Advisory Circular

NCAA-AC-ARD007

NIGERIAN CIVIL AVIATION AUTHORITY (NCAA)
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RESCUE AND FIRE FIGHTING SERVICE

1.0 GENERAL

Nigerian Civil Aviation Authority Advisory Circulars from Aerodrome Standards Department contain information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated Regulations.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Authority.

2.0 PURPOSE

This Advisory Circular provides methods, acceptable to the Authority, for showing compliance with the Rescue and Fire Fighting Services requirements of Part 12 of Nig. CARs as well as explanatory and interpretative material to assist in showing compliance.

3.0 APPLICATION

The material contained in this Advisory Circular applies to the operation of all aerodromes.

4.0 REFERENCE

The Advisory Circular relates specifically to Nig. CARs Part 12.6.16 and ASM 13.2.2

5.0 STATUS OF THIS AC

This is the second issue and first amendment of the AC and it supersedes the previous edition on this subject.

APPROVAL PAGE

RESCUE AND FIRE FIGHTING SERVICES

ADVISORY CIRCULAR-NCAA-AC-ARD007

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Date 19/02/19

AMENDMENT PROCEDURES

The Director, Aerodrome and Airspace Standards is responsible for the development, issuance and control of amendments to this document. The Document Controller is responsible for distribution of amended copies of the AC to Departmental staff and technical library and in making it available on NCAA website: ncaa.gov.ng for public use.

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RECORD OF AMENDMENTS

Issue No/Amendment No	Page(s) Affected	Date Entered	Entered By	Signature
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CHAPTER 1:

OBJECTIVE OF RESCUE AND FIRE FIGHTING

1.1 Principal Objective of the Aerodrome Rescue and Fire Fighting Service

The principal objective of an aerodrome RFFS is to save lives in the event of an aircraft accident or incident. For this reason, the provision of means of dealing with an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome assumes primary importance because it is within this area that there are the greatest opportunities of saving lives. This must assume at all times the possibility of, and need for, extinguishing a fire that may occur either immediately following an aircraft accident or incident, or at any time during rescue operations.

The most important factors bearing on effective rescue in a survivable aircraft accident are: the training received the effectiveness of the equipment, and the speed with which competent personnel and equipment designated for rescue and firefighting purposes can be put to use. Requirements to deal with building fires and fires involving fuel installations, or recommendations for the foaming of runways are not taken into account, they are dealt with under aerodrome emergency plan. The quantities of extinguishing agents and numbers of personnel required for certification of the aerodrome are not designed to deal with such eventualities. However, where an aerodrome operator may choose to deploy RFFS resources to any such incidents, but this shall not prejudice the response objective and minimum discharge rates specified in this document.

The RFFS shall be established at a level commensurate with the size of aircraft using the aerodrome and organised, equipped, staffed and trained to ensure rapid and effective deployment in the event of an accident. Policies and procedures relating to the provision and management of the RFFS shall be described in, or referenced to, the Aerodrome Manual.

1.2 Minimum Scale of Services to be provided

The level of protection provided by an aerodrome shall be described in terms of the aerodrome RFF category determined by the means identified below. In relation to fixed wing aircraft, the term 'RFF Category' is supplemented with a number between one and ten, Category Ten being the highest. The Aerodrome RFF Category is determined by the size of aircraft operating at the aerodrome. The facilities required by aerodromes accepting large public transport aircraft may be greater and more complex in organisation than those at aerodromes where only flying instruction is carried out or where only small public transport aircraft operate. To simplify the identification of applicable requirements, those relevant only

to the lower category aerodromes (Rescue and Firefighting Category One and Two) have been separated from the main body of this document and are included at Appendix IX. However, the certification requirements set out below apply to all aerodromes irrespective of size.

The RFF Category provided and promulgated by an aerodrome shall be determined in a consistent manner with reference to Table 1.1 and shall be based on the largest aircraft expected to use the aerodrome over a given 12 month period. When past traffic levels are unavailable, the level of RFFS shall be assessed from the best available information. The basis for this assessment shall be recorded.

When using Table 1.1it is essential to consider both the aircraft length and the maximum fuselage width. If after selecting the category appropriate to the largest aircraft's overall length, that aircraft's fuselage width is greater than the maximum fuselage width in Table 1.1, then the requirement will be to apply the next highest category, as appropriate.

Table 1.1	**Category for Rescue and Fire Fighting**	
Aerodrome Category (RFF)	**Aircraft Overall Length**	**Maximum Fuselage Width**
1	up to but not including 9m	2m
2	9m up to but not including 12m	2m
3	12m up to but not including 18m	3m
4	18m up to but not including 24m	4m
5	24m up to but not including 28m	4m
6	28m up to but not including 39m	5m
7	39m up to but not including 49m	5m
8	49m up to but not including 61m	7m
9	61m up to but not including 76m	7m
10	76m up to but not including 90m	8m

1.2.1 Airports should be categorized for RFF purposes by counting the aeroplane movements in the busiest consecutive three months of the year as follows:

a) when the number of movements of the aeroplanes in the highest category normally using the airport is 700 or greater in the busiest consecutive three months, then that category should be the airport category and

b) when the number of movements of the aeroplanes in the highest category normally using the airport is less than 700 in the busiest consecutive three months, then the airport category may be one less than the highest aeroplane category even when there is a wide

range of difference between the dimensions of the aeroplanes which are included in reaching 700 movements)

1.2.2 It should be noted that the level of protection provided based on frequency of operations in 2.1.3 b) shall not be less than one category below the determined category.

1.2.3 Either take-off or landing constitutes a movement. Movements of scheduled, non-scheduled and general aviation operations should be counted in determining the airport category.

1.3 Temporary Depletion of RFFS

1. Provision of RFFS to the Category set out in section 3.4 is a mandatory requirement. However, there may be circumstances when a part of the facility is temporarily unavailable due to unforeseen circumstances e.g. an in-service mechanical failure of a vehicle or piece of equipment or sudden illness of a member of staff. Immediate action shall be taken to reinstate facilities whilst considering whether landings and take-offs by aircraft required to use a certified aerodrome shall be restricted.

2. At aerodromes of RFFS Category 1 fixed wing aircraft, temporary depletion shall not be permitted.

3. At aerodromes of RFFS Category 2 and 3 fixed wing aircraft, the minimum Category of RFFS required during temporary depletion shall not be less than RFF Category 1.

4. At aerodromes of other categories (RFFS) during temporary depletion, the Category of RFFS shall not be less than the equivalent of two Categories below that of the RFF category according to the size of aircraft expecting to use the aerodrome.

5. If any depletion is significant enough to warrant a restriction of aircraft movements then the temporary level of RFFS stated in terms of specific RFF Category, shall be immediately promulgated by NOTAM and radio. The policy regarding the maximum duration of temporary depletion shall be considered in advance by each aerodrome operator and be published in the aerodrome Manual. Generally, temporary depletion shall not last more than twelve hours overnight at an aerodrome when few movements are expected or two hours at any aerodrome during peak traffic periods. NCAA must appropriately be informed of all actions taken.

6. Exceptions to the above shall be made for emergency landings, and for occasions when, in the pilot's opinion, a diversion or hold may introduce a more significant hazard.

7. Aerodrome operators shall consider developing contingency plans to limit the need for temporary depletion of the promulgated level of services. This may involve, for example, a preventative maintenance plan to ensure the mechanical efficiency of equipment and vehicles, arrangements to cover unplanned leave and absence of its minimum level

of RFF personnel, etc. Aerodrome operators shall consider the provision of reserve facilities to limit the need for temporary depletion.

CHAPTER 2:

EXTINGUISHING AGENTS

2.0 Extinguishing Agents

Successful extinguishment of fires involving aircraft requires the provision and correct application of sufficient quantities and types of extinguishing agents.

2.1 Principal Extinguishing Agents

2.2 Amounts of Extinguishing Agents

2.2.1 The amounts of water for foam production and the complementary agents to be provided on the RFF vehicles should be in accordance with the airport category determined under Table 1.1 and Table 2-3, except that for airport categories 1 and 2, up to 100 per cent of the water may be substituted with a complementary agent.

2.2.2 The amounts in Table 2-3 are the minimum amounts of extinguishing agents to be provided are based on the average overall length of aeroplanes in a given category. If the aeroplane operating at an airport is larger than the median aeroplane, the amounts should be recalculated in accordance with 2.2.7.

2.2.3 The amounts in Table 2-3 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 2.4.

2.2.4 The quantity of foam concentrate 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.

2.2.5 The amounts of water specified for foam production are predicated on an application rate of 8.2 L/min/m^2 for a foam meeting performance level A, 5.5 L/min/m^2 for a foam meeting performance level B and 3.75L/min/m^2 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.

2.2.6 The amounts of foams given in Table 2-3 have been determined on the assumption that the foams meet minimum specifications approved by the State. Guidance on basic characteristics of foams is contained in Chapter 8.

2.2.7 From 1 January 2015, at aerodromes where operations by aeroplanes 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.

2.2.8 Table 2-4 provides guidance on the calculation of the quantities of water and discharge rates based on the largest overall length of aeroplane in a given category. The table is based on the use of performance level A foam with an application rate of 8.2 L/min/m^2. Where performance level B or C foam is used, similar calculations should be made using the appropriate application rates. The formulae indicated in Table 2-4 are used only for the recalculation of quantities in accordance with 2.3.7.

Table 2-3. Minimum useable amounts of extinguishing agents

Aerodrome Category	***Water (L)***	***Discharge rate foam solution/minute (L)***	***Water (L)***	***Discharge rate foam solution/minute (L)***	***Water (L)***	***Discharge rate foam solution/minute (L)***	***Dry chemical powders (kg)***	***Discharge rate (kg/second)***
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	350	350	230	230	160	160	45	2.25
2	1 000	800	670	550	460	360	90	2.25
3	1 800	1 300	1 200	900	820	630	135	2.25
4	3 600	2 600	2 400	1 800	1 700	1 100	135	2.25
5	8 100	4 500	5 400	3 000	3 900	2 200	180	2.25
6	11 800	6 000	7 900	4 000	5 800	2 900	225	2.25
7	18 200	7 900	12 100	5 300	8 800	3 800	225	2.25
8	27 300	10 800	18 200	7 200	12 800	5 100	450	4.5

9	36 400	13 500	24 300	9 000	17 100	6 300	450	4.5
10	48 200	16 600	32 300	11 200	22 800	7 900	450	4.5

Note. — The quantities of water shown in columns 2, 4, and 6 are based on the average overall length of aeroplanes in a given category.

