normally available at an aerodrome could result from a change in the availability of RFF vehicles, extinguishing agents, equipment to deliver the agents or personnel to operate the equipment, etc.

ACM.OPS.LAA.C.015 Rescue and firefighting

EXTINGUISHING AGENTS

(a) An aerodrome operator shall:

(1) provide the amounts of water for foam production and the complementary agents on the rescue and firefighting vehicles in accordance with the aerodrome category

determined, except that for aerodrome categories 1 and 2 up to 100 per cent of the water may be substituted with complementary agent;

(2) ensure for the purpose of agent substitution, 1 kg of complementary agent is taken as equivalent to 1.0 L of water for production of a foam meeting performance level A;

(3) ensure, at aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water are recalculated and the amount of water for foam production and the discharge rates for foam solution are increased accordingly;

(4) ensure the quantity of foam concentrates separately provided on vehicles for foam production is in proportion to the quantity of water provided and the foam concentrate selected;

(5) ensure the discharge rate of the foam solution is not less than the rates shown in Table 48; and

(6) ensure the complementary agents comply with the appropriate specifications of the International Organization for Standardization (ISO).

(b) From 1 July 2026, provisions of environmental-sustainable extinguishing agents shall apply to new builds or replacement of existing systems or part thereof.

Table 48: Minimum usable amounts of extinguishing agents for LAA aerodromes

Aerodrome category	**Principal agents**				**Complementary agents**	
	Foam meeting performance level B		**Foam meeting performance level C**			
	Water (L)	**Discharge rate foam solution / minute (L)**	**Water (L)**	**Discharge rate foam solution / minute (L)**	**Dry chemical powder (kg)**	**Discharge rate (kg/sec)**
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
1	230	230	160	160	45	2.25
2	670	550	460	360	90	2.25
3	1 200	900	820	630	135	2.25
4	2 400	1 800	1 700	1 100	135	2.25
5	5 400	3 000	3 900	2 200	180	2.25
6	7 900	4 000	5 800	2 900	225	2.25
7	12 100	5 300	8 800	3 800	225	2.25
8	18 200	7 200	12 800	5 100	450	4.5

9	24 300	9 000	17 100	6 300	450	4.5
10	32 300	11 200	22 800	7 900	450	4.5

GM1 ACM.OPS.LAA.C.015(b) Rescue and firefighting

FOAM HEALTH, SAFETY, AND ENVIRONMENTAL ISSUES

(a) Guidance on foam health, safety, and environmental issues is given at **GM1 ACM.OPS.CERT.E.015(b) Rescue and firefighting.**

GM2 ACM.OPS.LAA.C.015(b) Rescue and firefighting

TRANSITION FROM EXISTING FOAMS TO ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS FOR AERODROMES

(a) Guidance on transitioning from existing foams to environmental-sustainable foam is given at **GM2 ACM.OPS.CERT.E.015(b) Rescue and firefighting.**

AMC1 ACM.OPS.LAA.C.015(a) Rescue and firefighting

EXTINGUISHING AGENTS

(a) Both principal and complementary agents should be provided at the aerodrome.

(b) Principal extinguishing agent should be either a foam meeting the minimum performance level B or C.

(c) Complementary extinguishing agent should be a dry chemical powder suitable for extinguishing hydrocarbon fires.

(d) The amount of foam concentrate provided on a rescue and firefighting vehicle should be sufficient to produce at least two loads of foam solution.

(e) Supplementary water supplies should be provided for the expeditious replenishment of rescue and firefighting vehicles at the scene of an aircraft accident.

(f) The discharge rate of complementary agents should be no less than the values shown in Table 48.

(g) Dry chemical powders should only be substituted with an agent that has equivalent or better firefighting capabilities for all types of fires where complementary agent is expected to be used.

(h) Reserve supplies of principal and complementary agent, equivalent to 200 per cent of the quantities identified in Table 48, should be maintained on the aerodrome for vehicle replenishment purposes.

(i) Sufficient propellant gas should be included to utilize this reserve complementary agent.

(j) RFF categories 1 and 2 aerodromes that have replaced up to 100 per cent of the water with complementary agent should hold a reserve supply of complementary agent of 200 per cent.

(k) Where there a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply should be increased as determined by a risk assessment.

AMC2 ACM.OPS.LAA.C.015(a) Rescue and firefighting

EXTINGUISHING AGENTS

(a) When selecting dry chemical powders for use with foam, care should be exercised to ensure compatibility.

(b) Alternate complementary agents having equivalent firefighting capability may be utilized provided practical testing and assessment are conducted.

