



NAMIBIA CIVIL AVIATION AUTHORITY

Advisory Pamphlet (AP)

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TASK RESOURCES ANALYSIS

Explanation of Advisory Pamphlets (AP) system.

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1. INTRODUCTION

1.1. Introduction and Background

NAMCARs, Part 139 requires an applicant for an aerodrome certificate/ licence to ensure that the aerodrome is provided with rescue and firefighting services, capable to provide the required level of protection.

This Advisory Pamphlet (AP) provides guidance to Aerodrome Operators on the conduct of task resources analysis to meet the requirements for aerodrome rescue and firefighting services in NAMCARs, Part 139, and the associated technical standards.

This guidance describes the stages that should be considered in carrying out a Task and Resource Analysis (TRA) to establish justification, as applicable, to the minimum number of qualified/competent personnel, applicable personnel training requirements, emergency communication systems, rescue equipment, minimum disabled aircraft recovery equipment, fire fighting vehicles, fire fighting vehicle water refilling systems, complementary agents including required reserves, emergency excess roads or outside support agency required to deliver an effective Aerodrome Rescue and Firefighting Service (ARFFS).

1.2. Purpose

By using a qualitative risk-based approach, which focuses upon probable and credible worst-case scenarios, a task and resource analysis seek to identify, as applicable, the minimum number of qualified/competent personnel, applicable personnel training requirements, emergency communication systems, rescue equipment, minimum disabled aircraft recovery equipment, fire fighting vehicles, fire fighting vehicle water refilling systems, complementary agents including required reserves, or emergency excess roads required to undertake identified tasks in real-time before supporting external services are able to effectively assist ARFFS. Consideration should also be given to the types of aircraft using the aerodrome, vehicle(s), and the need for personnel to use self-contained breathing apparatus, hand lines, ladders and other rescue and firefighting equipment provided at the aerodrome associated with aircraft rescue and firefighting operations. The importance of an agreed framework for incident command and human factor principles should form a primary part of the considerations.

1.3. Applicability

NAMCARs, Part 139, 16.3 aerodrome rescue and firefighting services, NAMCARs 139.08.3 personnel requirements and NAMCARs 139.16.4 disabled aircraft removal.

1.4. Description of Amendments

There are no amendments.

2. REQUIREMENTS AND REFERENCES

2.1. Regulatory reference

- NAMCARs 139.08.3, NAMCARs, PART 139.16.3 and NAMCARs, PART 139.16.4

2.2. Reference documents

- Namibia Civil Aviation Regulations (NAMCARs) 2018

3. GENERAL INFORMATION

The minimum requirements should be established including the minimum number of qualified/competent personnel, applicable personnel training requirements, emergency communication systems, rescue equipment, disabled minimum aircraft recovery equipment, firefighting vehicles, firefighting vehicle water refilling systems, complementary agents including required reserves, emergency excess roads for the delivery of the extinguishing agents at the required discharge rate for the specified ARFFS category of the Aerodrome and outside support agencies, as may be required.

4. HUMAN FACTORS

The Task Analysis should observe human factor principles to obtain an optimum response by all existing agencies participating in emergency operations. The principles should include the effects of human performance for example workload, capabilities, functions, decision aids, environmental constraints, and team versus individual performance and training effectiveness. Knowledge, experience, staffing including numbers, skill levels and organizational structure, safety, and health aspects, safety systems and protective equipment, not forgetting fatigue and the need for adequate relief should also be considered.

Note: The examples given are not exhaustive.

5. TASK ANALYSIS/RISK ASSESSMENT

A Task Analysis should primarily consist of a qualitative analysis of the ARFFS response to a realistic, worst case, aircraft accident scenario. The purpose should be to review, as applicable, the current and future staffing levels, training requirements, emergency communication system, rescue equipment, fire fighting vehicles, fire fighting vehicle water refilling systems, complementary agents including required reserves, emergency excess roads of the ARFFS or outside support agencies deployed at the aerodrome. The qualitative analysis could be supported by a quantitative risk assessment to estimate the reduction in risk. This risk assessment could be related to the reduction in risk to passengers and aircrew from deploying additional personnel, improving training requirements, improving emergency communication system, providing additional rescue equipment, fire fighting vehicles, improving fire fighting vehicle water refilling systems, providing additional complementary agents including required reserves, upgrading

emergency excess roads of the ARFFS or identifying additional outside support agencies as may be needed.