2.2.9 As of 1 January 2015, at aerodromes where the level of protection is reduced in accordance with the remission factor allowed in 1.2.1 b) and where operations by aeroplanes larger than the average size in a given category are planned, the recalculation of quantities of extinguishing agents required in 2.2.7 would need to be computed based on the largest aeroplane in the reduced category. As an example, an Airbus A380 (category 10) is operating infrequently into a B747 aerodrome (category 9). If the number of movements of the A380 is less than 700 movements in the busiest consecutive three months, the aerodrome is allowed to provide a category 9 level of protection, as permitted in 1.2.1 b). However, as of 1 January 2015, the quantities of an agent are to be recalculated for aerodromes where operations by aeroplanes larger than the average size in a given category are planned (see 2.3.7). As the A380 is larger than the average aeroplane used for calculation of quantities of extinguishing agents for category 9 in Table 2-3, the actual quantities to be provided need to be recalculated. Since 2.1.3 b) permits a remission factor of one, the largest quantity for category 9, i.e. 41 483 L (for performance level A foam) should be provided. As a comparison, this quantity is more than the median quantity of 36 400 L for category 9 in Table 2-3 but less than the maximum quantity of 54 242 L for category 10 in Table 2-4.

Table 2-4. Maximum quantities of extinguishing agents based on the largest dimension of an aeroplane (performance level A foam, application rate 8.2 L/min/m^2)

RFF category	*Largest theoretical length of aeroplane, L (m)*	*Fuselage width, W (m)*	*Total width of protection area (k_1 + W) (m)*	*Theoretical critical area, A_T = L x (k_1+W)*	*Practical critical area, A_P = ⅔ A_T*	*Q_1 = 8.2 x 1 x A_P*	*Q_2 = k_2 x Q_1 (see 2.4.10 for values of k_2)*	*∑Q = Q_1+Q_2 (litres)*	*Discharge rate (L/min) = A_P x (applica- tion rate of 8.2 L/min/m^2)*
1	9	2	12+2 = 14	126	84	689	0, 0	689	689
2	12	2	12+2 = 14	168	112	918	0.27 x 918=248	1 166	918

3	18	3	14+3 = 17	306	204	1 673	0.30 x 1 673=502	2 175	1 673
4	24	4	17+4 = 21	504	336	2 755	0.58 x 2 755=1 598	4 353	2 755
5	28	4	30+4 = 34	952	635	5 207	0.75 x 5 207=3 905	9 112	5 207
6	39	5	30+5 = 35	1 365	910	7 462	1.0 x 7 462=7 462	14 924	7 462
7	49	5	30+5 = 35	1 715	1 144	9 381	1.29 x 9 381=12 101	21 482	9 381
8	61	7	30+7 = 37	2 257	1 505	12 341	1.52 x 12 341=18 758	31 099	12 341
9	76	7	30+7 = 37	2 812	1 876	15 383	1.70 x 15 383=26 100	41 483	15 383
10	90	8	30+8 = 38	3 420	2 281	18 704	1.9 x 18 704=35 538	54 242	18 704

2.2.10 There may be aerodromes that use more than one type of performance level foams, such as a combination of level A and B foams, which could lead to error in quantity calculation or replenishment. The use of a combination of different performance level foams at an aerodrome is therefore not encouraged.

For the purpose of replacing water for foam production by complementary agents, 1 kg of a complementary agent shall be taken as equivalent to 1.0 L of water for production of a foam meeting performance level A. Higher equivalencies for complementary agents may be used if results of tests conducted on the complementary agents used by the State have indicated higher efficiencies than those recommended above. When any other complementary agent is used, the substitution ratios need to be checked.

2.4 Critical Area For Calculating Quantities Of Water

2.4.1 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.

2.4.2 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.

2.4.3 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 adequate. 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.

2.4.4 The overall length of the aircraft is considered appropriate for the theoretical critical area as the entire length of aircraft must 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.

The formula for the theoretical critical area A_T thus becomes:

Overall length	*Theoretical critical area A_T*
$L < 12$ m	$L \times (12 \text{ m} + W)$
$12 \text{ m} \le L < 18$ m	$L \times (14 \text{ m} + W)$
$18 \text{ m} \le L < 24$ m	$L \times (17 \text{ m} + W)$
$L \ge 24$ m	$L \times (30 \text{ m} + W)$

Where L = the overall length of the aircraft, and

W = the maximum width of the aircraft fuselage.

2.4.5 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 *Ap* has been found to be approximately two-thirds of the theoretical critical area, or

$$A_p = 0.667\ A_T$$

2.4.6 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.

2.4.7 The water required for control in the practical critical area (Q_1), may be expressed by the following formula: $Q_1 = A \times R \times T$

where	A	=	the practical critical area
	R	=	the rate of application, and
	T		time of application.

2.4.8 The amount of water required for Q_2 cannot be calculated exactly as it depends on a number of variables. The factors considered of primary importance are:

a) maximum gross mass of the aircraft;

b) maximum passenger capacity of the aircraft;

c) maximum fuel load of the aircraft; and

d) previous experience (analysis of aircraft RFF operations).

These factors, when plotted on a graph, are used to calculate the total amount of water required for each airport category. The volume of water for Q_2, as a percentage of Q_1,

varies from about 0 per cent for category 1 airports to about 190 per cent for an airport category 10.

2.4.9 The graph mentioned in the preceding paragraph gives the following approximate values for aeroplanes representative of each airport category:

Airport category	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	

2.5 Discharge Rates

2.5.1 The discharge rates of the foam solution should not be less than the rates shown in Table 2-3. 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 Q_1 in a control time of one minute.

2.5.2 The discharge rates of complementary agents should be no less than the rates shown in Table 2-3.

CHAPTER 3:

RESPONSE OBJECTIVE

3.1 The operational objective of the RFFS is to respond as quickly as possible to aircraft accidents and/or incidents in order to create maximum opportunity for saving lives.

Response times are dependent on the size of aerodrome, location of fire station(s) and disposition of vehicles and personnel at any given time. The primary objective of those involved with the provision of the RFFS shall be to achieve an expeditious response time commensurate with the operational objective defined at section 3.3.

3.2 The response area is considered to be the area including any point of each operational runway and all other areas of the aerodrome where aircraft park or taxi immediately prior to, or following any flight which is required to use a certified aerodrome.

3.3 The operational objective of the RFFS shall be to achieve a response time of two minutes, and not exceeding three minutes, to the response area in all circumstances of optimum visibility and surface conditions.

3.4 Response time is considered to be the time between the initial call to the Rescue and Fire Fighting Service and the time when the first responding vehicle(s) is (are) in position and producing foam at a minimum of 50% of the discharge rate specified in Table 2.1. The response time shall be assessed with reference to the whole of the response area.

3.5 To meet the operational objective as nearly as possible in conditions of less than optimum visibility, specific training, procedures and/or equipment shall be provided. See Appendix II.

3.6 Maximum effectiveness may only be achieved if the continued application of primary and/or complementary extinguishing agents is maintained. It is essential that personnel and vehicles are deployed at the scene of an accident with all vehicles and personnel arriving in sufficient time to ensure that the efforts of the first responding vehicle(s) are maximised. Therefore, any other vehicles required to deliver the amounts of extinguishing agents specified in Table 2.1 shall arrive not later than one minute after the first responding vehicle(s).

3.7 When RFFS personnel designated as part of the minimum riding strength are engaged on extraneous duties they shall be capable of meeting response times whilst carrying out those duties. No extraneous duty shall create conditions likely to affect individual or crew

performance or introduce additional hazards.

3.8 At aerodromes where the RFF Category is 3 and above, it is not considered reasonable to require personnel designated as part of the minimum riding strength to be engaged on extraneous duties involving the handling of fuel.

3.9 Aerodrome operators shall ensure that any changes to their stated RFFS policies and procedures are properly assessed with regard to their impact upon safety prior to implementation and notified to the NCAA at the earliest opportunity by amendment of the Aerodrome Manual.

3.10 A system of preventative maintenance of RFF vehicles shall be employed to ensure effectiveness of the equipment and compliance with the specified response times throughout the life of the vehicle.

3.11 Response in Difficult Environments. Where a significant portion of approach or departure operations take place over water, swampy areas or other difficult environments, consideration shall be given to the provision of special procedures or equipment when it has been deemed that conventional fire service vehicles may not be capable of an effective response. Special firefighting equipment need not be provided for water areas. However this does not prevent its provision where aerodrome operators have assessed the practical advantages of such equipment to deal with the likelihood of aircraft fire(s) or the ignition of fuel spilled onto water.

3.12 The objective of water rescue equipment is to maintain the survivability of passengers. Appropriate life-saving flotation equipment shall be provided, sufficient in number(s) commensurate with the typical anticipated passenger capacity of the largest aircraft using the aerodrome. This equipment shall be deployed as soon as practicable after notification of an aircraft accident in the water, taking into account the prevailing weather conditions.

3.13 On-aerodrome facilities shall be required to cover difficult environments within a distance of 1000 m from the threshold or at least within the aerodrome boundary.

3.14 These facilities need not be located on or provided by the airport if they are readily available from off aerodrome agencies and procedures have been documented ensuring effectiveness and accessibility as part of the aerodrome emergency plan.

3.15 In all cases, the area within which an RFFS response will be made and the equipment to be provided shall be determined and specified in advance and recorded in the Aerodrome Manual. Guidance materials to assist aerodrome operator in developing operational procedures which will maintain acceptable response times in all normal conditions are provided at the end of this document in Appendix II

CHAPTER 4:

APPLIANCES/VEHICLES

4.0 When selecting or designing RFF vehicles, consideration shall be given to many factors: the amounts and types of extinguishing agents, equipment and personnel to be carried, the response time objectives to be met, the local weather and terrain conditions likely to be encountered, the types of aircraft using the aerodrome and the tactics necessary to deal with the hazards arising from aircraft operations. The principal requirements relevant to vehicle design are set out in Appendix II.