(c) The amounts of water specified for foam production should be predicated on an application rate of 8.2 L/min/m2 for a foam meeting performance level A, 5.5 L/min/m2 for a foam meeting performance level B and 3.75 L/min/m2 for a foam meeting performance level C.

(d) When any other complementary agent is used, the substitution ratios should be checked and recalculated.

GM1 AMC1 ACM.OPS.LAA.C.015(a) Rescue and firefighting

PROPERTIES OF EXTINGUISHING AGENTS

(a) Guidance on properties of extinguishing agent can refer to **GM1 AMC1 ACM.OPS.CERT.E.015 Rescue and firefighting.**

GM2 AMC1 ACM.OPS.LAA.C.015(a) Rescue and firefighting

DETERMINING QUANTITIES OF EXTINGUISHING AGENTS

(a) Guidance on the conduct of a risk analysis to determine the quantities of reserve extinguishing agents can refer to ICAO Airport Services Manual (Doc 9137), Part 1.

ACM.OPS.LAA.C.020(a) Rescue and firefighting

RESPONSE OBJECTIVES

(a) An aerodrome operator shall ensure the rescue and firefighting service achieve the operational response time objective to any point of each operational runway and movement areas, in optimum visibility and surface conditions

AMC1 ACM.OPS.LAA.C.020(a) Rescue and firefighting

RESPONSE TIME

(a) For land aerodromes:

(1) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding three minutes to any point of each operational runway, in optimum visibility and surface conditions;

(2) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding four minutes to any other part of the movement area, in optimum visibility and surface conditions; and

(3) ensure any vehicles, other than the first responding vehicles(s), required to deliver the amounts of extinguishing agents specified in Table 48 should ensure continuous agent application and arrive no more than four minutes from the initial call.

(b) For water aerodromes:

(1) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding four minutes to any point of each operational runway, in optimum visibility and surface conditions;

(2) the operational objective of the rescue and firefighting service should be to achieve a response time not exceeding five minutes to any other part of the movement area, in optimum visibility and surface conditions; and

(3) ensure any vessels, other than the first responding vessel(s), required to deliver the amounts of extinguishing agents specified in Table 48 should ensure continuous agent application and arrive no more than five minutes from the initial call.

(c) To meet the operational objective as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations, suitable guidance, equipment and/or procedures for rescue and firefighting services should be provided.

(d) A system of preventive maintenance of rescue and firefighting vehicles/vessels should be established and implemented to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle.

GM1 AMC1 ACM.OPS.LAA.C.020(a) Rescue and firefighting

RESPONSE TIME

(a) Response time is considered to be the time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 48.

(b) Optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response route free of surface contamination, e.g. water or sand.

(c) Guidance on conducting response time verification can refer to **GM2 AMC1 ACM.OPS.CERT.E.020 Rescue and firefighting.**

GM2 AMC1 ACM.OPS.LAA.C.020(a) Rescue and firefighting

PREVENTIVE MAINTENANCE

Guidance on preventive maintenance of rescue and firefighting vehicles can refer to **GM1 AMC10 ACM.OPS.CERT.E.020 Rescue and firefighting.**

AMC2 ACM.OPS.LAA.C.020(a) Rescue and firefighting

EMERGENCY ACCESS ROADS AND GATES

(a) Emergency access roads should be provided at the aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times.

(b) Particular attention should be given to the provision of ready access to approach areas up to 1,000 m from the threshold, or at least within the aerodrome boundary.

(c) Where the airport is fenced, access to outside areas should be facilitated by the provision of emergency gates or frangible barriers.

(d) Emergency access roads should be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions.

(e) Roads within 90 m of a runway should be surfaced to prevent surface erosion and the transfer of debris to the runway.

(f) Sufficient vertical clearance should be provided from overhead obstructions for the largest rescue and firefighting vehicles.

(g) When the surface of the road is indistinguishable from the surrounding area, or in areas where sand or scrubs may obscure the location of the roads, edge markers should be placed at intervals of about 10 m.

GM AMC2 ACM.OPS.LAA.C.020(a) Rescue and firefighting

EMERGENCY ACCESS ROADS AND GATES

(a) Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

(b) Guidance on provision of emergency access roads and gates can refer to **GM AMC3 ACM.OPS.CERT.E.020(a) Rescue and firefighting.**

AMC3 ACM.OPS.LAA.C.020(a) Rescue and firefighting

FIRE STATIONS

(a) A fire station should be provided to accommodate rescue and firefighting personnel, vehicles and equipment at the aerodrome.

(b) Satellite fire station should be provided, whenever the response time cannot be achieved from a single fire station.

(c) The fire station should be strategically located so that the access for rescue and firefighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

(d) A watchroom, should be provided at the fire station, where necessary.