6. QUALITATIVE APPROACH

The Task Analysis including a Workload Assessment aims to identify the effectiveness of the current staffing level, training, emergency communication system, rescue equipment, fire fighting vehicles, fire fighting vehicle water refilling systems, complementary agents including required reserves, emergency excess roads of the ARFFS, or outside support agencies and to identify the level of improvement resulting from additional resources. A credible worst-case accident scenario should be analysed to assess the relative effectiveness of ARFFS as a unit.

7. QUANTITATIVE RISK ASSESSMENT

This will generally be used to support the conclusions of the qualitative analysis by examining the risks to passengers and aircrew from aircraft accidents at the Aerodrome. This comparison of the risk allows the benefit of employing additional ARFFS staff, improving training requirements, improving emergency communication system, providing additional rescue equipment, fire fighting vehicles, improving fire fighting vehicle water refilling systems, providing additional complementary agents including required reserves, upgrading emergency excess roads of the ARFFS and identifying additional outside support agencies as may be needed to be evaluated in terms of the risk reduction in passengers and aircrew lives saved.

8. TASK ANALYSIS

The following items will assist in determining the basic contents of an analysis:

- Description of the aerodrome(s) including the number of runways.
- Promulgated ARFFS Categories.
- Response Time Criteria (Area, times and number of Fire Stations).
- Current and future types of aircraft movements.
- Aerodrome Operational Hours.
- Current ARFFS Structure and Establishment.
- Current Level of operational crews.
- Level of Supervision for each operational crew.
- ARFFS Qualifications/Competence (Training Programme and Facilities).
- Extraneous Duties (To include First Aid Response or other specific duties assigned to ARFFS personnel).
- Communications and ARFFS Alerting system including Extraneous Duties.
- Appliances and Extinguishing Agents available.
- Specialist Equipment.
- First Aid- Role Responsibility.
- Medical Facilities- Role Responsibility.
- Pre-Determined Attendance: Local Authority Services- Police, Fire and Ambulance etc.

Incident Task Analysis. (Feasible Worst-case Scenarios) (Workload Assessment) (Human Performance/Factors). To include: Mobilisation, Deployment to Scene, Scene Management, Fire Fighting, Suppression and Extinguishment, Application of Complementary Agent(s), Post Fire Security/Control, Personnel Protective Equipment, Rescue Team(s), Aircraft Evacuation and Extinguishing Agent Replenishment.

- Appraisal of existing ARFFS provision.
- Future requirements. (Aerodrome development and expansion).
- Enclosures could include: Aerodrome Maps, Event Trees to explain tasks and functions conducted by the ARFFS etc.).
- Aerodrome Emergency Plan and Procedures.

Note: The above list is not exhaustive and should only act as a guide.

9. CONTACT OFFICE

Namibia Civil Aviation Authority (NCAA) Head office

2nd Floor, West Wing

Aerodrome and Ground Aid (AGA) Offices

12 Rudolf Hertzog Street

Windhoek, Namibia

10. APPENDIX

No information

11. ATTACHMENTS

EXAMPLE

PHASE 1

The aims and objectives of the RFF services must be clear as to the required tasks that personnel is expected to carry out.

Aim

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.

Principal Objective of the Rescue and Fire Fighting Service

The principle objective of the rescue and firefighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and firefighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The rescue may require the use of equipment and personnel other than those assessed primarily for rescue and firefighting purposes.

The most important factors bearing on rescue in a survivable aircraft accident are: the training received, the effectiveness of the equipment, emergency access roads, the speed with which personnel designated for rescue and firefighting purposes can be put into use.

Tasks:

- Meet the required response time.
- Extinguish an external fire.
- Protect escape slides and exit routes.
- Assist in the self-evacuation of the aircraft.
- Create a survivable situation.
- Rescue trapped personnel.
- Maintain post-fire security/control.
- Preserve evidence.

Note: The above list is not exhaustive, and all relevant tasks must be identified before moving to Phase 2.