4.1 The extinguishing agents and rescue equipment shall be carried on self-propelled vehicles which have maximum mobility in all weather conditions on and off paved surfaces.

4.2 The minimum number of foam producing vehicles shall not be less than that set out in Table 4.1

Table 4.1 Minimum number of RFF Vehicles

	RFF 3	RRF 4	RF F 5		RFF 6	RFF 7	RFF 8	RFF 9	RFF 10
Minimum	1	1	2		2	2	3	3	3
number of									
Foam									
producing									
Vehicles									

4.3 Aerodrome authorities shall consider the provision of reserve vehicles to maintain the appropriate level of services when any of the regular vehicles are temporarily unavailable due to maintenance requirements or becoming unserviceable. These vehicles shall comply with the requirements of this section and Appendix XII.

CHAPTER 5:

CRITERIA FOR SELECTION OF PERSONNEL

5.0 Medical requirement

5.1 In the initial selection of personnel, regard shall be given to: practical and technical aptitude, the relatively arduous nature of rescue and firefighting duties, and the personal qualities required including resolve, and the ability to work as part of a team.

5.2 Personnel selected for operational rescue and firefighting duties shall be assessed as medically fit and capable of their duties by a qualified practitioner appointed by the aerodrome operator. They shall be assessed prior to employment and undergo further examinations at five-yearly intervals up to the age of 40, then at two-yearly intervals up to the age of 50 and annually thereafter.

5.3 Notwithstanding the above, an assessment conducted before reaching the age of forty will not be valid after the person's forty-second birthday. Similarly, an assessment conducted before reaching the age of fifty will not be valid after the person's fifty-first birthday.

5.4 Taking into account the demands of the role, persons over the age of sixty shall not be acceptable as personnel designated to be part of the operational RFFS at aerodromes where the RFF category is 3 and above.

5.5 Technical Training/Qualifications

The aerodrome operator is responsible for the initial selection and continuous assessment of the competence of personnel engaged in operational RFFS duties.

CHAPTER 6:

MINIMUM NUMBER OF RFF PERSONNEL AND STAFFING OF APPLIANCES

6.0 During the promulgated hours of operation and while any other movements of aircrafts that require to use a certified aerodrome are taking place, the service provider shall ensure that a minimum of 4 crew members are provided to man each of the major foam tender in all airport category and sufficient, competent personnel are designated to be readily available to respond and operate other RFF equipment. These personnel shall be deployed in a way that ensures that response objectives shall be achieved and that continuous agent application at the appropriate rate(s) shall be fully maintained.

6.1 Minimum staffing levels for all RFF Categories operated by an aerodrome shall be agreed with the NCAA and promulgated in, or referenced to, the Aerodrome Manual.

6.2 On a vehicle which is capable of producing foam or other extinguishing agents through a monitor, the role of monitor operator must not be performed by the driver of that vehicle, other than when sidelines from that vehicle are in use.

6.3 In assessing the acceptability of the minimum staffing levels proposed by the aerodrome operator the NCAA will only take account of its safety regulatory requirements published in this Chapter.

6.4 An agreed minimum staffing level shall not be reduced without an assessment being conducted and forwarded, in writing, to the NCAA for acceptance.

6.5 There are three primary generic roles, which are attributable to personnel engaged in RFFS duties: Fire-fighter, Supervisor and Manager. The role of supervisor may differ considerably from one aerodrome to another. Therefore the function may be conveniently subdivided into two levels, 'Watch Commander' and 'Crew Commander'. Progression from Supervisor to Manager involves making a transition from (e.g.) Watch Commander to Station Commander introducing a higher management role. This significant change emphasizes the difference between an operational role involving the direct supervision of a watch, to one of managing the overall activities and performance of the RFFS.

6.6 The minimum level of staffing the aerodrome RFFS shall include an adequate number of competent managers and supervisors, according to the RFF Category of the aerodrome. In assessing the level of personnel proposed, the aerodrome operator shall take account of the managers' and supervisors' competence in the role(s) and tasks applicable to their position. As a minimum, the NCAA would expect that each aerodrome RFFS has a Station

Commander (Senior Airport Fire Officer) who would be responsible for the overall management of the RFFS. The Station Commander can also carry out the role of the Watch Commander provided he/she maintains the appropriate competence in role and task. However, the NCAA would not expect the roles defined above to be combined at categories 5 to 10. At these levels the NCAA would expect to see a dedicated Station Commander (SAFO) at least. A guide on the minimum staffing level is presented below.

Table 6.1 Minimum Level of Staffing the Aerodrome RFFS

Aerodrome Category	Staff Strength
	NCAA Requirement
1	5
2	10
3	20
4	40
5	60
6	80
7	100
8	120
9	120
10	120

The above is for 3 shift system of 8 hours each. In each shift there should be competent Fire officers and supervisors.

6.7 The two functional operational roles, which are significant and attributable to the direct management of the RFFS, are Watch Commander and Crew Commander. As a minimum the NCAA would expect each operational watch to have sufficient dedicated supervisors. The number of supervisors will be applicable to the size of each operational watch, and shall be determined by a task analysis appropriate to each individual aerodrome. At categories 5 to 10 the NCAA would expect a minimum of one dedicated watch Commander and sufficient dedicated Crew Commanders to support the command system. At category 4 and below the role of Watch Commander and Crew Commander may be combined. However, this will be dependent on the role and task associated with managing the overall operational activities.

6.8 The RFFS Supervisors at an aircraft accident shall wear a distinctive high-visibility tunic/waistcoat/suit coat/tabard and appropriate markings, which can be easily distinguished by attending external emergency services personnel.

6.9 If the NCAA considers that minimum staffing levels provided are inappropriate for the level of aircraft operation or where an aerodrome operator's assessment is unacceptable to the NCAA, it will assess and set the minimum staffing level based on the criteria set out above. This would include the supervisory grades.

CHAPTER 7:

TRAINING REQUIREMENTS

7.0 PERSONNEL TRAINING

"All RFF personnel shall be properly trained to perform their duties in an effective and efficient manner and shall participate in live fire drills commensurate with the types of aircraft and types of RFF equipment in use at the aerodrome, including pressure fed fuel fires''. Training facilities shall be commensurate with the type and size of aircraft in use at the aerodrome.

1. Due to the very nature of the work expected from rescue and firefighting personnel, some means of risk assessment shall be conducted for the processes generally involved and associated training. It is essential that all personnel involved in rescue and firefighting duties receive appropriate initial and recurrent comprehensive training to maintain skills and provide additional competence in any techniques and procedures which did not form part of their competence training. The overall aim is to ensure that they have sufficient knowledge, experience and techniques to carry out their RFF functions safely and effectively. In such a complex and potentially dangerous occupation, the provision of adequate training is critical to the overall success of the RFFS.

2. The control of any training regime may be complex and wide-ranging and will depend on local conditions, equipment, roles, ability and experience of participating individuals. Time shall be allocated specifically for training and regular assessment of skills shall be conducted.

3. Training programmes shall take account of human factors performance including team co-ordination. Opportunities to function both as an individual and as part of a team shall be provided. Practical facilities suitable for maintaining ongoing competence shall be available on the aerodrome or sourced and accessed externally. Opportunities shall be provided for co-ordination and inter-operability training where more than one vehicle is to be utilised as part of an accident response. Practical training shall create or simulate the conditions and situations likely to be experienced.

4. In addition to initial and recurrent training undertaken at establishment(s) approved by the NCAA, the aerodrome operator shall designate a competent person with responsibility to oversee the conduct of local training and ensure adequate coverage and application. Assessment of the competency of the appointed person shall be the responsibility of the aerodrome operator. The NCAA may ask for details of that assessment.

5. Health and safety risks arising from training shall be assessed and addressed by a competent person(s).

6. Risk assessment will enable the RFFS provider to judge whether the training contemplated is the safest way to deliver the training objectives or whether other equally effective alternatives shall be devised.

7. The core components of the local training system shall be identified by the competent person. Each member of the RFFS shall receive specific training in each core component at planned intervals.

8. A programme for the training of all non-core components shall be established. Periodically, it will vary according to training needs but shall be consistently applied. The criteria used to determine such a training programme shall be clearly identified and recorded.

9. All personnel shall be trained and competent in First Aid.

10. All drivers shall be competent in driving techniques appropriate to emergency response and all-terrain environments. All vehicle drivers shall be in possession of a relevant driving permit.

11. Personnel shall be given regular and comprehensive training in any specialised equipment carried. Particular attention is to be given to operation of marine rescue equipment, vehicles with aerial capability and equipment provided for dealing with hazardous materials including radioactive substances where appropriate.

12. Personal training records for all employees shall be retained by the aerodrome operator for the duration of that person's employment and for a period of five years after cessation of employment. Records shall contain sufficient information to enable judgement of any individual's training achievements to be made. These may be retained electronically provided they are available to the NCAA Inspectors for examination.

13. These figures in Table 7.1a below are based on the assumption that the maximum number of surviving casualties at an aircraft accident occurring on or in the vicinity of an airport is estimated to be about 75% of the aircraft occupants.

14. Resuscitators and infusion equipment shall only be operated by persons specifically trained and competent in their use.

Table 7.1a Maximum Number of surviving casualties at an aircraft incident

Aircraft occupants	Number of casualties	20 percent casualties immediate care priority I	30 percent casualties delayed care priority II	50 percent casualties minor care priority III
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

15. The provision of portable casualty shelters and blankets for use during inclement weather conditions shall be considered taking into account the numbers of casualties that could reasonably be expected.

16. Where the normal journey time for the first Local Authority ambulance exceeds 15 minutes the provision of an on-site ambulance shall be considered. Alternative arrangements may include the provision of external assistance such as search and rescue helicopters, private ambulances, military facilities, etc.

17. Where the normal journey time for the first Local Authority ambulance exceeds 15 minutes the provision of an on-site ambulance shall be considered. Alternative arrangements may include the provision of external assistance such as search and rescue helicopters, private ambulances, military facilities, etc.

7.1 Personal Protective Equipment

1. The NCAA requires that there shall be adequate provision of Personal Protective Equipment (PPE) for all RFF employees. The term PPE includes personal protective clothing (PPC) and respiratory protective equipment (RPE). Employers are also required to provide adequate training and facilities for the use and maintenance of appropriate PPE according to the Nig. CARs Part 12.6.16.