GM AMC3 ACM.OPS.LAA.C.020(a) Rescue and firefighting

FIRE STATIONS

(a) Where a purpose-built fire station is not available, a suitable facility to accommodate rescue and firefighting vehicles, personnel and equipment may be provided at the aerodrome.

(b) Guidance on fire station/s and facilities can refer to **GM AMC6 ACM.OPS.CERT.E.020 Rescue and firefighting.**

AMC4 ACM.OPS.LAA.C.020(a) Rescue and firefighting

COMMUNICATION AND ALERTING SYSTEMS

(a) A discrete communication system should be provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and firefighting vehicles.

(b) An alerting system for rescue and firefighting personnel, capable of being operated from that station, at a fire station, any other fire station on the aerodrome and the aerodrome control tower, should be provided.

GM AMC4 ACM.OPS.LAA.C.020(a) Rescue and firefighting

COMMUNICATION AND ALERTING SYSTEMS

Guidance on communication and alerting systems can refer to **GM AMC7 ACM.OPS.CERT.E.020(a) Rescue and firefighting.**

AMC5 ACM.OPS.LAA.C.020(a) Rescue and firefighting

NUMBER OF RESCUE AND FIREFIGHTING VEHICLES OR VESSELS

(a) The minimum number of rescue and firefighting vehicles or vessels should be provided at the aerodrome, in accordance with Table 49.

(b) Rescue and firefighting personnel should hold the appropriate licenses to drive or operate rescue and firefighting vehicles or vessels as required by local road or marine authority.

Table 49: Minimum number of RFF vehicles or vessels for LAA aerodromes

Aerodrome category	Minimum number of rescue and firefighting vehicles	Minimum number of rescue and firefighting vessels
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	2	2
7	2	2
8	3	3
9	3	3
10	3	3

GM AMC5 ACM.OPS.LAA.C.020(a) Rescue and firefighting

NUMBER OF RESCUE AND FIREFIGHTING VEHICLES

Guidance on minimum characteristics of rescue and firefighting vehicles can refer to **GM AMC8 ACM.OPS.CERT.E.020 Rescue and firefighting.**

ACM.OPS.LAA.C.025 Rescue and firefighting

RESCUE AND FIREFIGHTING PERSONNEL

(a) An aerodrome operator shall:

(1) ensure all rescue and firefighting personnel are properly trained to perform their duties in an efficient manner and participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fuel fires;

(2) ensure the rescue and firefighting personnel training programme includes training in human performance, including team coordination; and

(3) provide all responding rescue and firefighting personnel with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

GM ACM.OPS.LAA.C.025(a) Rescue and firefighting

TRAINING AND PROFICIENCY CHECKS REQUIREMENTS

(a) Training and proficiency checks requirements for rescue and firefighting personnel are specified in **CAR AGA PART TRAINING**.

(b) Fires associated with fuel discharged under very high pressure from a ruptured fuel tank are known as “pressure-fed fuel fires”.

(c) Guidance material to design training programmes on human performance and team coordination can be found in the ICAO Doc 9683 Human Factors Training Manual.

AMC1 ACM.OPS.LAA.C.025(a) Rescue and firefighting

RESCUE AND FIREFIGHTING PERSONNEL

(a) Sufficient trained and competent personnel including supervisors and/or managers, should be readily available to ride the rescue and firefighting vehicles and to operate the equipment at maximum capacity.

(b) These personnel should be deployed in a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained.

(c) Consideration should be given for personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and firefighting operations.

(d) The minimum number of rescue and firefighting personnel including supervisors and/or managers, should be determined and documented in the Aerodrome Manual.

(e) Where the GCAA determines that the staffing level is insufficient to meet the promulgated level of protection, the aerodrome operator should review the current staffing arrangements and implement the required number of personnel including supervisors and/or managers.

GM AMC1 ACM.OPS.LAA.C.025(a) Rescue and firefighting

ESTABLISHING MINIMUM STAFFING LEVEL

(a) At aerodrome holding a landing area acceptance, it is possible that personnel performing full-time facilities management, aircraft maintenance, etc, may be assigned to perform additional rescue and firefighting duties in the event of an aircraft accident. However, this arrangement must not compromise the capability of these personnel to respond to an aircraft accident at an aerodrome safely and efficiently.

(b) Aerodrome operator may refer to Table 50 for guidance on minimum staffing levels. Further guidance on establishing the minimum level of rescue and firefighting personnel for different aerodrome categories can refer to **GM2 AMC1 ACM.OPS.CERT.E.005(a) Rescue and firefighting**.