Each task/mission may include numerous functional activities/actions.

PHASE 2

Identify a selection of representative realistic, feasible accidents that may occur at the Aerodrome, this can be achieved by a statistical analysis of previous accidents on Aerodromes and by analysing data from both International National and Local sources.

Note - All incidents should involve fire to represent a feasible worst-case scenario that would require an ARFFS response.

Typical incidents:

- Aircraft engine failure on take-off with a fire (aborted takeoff).
- Aircraft aborts and overruns into the Runway End Safety Area (RESA) with fire on takeoff.
- Aircraft into aircraft with fire (collision).
- Aircraft into structure- terminal building(s) with a fire.
- Aircraft leaves the runway on landing into the runway strip (full emergency evacuation).
- Internal aircraft fire (Cabin fire, baggage hold, cargo hold, avionics bay(s)).

PHASE 3

Identify the types of aircraft commonly in use at the Aerodrome; this is important as the type of aircraft and its configuration has a direct bearing on the resources required in meeting Phase 1 above, 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. Typical scenarios:

- a) Long wide-bodied aircraft with multiple passenger decks and multiple aisles.
- b) Long narrow-bodied aircraft with single aisle, high passenger density.
- c) Short narrow-bodied aircraft with single aisle, high passenger density.

A representative aircraft type can then be chosen: Airbus A330, B747-400, Airbus A319, and Boeing 737.

PHASE 4

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.

In order that the feasible accident scenario can be simulated, a major factor is to consider the probable location for the most realistic accident type that may occur.

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.

The role of the facilitator is to seek agreement in identifying the credible worst-case locations and by using a scoring system to place these locations in order of relevance and priority. The team must 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, the total numbers can then be added up in relation to each identified location.

Typical areas to be considered

The team may have identified that the following contributed to a worst-case location:

- Response Time.
- Route to the accident site (on or off paved surfaces).
- Terrain.
- Crossing procedures for active runway(s).
- Aircraft congestion on route (taxiways).
- Surface conditions.
- Communications.
- Supplementary water supplies.
- Adverse weather conditions Low Visibility Procedures.
- Daylight or darkness.

An additional time delay for any of the factors listed above should be estimated and recorded and the location with the highest additional response time could be identified with the worst-case location.

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 ARFF personnel.

From the above analysis a location or several locations could be identified, in agreement with the Aerodrome operator, and the TRA facilitator.

PHASE 5

This Phase 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.

The above information is to be built into a complete accident scenario that can be analyzed by experienced supervisors and firefighters for the task and resource analysis in Phase 6.

Example of Scenario

Accident Type: Aircraft Overrun into Runway 06 - Runway End Safety Area (RESA).

Aircraft Identified: B747-400- Phase 3.

Accident Location: Runway 06 RESA- Phase 4.

The Boeing 747 400 is a wide-bodied multi-deck aircraft, its typical seating configuration can be 340 Economy, 23 Business, and 18 First Class passengers on the lower deck. On the upper deck, provision is made for a further 32 Business Class passengers, giving an estimated aircraft seating capacity of 413 excluding the crew. The aircraft typically has 4 exits on both sides of the lower deck and one on each side of the upper deck.

During the take-off phase, the aircraft suffers a fire in the number 3 engine and the pilot decides to abort the take-off. During this phase, the fire develops rapidly and impinges on the fuselage. The aircraft overruns the runway and comes to rest in the RESA. Flight Deck Crew orders an evacuation. The RFF services are informed by ATC and respond accordingly, and the aerodrome emergency procedures are activated.

PHASE 6

By using a TRA facilitator with teams of experienced Aerodrome supervisors and firefighters the accident scenario(s) developed in Phase 5 are subject to a task and resource analysis carried out in a series of tabletop exercises/simulations.

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 the 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.
- Need to replenish foam supplies.

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.

In order to start a task and resource analysis, the required category of the Aerodrome must be identified as required by the NAMCARs 139, 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.

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 the call and the timeline continues until additional external resources arrive or the facilitator decides an end time.
- List of assessed tasks functions and priorities are achieved.
- The resources (personnel, vehicles and equipment) required for each task is defined.
- Comments to enable team members to record their findings.
- Identified Pinch points.