2. All personnel shall be provided with PPC and RPE appropriate to the hazard and risk and be given adequate training in its use, care and maintenance.

CHAPTER 8:

RESCUE, MEDICAL AND PERSONAL PROTECTIVE EQUIPMENT

8.0 Rescue, Medical and Personal Protective Equipment.

1. An aircraft accident will result in a need for rescue and medical equipment at some stage. Most aerodromes will request external emergency services assistance and supplementary equipment at a relatively early stage. However, aerodrome operators shall consider the provision of specific resources and rescue equipment commensurate with the level of aircraft operations at the aerodrome. This equipment (where provided) shall be carried on the responding rescue and fire fighting vehicles(s).

2. Guidance on the nature of rescue equipment and quantities to be provided at aerodromes in RFFS categories 3 to 9 is indicated in the ICAO Airport Services Manual, Part 1 (Document 9137-AN/898; Part 1).

3. Hand lamps and appropriate portable lighting equipment shall be provided at aerodromes which are licensed for use during the hours of darkness.

   Where these are to be used in an explosive or flammable atmosphere, the equipment shall be selected according to its fitness.

8.2 Medical Equipment

1. The airport authority shall arrange to have sufficient medical supplies, available on or in the vicinity of the airport, to treat the passenger and crew capacity of the largest aircraft normally using the aerodrome. Experience has shown, however, that more than one aircraft may be involved in an aircraft accident. Consequently, medical supplies to handle this possibility shall be determined accordingly.

2. The estimated maximum number of casualties at an aircraft accident at an airport may be anticipated by reference to the following statistical information published by ICAO:

Table 8.1a maximum number of casualties at aircraft accident

Aircraft Occupants	Number of Casualties	20 percent casualties immediate care priority I	30 percent casualties delayed care priority II	50 percent casualties minor care priority III
500	375	75	113	187
450	338	68	101	169

CHAPTER 9:

RADIO COMMUNICATIONS

9.0 Radio Communications

The provision of effective communications is a key consideration when preparing to deal with an aircraft incident. Effective communications cannot be achieved without considerable pre-planning, provision of suitable equipment, specific training and frequent testing and re-assessment. The objective shall be to provide communications equipment in all areas where discernible benefits can be achieved.

1. All fire and rescue vehicles shall be provided with adequate communications equipment.

2. Where more than one aerodrome fire vehicle has radio equipment, there shall be a facility for two-way communication between vehicles.

3. The equipment provided on fire vehicles may be in fixed or portable form and shall have an effective range which will ensure reception within all areas that the fire service may be required to operate.

4. Radio facilities to enable the Airport Fire Service to communicate with responding Local Authority Fire Services shall be provided.

5. Equipment to provide effective communication between vehicle drivers and foam monitor operators shall be provided.

6. Radio equipment to enable Fire Officers to maintain communications when not in their vehicles shall be provided.

7. Where the deployment of personnel and vehicles for non-fire service duties includes entry to buildings, aircraft or aerodrome installations, portable communications equipment shall be provided to ensure that ARFFP response to aircraft incidents capability is maintained.

8. Communication systems for use by the RFFS during an emergency shall be operated on licensed radio frequencies assigned specifically for that use.

9. At aerodromes where the RFF Category is 3 and above, RT Communications equipment shall be provided to enable the airport fire officer(s) to communicate with the aircraft flight deck. An aeronautical radio frequency, 121.7 MHz, is to be used for this purpose and equipment shall be assessed to ensure that it will not interfere with any other frequency in use at the aerodrome and its proximity. It is recommended that a recording facility for this specific frequency be provided.

10. To use 121.7 MHz, the RFFS must obtain prior approval to install and operate radio equipment from the relevant licensing authority. The use of 121.6 MHz is limited to direct communications between the fire officer and pilot when the aircraft is on the ground and only within the period of a declared emergency.

CHAPTER 10:

INSPECTION AND TESTING OF EQUIPMENT AND APPLIANCES

1. All equipment and vehicles require regular and structured maintenance if reliability is to be assured. Guidance regarding the periodicity and methods of testing is available from manufacturers.

2. All vehicles equipped with foam-making equipment shall be formally tested at least once per year to ensure that the quality of foam production is maintained.

3. These tests shall include, for vehicles when equipped with foam monitors intending to produce foam whilst on the move, an assessment of the ability to meet this intention. Where both a high and low discharge capability has been provided on larger monitors, this provision shall be considered in the annual test.

4. Foam generating systems shall be regularly checked for induction accuracy.

5. For systems designed to induce at 6%, induction shall be in the range of 5% to 7% at the optimum working conditions. For systems designed to induce at 3%, the range is 3% to 4% and for 1% systems, the range is 1% to 1.1%. Pre-mixed foam systems shall have foam concentrate introduced to within a tolerance of 0.9 to 1.1 times the manufacturer's desired induction rate. Care shall be taken in the use of freeze point depressants where premixed foam systems are exposed to inclement temperatures since excessive amounts of additives may have adverse effects on fire extinguishing performance.

6. Pre-mixed foam units shall be hydraulically pressure-tested in accordance with the intervals set by its manufacturer (usually 5 years). Only foam concentrates suitable for use in pre-mixed form shall be used in these kinds of pressure vessels.

7. Records of all tests and inspections shall be retained by the aerodrome operator for a period of five years. The records shall include details of consequential action where an inspection has revealed a defect or deficiency.

APPENDIX I:

Inspections of the RFFS by Inspectors of the NCAA Aerodrome Standards Department

1. The NCAA Inspectors will require to be satisfied that the RFFS is capable of operating as an effective unit and will require to see evidence that the aerodrome operator has made a full assessment of the operational requirements, and that the necessary procedures and practices are in place for an effective response to aircraft accidents or incidents. Inspections will be carried out at regular pre-determined intervals or without prior warning. The aerodrome operator may be required to provide a full-scale demonstration of the RFFS to demonstrate the effectiveness of any element of the emergency arrangements. When this is called for, prevailing operational conditions will be taken into account.

2. The NCAA Inspectors will also require to see documentary evidence relating to the qualifications of personnel employed in the RFFS including Certificates of Competence and medical certification. Inspectors will also wish to examine records of training received and assessments made including those for training exercises conducted with other emergency services.

3. Records of inspections, test and maintenance of all vehicles and equipment used by the RFFS shall be available for examination.

APPENDIX II:

Specifications for Rescue and Fire Fighting Vehicles.

1.0 Introduction

1. Vehicles shall be capable of carrying their full load with maximum traction and mobility on and off paved surfaces in optimum weather conditions. They shall be able to operate over all types of terrain on or around the aerodrome, at a speed commensurate with safety.

2. The following information is provided so that RFFS vehicles may be specified with characteristics that support the objective of conveying and delivering at least the minimum quantities of extinguishing agents provided at the aerodrome, according to the aerodrome RFFS category. RFFS vehicles shall be specified so that the response objective is met in all circumstances of optimum visibility and surface conditions.

3. RFFS vehicles may also be designed to carry all or part of the rescue equipment provided at the aerodrome. Rescue equipment may be carried on one vehicle or distributed over a number of vehicles provided that the response objective is met.

4. Where personnel forming part of the minimum number of staff designated to be readily available to respond and operate the RFFS equipment are intended to be carried in a vehicle, the vehicle shall be capable of being deployed in a way that ensures that response objectives are achieved and that continuous agent application at the appropriate rate(s) may be fully maintained.

5. On a vehicle which is capable of producing foam or other extinguishing agents through a monitor, the role of monitor shall not be performed by the driver of that vehicle, other than when sidelines from that vehicle are used.

6. Additional guidance and a detailed outline of the acceptable factors in the Specification Process of RFFS vehicles may be found in ICAO Doc 9137-AN/898 – Airport Services Manual, Part One, Rescue and Fire Fighting.

2.0 RFF Vehicles with Extinguishing Agent Capacity Less than 4500 Litres (Rapid Intervention Vehicles – RIV)

1. The main functions of an RIV are to reach accident sites quickly, carrying the Officer in- Charge (OIC) and/or personnel to initiate rescue action and/or provide an effective means of fire suppression pending the arrival of the major foam tenders. The RIV shall be capable of crossing adverse terrain particularly where access for the major foam tenders may be slow or difficult.

2. The design shall combine speed, acceleration, flotation, traction and manoeuvrability as far as possible, bearing in mind these characteristics are not necessarily compatible. Speed and acceleration are considered to have preference at most aerodromes.

3. The vehicle shall carry an effective quantity of primary/complementary extinguishing agents appropriate to the aerodrome category.

4. The vehicle may also carry the rescue, lighting and miscellaneous equipment but due regard must be paid to the weight and performance characteristics of the chosen chassis.

3.0 Minimum Characteristics

At the full operational weight on a dry level paved surface, the RIV shall have the following minimum characteristics:

Acceleration: 0 to 80 km/h (50 mph) within 25 seconds from rest at normal engine and transmission operating temperatures.

Top speed: Minimum 105 km/h (65 mph); All-wheel drive capability.

4.0 Foam-making Equipment

1. Foam monitors shall be capable of producing foam in a jet or dispersed pattern with fully variable selections throughout the range.

2. All vehicles fitted with monitors are required to produce foam on the move at slow speed not exceeding 10km/hour at optimum monitor operating pressure.

3. When selecting monitor discharge rates, consideration shall be given to the minimum discharge rates set out in Chapter 1 Table 1.1 and the need to ensure continuous application as set out within the ICAO critical area concept.

4. At aerodromes where the RFFS category is 1, 2 or 3, portable foam-making equipment used with vehicle side lines shall be capable of producing finished foam at a flow rate commensurate with the objective of achieving the discharge rates of foam solution specified in Table 1.1 of chapter 1 at normal operating pressures.

5. At aerodromes where the RFFS category is 4 and above, portable foam-making equipment used with vehicle side lines is considered as supplementary equipment for the purposes of calculating water and foam concentrate tank capacities.

5.0 RFFS Vehicles with Extinguishing Agent Capacity Over 4500 Litres (Major Foam Tenders)

At their full operational weight on a dry level paved surface, major foam tenders shall have the following characteristics and performance:

I. Acceleration: Minimum 0-80 km/hour within 40 seconds from rest (with engine and transmission at normal operating temperatures).