Table 50: Minimum staffing levels for LAA Aerodromes

Rank	LAA Aerodrome RFF Category									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Chief Fire Officer							1	1	1	1
Dy Chief Fire Officer									1	1
Unit Commander						1		1		1/duty
Station Commander				1	1	1	1	1/duty	1/duty	1/duty
Watch Commander					1/duty	1/duty	1/duty	1/duty	1/duty	1/duty
Crew Commander	1/duty	1/duty	1/duty	1/duty	1/duty	2/duty	2/duty	1/duty	2/duty	2/duty
Senior Firefighter			1/duty	1/duty	2/duty	2/duty	2/duty	3/duty	3/duty	4/duty
Firefighter	1/duty	1/duty	1/duty	2/duty	2/duty	4/duty	6/duty	6/duty	6/duty	7/duty
Total	2/duty	2/duty	3/duty	4/duty	6/duty	9/duty	11/duty	12/duty	13/duty	16/duty

AMC2 ACM.OPS.LAA.C.025(a) Rescue and firefighting

TRAINING AND PROFICIENCY CHECK PROGRAMME

(a) The aerodrome operator should ensure training and proficiency checks programme are established and implemented for rescue and firefighting personnel.

GM AMC2 ACM.OPS.LAA.C.025(a) Rescue and firefighting

TRAINING AND PROFICIENCY CHECK PROGRAMME

(a) Refer to **CAR AGA PART TRAINING** for the detailed requirements on training and proficiency check programme.

AMC3 ACM.OPS.LAA.C.025(a) Rescue and firefighting

FITNESS

(a) The aerodrome operator should ensure personnel assigned for rescue and firefighting duties are fit to perform their tasks in a safe and effective manner.

GM AMC3 ACM.OPS.LAA.C.025(a) Rescue and firefighting

FITNESS

(a) The aerodrome operator should establish and implement fitness assessment policies and procedures or engage a qualified occupational medical person or organisation to establish fitness assessment programmes for their rescue and firefighting personnel.

(b) Guidance on establishing fitness programmes can refer to **GM1 AMC4 ACM.OPS.CERT.E.025(a) Rescue and firefighting**, and **GM2 AMC4 ACM.OPS.CERT.E.025(a) Rescue and firefighting**.

AMC4 ACM.OPS.LAA.C.025(a) Rescue and firefighting

PROTECTIVE CLOTHING AND RESPIRATORY EQUIPMENT

(a) The aerodrome operator should ensure:

(1) rescue and firefighting personnel are provided with fit for purpose protective clothing and respiratory equipment to enable them to perform the assigned operational duties safely and effectively;

(2) rescue and firefighting personnel are trained and competent in the use and operations of these equipment;

(3) safety procedures are established and implemented in the use of these equipment at operational incidents and training activities; and

(4) facilities for the storage, maintenance and cleaning of these equipment are provided at the aerodrome.

GM AMC4 ACM.OPS.LAA.C.025(a) Rescue and firefighting

PROTECTIVE CLOTHING AND RESPIRATORY EQUIPMENT

(a) Guidance on protective clothing and respiratory equipment can refer to **GM1 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting**, and **GM2 AMC5 ACM.OPS.CERT.E.025(a) Rescue and firefighting**.

SECTION D – FIRE PREVENTION

ACM.OPS.LAA.D.005 Fire prevention

AERODROME FIRE PREVENTION

(a) An aerodrome operator shall establish and implement a fire prevention programme at airside including:

(1) appropriate fire prevention measures are taken during aircraft fuelling operations;

(2) prohibition of smoking within the movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material is stored;

(3) prohibition of display of an open flame or undertaking of an activity that would create a fire hazard within:

(i) areas of the aerodrome where fuel operation takes place or other flammable material is stored; and

(ii) the movement area or other operational areas of the aerodrome, unless authorised by the aerodrome holder;

(4) ensure sufficient fire extinguishing equipment suitable for an initial intervention in the event of fuel fire including personnel trained in its use, are readily available during the ground servicing of an aircraft; and

(5) a means of quickly summoning the rescue and firefighting service in the event of a fire or fuel spillage is provided on the apron areas.

(b) An aerodrome operator shall establish, implement and maintain a fire prevention programme at landside including new builds at an aerodrome.

AMC1 ACM.OPS.LAA.D.005(a) Fire prevention

AIRSIDE FIRE PREVENTION

(a) Policies and procedures including provide sufficient personnel, resources and equipment, for the control of smoking or activities that may cause fire hazards at airside should be established and implemented at the aerodrome.

(b) Policies and procedures should address the adoption and use of mitigating measures, when necessary, activities (e.g. maintenance, etc.) which might involve fire hazard need to be authorised.