II. Top speed: Minimum 100 km/hour (on a dry and paved surface).

III. Automatic or semi-automatic transmission.

IV. All-Wheel Drive (Twin-wheel configuration is not acceptable).

V. Differential and cross axle locks shall be fitted.

VI. Some transmission trains may require a high/low range 'Drop' box.

VII. Power dividers, separate pump engines or power take-offs are acceptable.

VIII. Ability to produce a minimum foam jet throw distance of 62m under normal wind speed(less than 8km/h) and turret angle of approximately 300 to the horizontal.

NOTE: Any system chosen shall be engineered so as to be fit for the specific purpose designated.

6.0 Clearances

1. The ground clearance shall be sufficient to permit full mobility during 'off-pavement' conditions.

2. The minimum acceptable ground clearances and angles shall be – (fully laden): Additional information is provided by Figure 8A.1.

3. Vehicle Tilt Angle, Left and Right hand sides:

The centre of gravity of the vehicle shall be kept as low as possible and At its full operational weight with tyres inflated to normal working pressures, the vehicle shall pass a static tilt test of not less than 28 degrees platform tilt, right and left, with not more than 33 degrees chassis tilt.

7.0 Weight

1. The gross weight of the vehicle shall be distributed as equally as practicable over all

the axles and tyres.

2. The difference in weight between tyres on any axle shall not exceed 5% of the average tyre weight for the axle. The difference in weight between any two axles shall not exceed 10% of the weight of the heaviest axle if the heavy axle is a rear axle. If the heavy axle is a front axle, the weight difference between that axle and any other shall not exceed 5% of the heavy axle weight. Under no circumstances shall the axle and tyre Manufacturers' ratings be exceeded.

   Approach Angle 30°

   Departure Angle 30°

   Inter Axle Clearance 12°

   Under Chassis Clearance 356 mm (14 inches)

   Additional information is provided in the figure below.

   Vehicle Tilt Angle, Left and Right hand sides

   The centre of gravity shall be kept as low as possible and at its full operational weight with tyres inflated to normal working pressures, the vehicle shall pass a static tilt test of not less than 28 degrees platform tilt, right and left, with not more than 33 degrees chassis tilt.

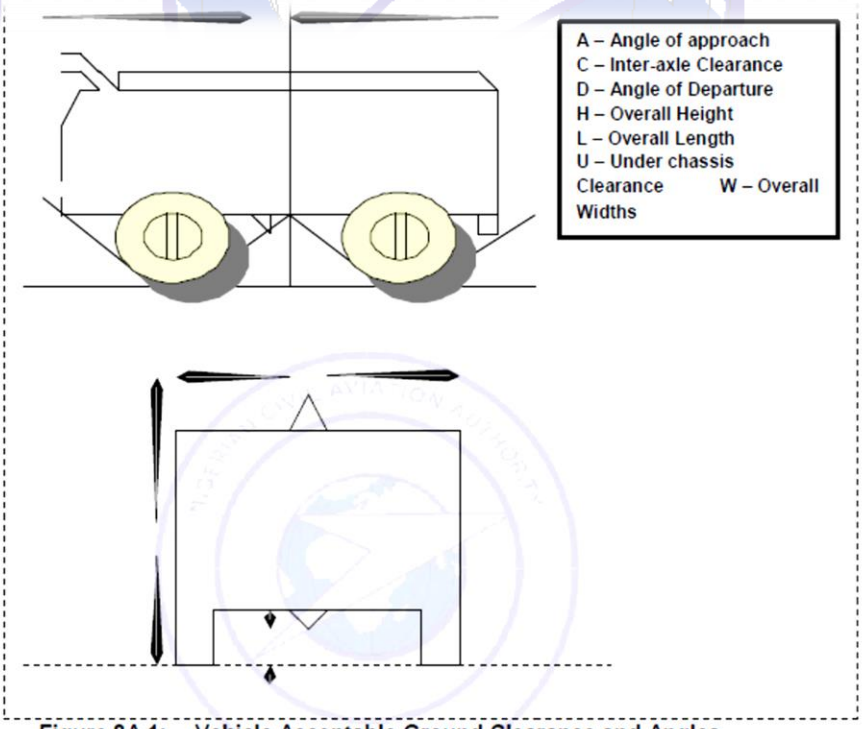

Figure 8A.1: Vehicle Acceptable Ground Clearance and Angles

8.0 Foam-making Equipment

1. Foam tenders equipped with foam monitors shall be able to produce foam whilst on the move at slow speeds (8-10 km/hr). These monitors must be capable of producing finished foam with the properties identified in Appendix VI. Attention is drawn to the advisability of having both a high and low discharge capability on the larger monitors. Vehicles shall be fitted with a monitor capable of a range appropriate to the longest aircraft operating at the aerodrome, measured using aspirated foam.

2. Monitors shall have the capability to deliver foam in a dispersed pattern for blanketing purposes.

3. Monitors are to be capable of at least 50% of the discharge rate required for the RFF Category.

4. The option to fit a bumper monitor/turret, and under vehicle protection is permitted, however extinguishing agents used by such systems must be in addition to minimum extinguishing agents required for that aerodrome category.

5. The option of having a monitor operable by the driver and/or monitor operator exists but in considering this, due regard must be given to the level of staffing of the RFFS.

6. Ergonomic Controls – the design and layout of controls for successful operation of vital equipment shall be carefully planned for the operators.

7. Monitor Platforms shall be designed to provide a safe area for working.

8. Hand rails and safety harnesses shall be provided, particularly where access to rooftop or tank top areas is required.

9. At aerodromes where the RFFS category is 1, 2 or 3, portable foam-making equipment used with vehicle side lines shall be capable of producing finished foam at a flow rate commensurate with the objective of achieving the discharge rates of foam solution specified in Table 1.1 of this chapter at normal operating pressures.

10. At aerodromes where the RFFS category is 4 and above, portable foam-making equipment used with vehicle side lines is considered as supplementary equipment for the purposes of calculating water and foam concentrate tank capacities.

9.0 Lockers and Stowage

1. Suitable and adequate lockers and stowage facilities shall be provided to carry – Required complementary extinguishing agents and Rescue equipment.

2. All equipment shall be safely and securely stowed whilst allowing maximum accessibility.

10.0 Rims Tyres and Wheels

1. Vehicles shall be fitted with wheels, rims and tyres approved for use by manufacturers for paved and non-paved surfaces. Tyres shall be of identical size and tread design and 'ply'.

2. Tyres selected shall maximise acceleration, top speed, braking, manoeuvring control and optimise flotation.

3. The recommended tyre inflation pressures shall be marked on each wheel arch.

11.0 Factors Applicable to all RFFS Vehicles

11.1 Lighting Equipment

Where aerodromes are licensed for use during the hours of darkness, vehicles shall be fitted with portable/fixed lighting equipment sufficient to illuminate the incident/ accident site.

11.2 Radio, Fixed and Hand Portable

1. Adequate radio installations shall be provided.

2. Radio antennae fitted to the top of the vehicle shall be separated as necessary to minimise interference.

11.3 Cab/Crew Compartment

1. The crew compartment shall be capable of safely accommodating personnel and their equipment, including breathing apparatus sets and spare cylinders, if appropriate. Sufficient space shall be provided to facilitate the donning of PPE/RPE.

2. All seats shall be fitted with safety restraints to accepted road use standards.

3. All seats shall face forwards.

4. The noise level in the cab shall not exceed 85 BA at a road speed of 80 km/hour

on a hard paved level surface.

5. The cab shall provide a seated driver with good all round vision at least 5° above the horizontal plane and at least 90° each side from the straight ahead position.

6. Any equipment carried within the cab shall be securely stowed to avoid injury to crew whilst ensuring rapid deployment when required.

11.4 Other Considerations

A number of additional factors may be found of benefit to the operation of RFFS vehicles:

1. Forward and Rear facing cameras Infra-red etc., with video recording.

2. Mapping/Global Positioning System Systems.

3. Automatic Tyre Deflation/Inflation.

4. Extending working platform.

5. Extending/telescopic walkway and/or monitor.

6. Safety warning/interlocks for the safe operation of critical systems fitted to the vehicle.

7. Traction Control.

8. Anti-lock braking systems.

11.5 Where these are desired as part of the vehicle specification these must meet or exceed national statutory requirements, subject to any special dispensations as may be applicable to emergency vehicles.

APPENDIX III:

The Development of Operational Procedures to Maintain Response Capability.

1.0 General

1. The following guidance is intended to assist licensees with the development of operational procedures to maintain acceptable response times in all conditions night/ day, weather, surface and traffic state. Account shall be taken of all factors likely to interfere with the efficient functioning of the emergency services such as the effects of weather and associated surface conditions and traffic on runways, taxiways and roads which may be used or crossed by responding vehicles.

2. The aim is to achieve optimum response times during conditions likely to impede progress by determining and reviewing circumstances, identifying equipment needs and determining and practicing procedures which will maximize effectiveness whilst minimizing response times.

2.0 Preparation and Knowledge

1. A thorough knowledge of the topography of the airport and its immediate vicinity is fundamental. The use of grid maps and careful selection of routes is essential for success in meeting the response objective.

2. The existence of any areas that may from time to time become impassable because of weather or other conditions shall be known to all RFFS and associated emergency response personnel (outside agencies).

3. The location of obstacles both permanent and temporary shall be known.

4. Operational procedures shall be developed through which ATC stop or divert all aircraft and non-essential traffic that conflicts with responding RFFS vehicles. RFFS personnel shall ascertain the minimum visibility operating conditions from the local ATC provider in order to establish response capability under such conditions.

5. Licensees considering or conducting airport development shall take into account any factors which would improve/delay the response capability.

6. The load bearing characteristics of the airport soil structure under various weather conditions shall be determined and taken into account.

3.0 Work in Progress (WIP)

1. WIP is likely to affect the response capability or operational performance of the RFFS and other emergency services. Prior notification of the work intended is essential so that amendments to overcome or minimise their effects can be to the emergency services' operational procedures.

4.0 Natural Features

1. Natural features may create obstructions that would delay or preclude access by RFFS vehicles. I.e. rough terrain, soft ground, rivers etc. Consideration shall be given to the provision of specialized vehicles/equipment.

2. Any delay in response capability is critical and mutual assistance agreements with off airport agencies shall be established to provide an optimum response.

3. Where aerodromes are situated adjacent to large areas of water such as rivers or lakes, or where they are located on coastlines, special provisions shall be made to facilitate rescue.

5.0 Emergency Access/Egress Roads

1. Direct access to the operational runway(s) will assist the objective of minimizing response times.

2. Access routes to the response area shall be designated and suitable for use by RFFS vehicles. Routes shall be maintained in a condition that facilitates use.

3. Access road construction shall mitigate the possibility of one vehicle blocking ingress/egress by other emergency response vehicles. Access roads shall be designed to take account of the gross weight and maximum dimensions of the RFFS vehicle(s) expected to use them.

4. Emergency access roads shall be capable of being traversed in all weather conditions. Roads within 90 m of a runway shall be surfaced to prevent surface erosion and the transfer of debris to the movement area.

5. The total area within the runway strip shall be capable of supporting unrestricted access for emergency service vehicles.

6. The provision of exit points (gates and or frangible sections) in the security fence shall be considered. All 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.

7. Access routes to cover difficult environs within a distance of 1000m beyond the ends of each runway shall be established and shall be suitable for use by RFF vehicles.

8. Where the surface of the road(s)/route(s) is indistinguishable from the surrounding area, or in areas where these may be obscured, edge markers shall be placed at intervals of about 10 m.

6.0 Low Visibility Conditions

1. Procedures shall be developed to place the RFF personnel on stand-by alert when the aerodrome visibility has deteriorated below a predetermined level. This shall include the provision of forward stand-by positions where response times are likely to be compromised.

2. RFF personnel shall monitor applicable radio frequencies during stand-by periods.

3. ATC shall be made aware of the exact location of the RFF vehicles assigned to standby duties.

4. Infrared vision systems fitted to RFF vehicles have been shown to assist the response to and location of emergencies in low visibility conditions.

5. RFFS vehicles shall be equipped with an airfield chart clearly showing all taxiways, runways, holding points and vehicle routes marked with their appropriate designation. The chart(s) shall be accompanied by written instructions clearly detailing the action that the driver shall take in the event that the vehicle shall break down or that the driver shall become unsure of the vehicle's position on the aerodrome.

6. Positioning equipment installed on RFFS vehicles has been shown to enable the drivers to be aware of the position of the vehicle on the aerodrome at all times.

7.0 RFF Training

1. Training shall include actual RFFS vehicle operations over primary and secondary travel routes on the airport and runway overrun areas likely to be used in the event of an aircraft incident/accident. Consideration shall be given to the need for other personnel and responding agencies to be given similar training.

2. Preferred routes and standby points, especially those within the critical rescue and firefighting access area, shall be pre-selected. Training and practice response runs shall be made under ideal and where practicable, inclement weather conditions.

3. RFF vehicles shall approach any aircraft accident by the quickest route commensurate with safety. This might not necessarily be the shortest distance to the scene. Traversing through unimproved areas can take longer than travelling a greater distance on paved surfaces.

APPENDIX IV:

Development of Existing and New Aerodrome Fire Stations

1.0 Fire Station Location

1. Emergency Fire Vehicles shall have direct access to critical aircraft movement areas. The location of the airport fire station shall be based on minimising response times to areas where aircraft accidents and incidents might occur.

2. At large complex aerodromes it may be necessary to consider the provision of more than one fire station, each located strategically in relation to the runway patterns.

3. Where more than one station is provided, consideration shall be given to the number of vehicles to be located at each station in order to ensure that sufficient quantities of extinguishing agents are available to initiate fire control at an incident/accident pending the arrival of the responding units.

4. A layout plan of the aerodrome indicating the principal sites of any new fire station(s) shall be developed.

5. All areas on the aerodrome shall be evaluated when considering the fire station location.

6. Vehicle response time trials shall be conducted to determine the optimum location in relation to potential accident areas.

7. When siting a new fire station the following operational factors shall be considered:

   a. Immediate, straight, and safe access airside.
   b. Unimpeded access routes with a minimum of turns to runways, taxiways.
   c. Direct access to the terminal and apron areas minimising the need to cross active runways and taxiways and avoiding difficult terrain.
   d. Maximum opportunity for monitoring the movement area.
   e. Minimum obstructions or interference from existing facilities or uses, Such as access roads, fuelling areas, and aircraft taxing operations/parking areas.
   f. Due consideration shall be given to future development plans of the airport such as new runways, taxiways and parking areas, which may affect response distances and therefore response times.
   g. The range and extent of facilities may vary but, in general may include:
      - Adequate accommodation for the housing of vehicles and for the conduct of minor servicing or maintenance.

- Domestic and administrative facilities for personnel.
- Appropriate storage and technical support facilities.

2.0 Fire Station Apron

1. The apron design shall provide responding RFF vehicles with a straight access from the vehicle bays to the movement area without any tight curves or other obstacles.

2. A warning device shall be provided if the station has pedestrian or vehicular traffic crossing the apron/driveway. It shall be activated automatically whenever the vehicle bay doors are in use.

3. A drive-through facility is preferred as it reduces wear on vehicle tyres and transmission/steering. In the event that this is not possible, the station apron operating surface shall be large enough to allow the largest vehicle to reverse into any bay of the station.

4. The station apron shall be adequately illuminated. Lights shall be mounted so as not to adversely affect drivers' vision or airport operations.

5. Station apron areas shall be strong enough to bear the weight of fully laden vehicles and shall not be damaged when the vehicles are driven away rapidly.

6. There shall be an exterior water connection or hydrant assembly for the refilling of vehicle water tanks.

7. The provision of means to rapidly replenish foam concentrate tanks is desirable.

3.0 Vehicle Bays

1. Vehicle bays shall provide sufficient room for personnel to walk around vehicles and gain access to equipment lockers and vehicle cabs.

2. Ceilings shall be high enough to permit access to the tops of vehicles so that inspection of foam tanks etc. may be conducted.

3. Floors shall be strong enough to bear the weight of fully laden vehicles and shall not be damaged when the vehicles are driven away rapidly.

4. Doorways shall be wide enough to enable a quick and safe exit by vehicles giving adequate clearance to ladders, obstruction lights and aerials etc. which may be fitted to vehicle roofs.

5. Vehicles shall be positioned so that the failure of any one shall not prevent the others from making an immediate response.

6. Vehicle bays shall be provided with adequate lighting facilities.

7. Electrical systems of appropriate design shall be required where vehicles are fitted with battery charging devices or other protective equipment.

8. Consideration shall be given to the provision of exhaust extraction equipment thus avoiding contamination within the vehicle bays when vehicles are started or run for prolonged periods.

9. All services provided for vehicles shall be designed to achieve immediate and safe disconnection without delaying the response of vehicles.

10. Doors may be provided with automatic opening devices, which could include remote operation from the watch room or in association with the operation of the station alarm. Where electronically operated vehicle bay doors are installed, these shall fully open within 15 seconds of initial operation. These must be fitted with manual overrides which allow operation within similar timescales in the event of a power failure or breakage.

4.0 'Watch Room'

1. There shall be a central point/method for the reception of emergency calls.

2. The watch room shall be part of the fire station and shall be sited on an elevated structure in a position which enables surveillance of as much of the movement area as possible.

3. If an elevated structure is built and the watch room attendant is part of the minimum number of personnel designated for an immediate response by the RFFS, quick and safe access to the vehicle bays shall be provided.

4. Double glazing and other sound-proofing measures may be necessary to exclude excessive noise from aircraft which may interfere with verbal communications (e.g. telephone and radio transmissions).

5. Facilities may be required to minimise the effects of direct exposure to the sun i.e. tinted windows or sunshades.

6. Facilities shall be provided for varying lighting intensity in the watch room to permit maximum external vision at night.

7. The Watch room/Fire Station shall be provided with a public address system so

that details of the emergency can be conveyed to crew members.

8. The importance of prompt and clear communications is paramount. Therefore, consistent with individual requirements of each airport there shall be provision for:

   a. Direct communication between Air Traffic Control and the airport fire station(s).
   b. Communication between Air Traffic Control and the RFF crews en route to, or in attendance at, an aircraft accident/incident.
   c. Communication between the fire station, or the main station, where more than one is provided, and the RFFS vehicles.
   d. Communication between the rescue and fire-fighting vehicles.
   e. Where an air traffic control service is provided at an aerodrome a direct telephone line shall be provided between ATC and the watch room. Similarly, a direct telephone line to the local authority fire brigade shall be provided. In addition there should be a means of activating fire alarm in the fire station from the control tower.

5.0 Domestic and Administrative Facilities (Where Provided)

1. The extent of domestic and administrative accommodation will depend on the range of technical control and duties required to be performed on the station.

2. The station alarm shall be sited so that it is audible in all parts of the station and its environs during high ambient noise levels.

3. These are facilities which can contribute to the efficiency of rescue and firefighting services by preserving equipment and extinguishing agents in optimum condition, ensuring its prompt availability and in providing test/inspection and maintenance provisions.

4. Hose storage space shall be provided; these facilities may require suitable racking and ventilation.

5. Storage space may be required for storing the reserve supply of foam concentrate, other extinguishing agents, first aid supplies and other departmental equipment.

6. Particular attention shall be given to ensuring that storage temperatures for foam concentrates and other extinguishing agents are kept within the levels specified by the manufacturers.

7. A general workshop, where maintenance and repairs can be performed on RFFS vehicles and other station equipment may be a valuable contribution towards the efficient and economical operation of the service.

8. A specific area shall be provided for training purposes. The area is not required to be a separate enclosed room, although this may be desirable.

9. The provision of proper exercise facilities shall be considered. Proper exercise encourages physical fitness and mental alertness and fire-fighter professional development standards and employment criteria specify minimum physical fitness standards for emergency personnel.

10. At aerodromes where the RFFS Category is 3 and above, all fire stations shall be provided with a secondary electrical power supply to ensure the continuous availability of essential equipment and facilities.

APPENDIX V:

The Provision of Additional Water Supplies for Use in Fire Fighting Operations Following an Aircraft Accident.