(c) Authorised activities should not include smoking within the movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material are stored;

(d) Precautionary measures should be taken during fuelling operations and when passengers remain on board or embark/disembark during refuelling operations.

(e) Sufficient portable fire extinguishing equipment suitable for at least initial intervention in the event of fire or major fuel spill at airside including trained personnel should be readily available.

(f) A means of quickly summoning the rescue and firefighting service in the event of a fire at airside should be provided.

GM AMC1 ACM.OPS.LAA.D.005(a) Fire prevention

AIRSIDE FIRE PREVENTION

Guidance on airside fire prevention can refer to **GM AMC2 ACM.OPS.CERT.F.005(b) Fire prevention.**

AMC1 ACM.OPS.LAA.D.005(b) Fire prevention

LANDSIDE FIRE PREVENTION

(a) A fire prevention programme for all buildings and facilities, commensurate with the level of fire risks and hazards at an aerodrome should be established and implemented.

(b) A competent person with the authority and responsibility to oversee and manage the programme should be nominated.

(c) The programme should comply with the applicable requirements of the UAE fire code regulations.

GM AMC1 ACM.OPS.LAA.D.005(b) Fire prevention

LANDSIDE FIRE PREVENTION

(a) Where such fire prevention programme comes under the direct oversight of the local fire authority, the requirements specified in **AMC2 ACM.OPS.LAA.D.005(c) Fire prevention** can be disregard.

(b) Guidance on landside fire prevention can refer to **GM1 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention**, and **GM2 AMC1 ACM.OPS.CERT.F.005(c) Fire prevention.**

SECTION E – AERODROME WORKS SAFETY

ACM.OPS.LAA.E.005 Aerodrome works safety

AERODROME WORKS SAFETY

(a) In accordance with **CAR AGA PART ADR ADR.OPS.B.070**, an aerodrome operator shall establish and implement procedures to ensure that:

(1) aircraft safety is not affected by aerodrome works;

(2) aerodrome works safety is not affected by aerodrome operational activities;

(3) airfield work permit system is established and implemented involving all relevant stake holders.

AMC1 ACM.OPS.LAA.E.005(a) Aerodrome works safety

GENERAL REQUIREMENTS

(a) General requirements on aerodrome works safety is specified in **AMC1 ACM.OPS.CERT.G.005(a) Aerodrome works safety.**

AMC2 ACM.OPS.LAA.E.005(a) Aerodrome works safety

RFFS RESPONSE CAPABILITY ASSESSMENT

(a) The extent to which aerodrome works is likely to affect the response capability or operational performance of the rescue and firefighting service and other emergency services in the event of emergencies at an aerodrome or work site should be assessed.

(b) Suitable control measures should be developed if the aerodrome works may impact the response capability of the rescue and firefighting service and other emergency services.

GM AMC2 ACM.OPS.LAA.E.005(a) Aerodrome works safety

RFFS RESPONSE CAPABILITY ASSESSMENT

(a) Guidance on ARFFS response capability assessment can refer to **GM AMC2 ACM.OPS.CERT.G.005(a) Aerodrome works safety.**

AMC3 ACM.OPS.LAA.E.005(a) Aerodrome works safety

SUPPLEMENTARY WATER SUPPLY ASSESSMENT

(a) The aerodrome operator should ensure:

(1) impact to supplementary water supply arising from the aerodrome works is assessed; and

(2) suitable control measures are developed to mitigate the impact to supplementary water supply.

GM AMC3 ACM.OPS.LAA.E.005(a) Aerodrome works safety

SUPPLEMENTARY WATER SUPPLY ASSESSMENT

(a) Supplementary water supply requirements are determined to ensure continuous supply in the event of aircraft emergencies at an aerodrome only. Additional quantities need to be calculated to support the aerodrome works.

(b) Guidance on supplementary water supply assessment can refer to **GM AMC3 ACM.OPS.CERT.G.005(a) Aerodrome works safety.**

AMC4 ACM.OPS.LAA.E.005(a) Aerodrome works safety

FIRE RISK ASSESSMENT

(a) The aerodrome operator should ensure:

(1) assessment of the fire hazards and risks relating to the aerodrome works is conducted; and

(2) suitable control measures are developed to prohibit smoking, managing hot works, use of flammable/combustible materials, fuelling, emergency response and evacuation.

GM AMC4 ACM.OPS.LAA.E.005(a) Aerodrome works safety

FIRE RISK ASSESSMENT

(a) Guidance on conducting fire risk assessment can refer to **GM AMC4 ACM.OPS.CERT.G.005(a) Aerodrome works safety.**