1.0 The Provision of Additional Water Supplies for use in Fire Fighting Operations Following an Aircraft Accident

1. The objective of providing additional water supplies at adequate pressure and flow is to ensure rapid replenishment of aerodrome RFFS vehicles thus allowing the maintenance of survivable conditions around the scene of an aircraft accident for far longer than that provided for by the minimum amounts of water set out in Table 1.1.

2. It is not possible to specify a single operational requirement which ensures adequate provision in all circumstances for all sizes of aerodrome. Each aerodrome shall conduct a needs analysis to determine requirements and shall ensure that emergency planning arrangements fulfil those requirements. It is possible that additional water to replenish vehicles may be required in as little as five minutes after an accident.

3. The following factors shall be considered when conducting a needs analysis:
    - Sizes and types of aircraft using the aerodrome.
    - The capacities and discharge rates of aerodrome fire vehicles.
    - The provision of strategically located hydrants.
    - The provision of strategically located static water supplies.
    - Utilisation of existing natural water supplies.
    - Vehicle response times.
    - Historical data of water used during aircraft accidents.
    - The need and availability of supplementary pumping capacity.
    - The options for providing additional water may include additional vehicle-borne supplies and the development of plans to utilise support provided by Local Authority Emergency Services.
    - Response of Local Authority Emergency Services including pre-determined attendance.
    - The aerodrome shall consult closely with the Local Authority Fire Service when determining needs.
    - It is important to ensure that adequate hard standing/access is provided for all supplementary water supplies. Consideration shall be given to provision of fixed pumps where these may provide a less resource-intensive and rapid method of replenishment.
    - Consideration shall be given to the provision of additional water supplies adjacent to airport fire service training areas. These shall be configured in such a way as to provide the most rapid method of replenishment.

APPENDIX VI:

Availability of Extinguishing Agents, Specifications, Procedures and Performance Levels

1.0 Availability of Extinguishing Agents

1. The Management of Stocks of Extinguishing Agents.

2. In addition to any statutory or legal requirements, stocks of fire extinguishing agents shall be stored and used in a consistent manner in accordance with manufacturers' guidance. Consideration shall be given to avoid prolonged or extreme storage conditions. As is the case with all fire extinguishing equipment, extinguishing agents shall be subject to regular inspection and testing. This may require the keeping of log books and records of test to be assured of continual fitness for purpose. It is advisable to always observe the manufacturers' recommended service and test intervals in addition to any requirements placed upon the aerodrome operator as a result of experience gained by the NCAA Aerodrome Standards Department.

3. Where different types of extinguishing agents are used on the aerodrome, care must be taken to ensure that incompatible types are kept apart and care is exercised when these have to be used simultaneously against fires (e.g. powders and foams). In particular, the mixing of different types of foam concentrate may lead to serious sludging and possible malfunctioning of vehicle foam production systems. If it is necessary to change the concentrate type carried on a vehicle it is essential that the manufacturers of the concentrate and the vehicle are consulted for guidance to ensure that all parts of the foam system are thoroughly cleaned prior to the new concentrate being used. This is vital to prevent any damage to foam systems or detrimental foam performance caused by the inadvertent mixing of incompatible foam concentrate types.

1.1 Induction Accuracy

1. Foam generating systems shall be regularly checked for induction accuracy.

2. For systems designed to induce at 6%, induction shall be in the range 5% to 7% at the optimum working conditions. For systems designed to induce at 3%, the range is 3% to 4% and for 1% systems, the range is 1% to 1.1%. Pre-mixed foam systems shall have foam concentrate introduced to within a tolerance of 0.9 to 1.1 times the manufacturer's desired induction rate.

1.2 Foam Properties

Methods pertaining to measurement of finished foam properties are not dealt with here only standard requirements and specification are spelt out.

1. Expansion ratio: 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. The expansion of a representative sample of the foam blanket produced in field operating conditions shall be no less than 6:1, a value between 8:1 and 12:1 being preferred.

2. Drainage time: 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. Some guidance regarding an appropriate level of post-fire security provided by a finished foam blanket may be derived from experience of carrying out the ICAO fire tests as specified in this Appendix. A 25% drainage time of more than 5 minutes is preferred. However, the time taken for the drainage of 25% of the foam solution from a representative sample of the foam blanket produced in field operating conditions determined using the methods specified above shall be the greater of at least 3 minutes, or no less than 90% of the ideal figures agreed and quoted by the foam and equipment manufacturers concerned. Amongst other factors, the use of foam branch pipes capable of producing an aspirated foam of good consistency will be beneficial in prolonging foam drainage times. For this reason the use of any so-called 'non-aspirated' foam branch pipes shall be quickly supplemented by using 'aspirating' foam branch attachments or additional branch pipes traditionally referred to as 'aspirating' types.

3. Certain combinations of types of foam concentrate and branch pipes may be found to perform differently to others. Care shall be taken during the selection process to ensure that the optimum combination of foam and equipment is chosen.

1.3 Foam Performance Levels, Specifications and Test Procedures

1. In specifying foam concentrate for use at certified aerodromes, the minimum requirements set out in this Appendix apply. The aerodrome operator shall demonstrate that the extinguishing agents in use shall always be of consistent good quality, fit for purpose, stored and used in accordance with manufacturers' recommendations.

2. The Nigerian Civil Aviation Authority will approve, inspect or certify firefighting equipment /training facilities to make sure is in compliance with current, relevant, national standards or NCAA guidance.

3. Foam concentrates used to provide the extinguishing agents quantities listed at Table 1.2 are required to meet the relevant National Standard as stated in this chapter and also meet either Performance Level A or Performance Level B as designated by ICAO in the Airport Services Manual, Part 1.

4. Aerodrome authorities shall ensure that suppliers of foam concentrates provide a certificate of assurance to the effect that the concentrate supplied meets all requirements of this Appendix and any supplementary conditions agreed with themselves prior to the

occasion of the first purchase (e.g. suitability for use in premixed form). A certificate of assurance shall be obtained for each batch of extinguishing agents used on the aerodrome. The criteria used to determine compliance shall be applied consistently. Such conditions may include the declaration by the manufacturer of any incompatibility with alternative foams or extinguishing agents in general use, particularly with respect to simultaneous use on the same fire, corrosive effects in storage and use in contact with materials normally used in the construction of fire extinguishing apparatus, cleaning and removal of spilled extinguishing agents, health hazards and side effects, environmental consequences of use and/or disposal. It is suggested that it is good practice to determine in co-operation with an aerodrome's usual suppliers a purchasing specification to include all the characteristic values of the extinguishing agents and acceptable deviations from the typical values for these.

1.4 Regular Assessment of Extinguishing Agents

1. A regular programme of inspection and test shall be determined to assure continued conformance of each batch of extinguishing agents with the manufacturer's declared original specification when measured according to relevant accepted national standard. The NCAA Inspectors may require to examine any evidence of this assurance from time to time.

2. Any stocks of fire extinguishing agents, especially foam concentrates held in bulk tanks or drums shall be assessed for continued satisfactory performance by taking samples from each batch and having these analysed at regular intervals by a competent person. By way of guidance, the measurement of those physical and chemical properties determined as being important during the selection phase using methods outlined in national standards will be appropriate.

APPENDIX VII:

Remission for Dry Powders

The Nigerian Civil Aviation Authority (NCAA) has permitted a 50% remission on the minimum amount of dry powder to be carried on fire vehicles at an aerodrome for a period not exceeding 90 days.

For example at Category 9 aerodromes where the minimum complementary agent to be carried on wheel is 450kg, it could be remitted by up to half i.e. 225kg. In that case, the difference of 225kg will be substituted by water and foam respectively in the following ratio: 1Kg DCP = 1 Litre water for foam meeting performance level B. From the above case the minimum water to be carried on wheel will now be 24,525 litres, while the foam concentrate will be 1,472litres based on 6% foam solution.

APPENDIX VIII:

Medical Examinations for Aerodrome RFFS Personnel

The purpose of requiring medical examinations for aerodrome RFFS personnel is to ensure an acceptable standard for the fitness of personnel likely to be engaged in operational duties. The examination will assist aerodrome operators to ensure that the performance of the required tasks is not placed in jeopardy by any physical disability and that personnel do not possess any medical condition(s) which may be aggravated by prolonged exertion or exposure to heat, smoke, fumes, dust, irritants etc.

APPENDIX IX

Rescue and Fire Fighting Service (RFFS) Facilities at RFFS Category One & Two Aerodromes.

1.0 Introduction

1. This Appendix describes some minimum RFFS requirements which are specifically applicable to aerodromes where the RFFS category is 1 or 2.

2. Aerodrome operators shall note that certain requirements related to RFFS provisions are applicable at all aerodromes irrespective of the RFFS category.

1.1 Minimum Scale of Services to be provided

The aerodrome management shall provide and staff an effective RFF facility which can respond to an aircraft accident/incident pending the arrival of external emergency services.

1.2 Availability of RFFS

The facility shall be available whenever flights required to use an aerodrome are taking place. It shall be maintained for at least fifteen minutes after the time of departure of any aircraft requiring the use of an aerodrome.

1.3 Temporary Depletion of RFFS

If the facility is not available for any reason, pilots shall be made aware of its non-availability and movements by aircraft required to use an aerodrome shall cease until it has been re-established. Exceptions may be made for emergency landings and for occasions when, in the pilot's opinion, a diversion or hold may introduce a more significant hazard.

1.4 Scale of RFFS

Facilities shall be provided on aircraft using the aerodrome accordance with this document. a scale commensurate with the size of taking account if its intended use is in;

1. **Category One**– Fixed wing aircraft of overall length up to but not including 9 metres, engaged in public transport of passengers.

2. **Category Two** – Fixed wing aircraft of overall length equal to, or greater than 9 metres, up to but not including 12 metres, engaged in the public transport of passengers.

1.5 The facility shall consist of at least the following:

1. A mechanically reliable and serviceable vehicle capable of accommodating the RFF personnel and traversing the terrain likely to be encountered in response to any incident. All wheel drive shall be necessary. The specified equipment shall be carried either on the vehicle or on a suitable trailer connected to the vehicle.

2. The vehicle and equipment shall be protected from the adverse effects of weather.

3. Sufficient quantities of principal and complementary firefighting agent. See Table 5.1

4. Dry powder fire extinguishing agents are normally considered more efficient than carbon dioxide for aircraft rescue and firefighting operations. When selecting dry powder for use with foam, care must be exercised to ensure compatibility. Where the main complementary agent is a dry powder there shall be a quantity of CO_2 provided with a suitable applicator for use on aircraft engine fires. The appropriate minimum quantity of CO_2 shall be 18 kg.

Table 5.1: Minimum Quantities of Principal and Complementary Fire Extinguishing Agents required.

AERODROME. CATEGORY	FOAM MEETING Water/litres	PERFORMANCE Foam Conc. At 6%	LEVEL B Foam Conc. At 3%	Discharge Rate Foam Solution (L/min)	COMPLEMENTARY DCP	AGENTS CO_2
1	230	14	7	230	45	90
2	670	40	20	550	90	180

5. Where the main complementary agent is CO_2 there shall be a quantity of dry powder provided to assist in dealing with a running fuel fire. Where this additional quantity of dry powder is provided in hand-held extinguishers of minimum capacity 9 kg, it will not be necessary to comply with the discharge rates of 1.35 kg/s or 2 kg/s. The appropriate minimum amount of powder to be provided is 9kg.

6. Hose line(s) of sufficient length(s) appropriate to dealing with fires involving the sizes and types of aircraft normally using the aerodrome and a hand controlled foam-making branch.

7. A 200% reserve of foam concentrate and 200% reserve of complementary agent shall be available at the aerodrome.

Table 5.2: Minimum quantity of ancillary equipment appropriate to the sizes and types of aircraft:

Equipment	Category One / Two
Axe, aircraft non wedging	1
Saw general purpose	1
Crowbar 1m	1
Side cutting pliers	1 pair
Set screw drivers (Philips and slotted)	1 each
Fire resistant blanket	1
Ladder/steps (appropriate to aircraft size and type)	1
Bolt cropper	1
Hacksaw complete with six blades	1
Harness knife with sheath	1
Tin snips	1
General purpose line 50mm circumference *15m length	1
Hook grab or salving	1
Adjustable wrench	1
Ambulance dressing No. 1 (127mm * 178mm)	3
Ambulance dressing No. 2 (203mm * 178mm)	4
Ambulance dressing No. 3 (280mm * 178mm)	4
Ambulance dressing No. 4 (330mm * 203mm)	2
Eye pads	2
Triangular bandages	4
Tuf Cut scissors	1 pair

Blankets (foil/wollen)	4
Stretcher/corpse carrying bag	1

8. Radio communications equipment shall be provided in fixed or portable forms and shall have a range which will ensure effectiveness within response areas.

9. The above list of rescue and medical equipment is not exhaustive and the aerodrome operator shall assess the level commensurate with the hazard and risk of the scale of aircraft operations at the aerodrome (e.g. the anticipated maximum number of occupants of the largest type of aircraft using the aerodrome).

10. Hand lamps and appropriate portable lighting equipment shall be provided at aerodromes for use during the hours of darkness.

11. Personal protective equipment and respiratory protective equipment appropriate to the hazard and risk shall be provided.

12. In order to ensure reliability and effectiveness, all equipment shall be properly maintained and regularly checked for serviceability. As a guide, all equipment shall be checked for serviceability at least twice every three months.

13. The following checks shall be made daily before the commencement of any flying at the aerodrome:

    a. Check extinguishing agents' availability.

    b. Check availability, condition and security of RFFS equipment including hose line and hand branch.

    c. Check personal protective equipment.

    d. Check vehicle including lubricant and coolant levels, tyres, battery and electrical systems.

    e. Start engine and check general operation of all controls.

    f. Check radio equipment and alerting system.

14. Some items, such as vehicle servicing and pressure unit testing will require more formalised arrangements.

15. Manufacturers of equipment are generally expected to provide guidance on maintenance and testing.

16. All inspections shall be conducted by a competent person. Records of tests and inspections shall be kept.

1.6 Minimum Number of Staff Designated as RFFS Personnel

1. The operational objective shall be to staff the facility and respond as quickly as possible to any aircraft incident. In any event, a meaningful response to an accident involving fixed wing aircraft shall be made within three minutes in conditions of optimum visibility and surface state.

2. The response to an accident involving helicopters shall be made within two minutes.

3. A method of monitoring the aircraft movement area for the purpose of alerting and deploying the facility shall be provided.

4. An instantaneous method of alerting the designated RFFS operating personnel of an incident shall be provided.

5. A reliable method of summoning assistance from off-aerodrome local emergency services shall be provided.

6. Trained personnel shall be designated to operate the RFF facility whenever flight required to use an aerodrome are taking place. The number of personnel and minimum supervisory level of supervision shall be determined by the aerodrome operating taking into account the operating characteristics of the equipment, efficiency of operation and safe working practices but shall not be less than:

Table 5.3 Minimum Number of Staff Designated as RFFS Personnel

RFFS Category	Minimum number of personnel	Minimum supervision level
One	Two	To be determined locally
Two	Three	Lower Category Airport Junior Officer/Supervisor

7. Personnel detailed to be available to operate the facility may be engaged on other activities provided that a response objective to an aircraft accident could easily be made. If fuelling of aircraft is one of the activities undertaken, then measures to ensure that fuel-contaminated clothing can be quickly changed, shall be in place.

8. At aerodromes where the RFFS category is 1 or 2, personnel designated to operate the RFFS facility may be engaged on fuelling of aircraft provided that:

   a. Response time(s) are not compromised;

   b. They remain throughout the fuelling operation immediately available to respond. This requires the fuelling system to be of a type which allows instantaneous shut off, preferably by release of a handgrip;

   c. That fuel-contaminated clothing may be quickly removed and personnel may quickly don personal protective clothing appropriate for use in firefighting activities;

   d. Personnel are fully trained for all relevant duties specific to the fuelling of aircraft and the RFFS.

9. Regard shall be given to the arduous nature of activities likely to be undertaken. Aerodrome operators shall assess the medical and fitness suitability of all personnel detailed to participate in the task.

RESCUE AND FIRE FIGHTING SERVICE FOR HELIDECKS

The following points shall be considered when providing RFFS equipment at helidecks:

a. A response time of less than thirty seconds (30) measured from the time of incident to actual production of foam at the required foam rate is the primary objective.

b. Foam-making equipment shall be located so as to ensure the uniform application of foam to any part of the safe landing area (SLA) irrespective of the wind strength/direction or incident location.

c. The minimum capacity of the foam production system will depend on the D-value of the deck (D is the diameter in meter (m) equal the largest dimension of the helicopter when the rotors are turning) the form rate, the discharge rates of installed equipment and the expected duration of application.

d. The application rate is dependent on the types of foam concentrate in use and the types of foam application equipment, NCAA generally recommends use of foam meeting performance level B at 6% solution strength. The foam shall be applied at a minimum application rate of 6.0 litres per square meter minute.

e. There shall be at least seven minutes (7) discharge capacity from the foam system for the initial extinction of any fire.

f. There shall be a provision to deploy at least two deliveries with hand control branch at a minimum rate of 250 litres/mm through each hose line.

g. NCAA recommends the use of dry powder (DCP) as the primary complementary agent with gaseous carbon dioxide as an addition.

h. The facility shall have sufficient trained firefighting personnel available whenever aircraft movements are taking place. They shall be deployed in such away as they allow the appropriate firefighting and rescue system to be operated efficiently and to maximum advantage so that any helideck incident can be managed effectively.

i. All personnel assigned to RFF duties shall be provided with suitable personnel protective equipment to allow them to carry out their duties.

j. The installation or vessel emergency procedures manual shall specify the actions to be taken in the event of an emergency involving a helicopter on or near the installation or vessel. Also exercise designed specifically to test these procedures and the effectiveness of the firefighting teams shall be carried out at the regular intervals. Records of such exercises shall be kept.

k. Further information and advice is available from NCAA Aerodrome Standard Department.

Table 1: Minimum Extinguishing Agents Requirement For Helideck

TYPICAL HELICOPTER TYPE	D-VALUE IN METERS	PRINCIPAL AGENT PERFORMANCE LEVEL B*		COMPLEMENTARY AGENT	
		DISCHARGE LITRES/MIN	FOAM CONCENTRATE IN LITRES	DCP(Kg)	CO2 (Kg)
Bolkon Bo 1050	12.00	679	285	45	1 (18kg) 1 (9kg)
Bolkow	13.00	797	335	45	1 (18kg)
Agusta A 109	13.68	800	336	45	1 (9kg)
Daughin SA 36 N2	14.30	882	370	45	1 (9kg)
EC 155 B1	14.30	991	416	45	1 (9kg)
Sikorsky S76	16.00	1207	507	45	1 (9kg)
Agusta/Bell 139	16.66	1309	550	45	1 (9kg)
Bell 214	17.46	1437	604	45	1 (9kg)

Super puma AS 332L2	18.70	1649	693	45	1 (9kg)
Bell 214 ST	18.95	1695	712	45	1 (9kg)
Super Puma AS 332L2	19.50	1793	753	45	1 (9kg)
EC 225	19.50	1793	753	45	1 (9kg)
Sikorsky S92	20.88	2055	863	45	1 (9kg)
Sikorsky S 6IN	22.20	2323	967	45	1 (9kg)
EH101	22.80	2451	1029	45	1 (9kg)
Boeing BV 234LR Chinook	30.18	4294	1803	45	1 (9kg)

*Based on 6% solution strength and 7 minutes discharged duration.

These values will be lower when using 1% foam solution strength

RESCUE EQUIPMENT

The provision of minimum number of the following equipment is recommend by NCAA to be stored in a clearly marked and secure water tight cabinet or chest irrespective of the D - value of the dock inventory checklist of equipment shall also be held inside the equipment cabinet/chest.

Table 2: Minimum Number of RFFS Equipment on a Helideck

EQUIPMENT	QUANTITY FOR ALL HELICOPTER RFF CATEGORY IRRESPECTIVE OF D-DIMENSION
Adjustable Wrench	1
Rescue Axe large crown wedge or aircraft type	1
Cutters, bolt	1
Crowbar, large	1
Hook, grab or salving	1
Hacksaw, heavy duty coupled with 6 spare blade	1
Blanket, fire resistant	1
Ladder (two piece)	1
Life line, 15mm length plus rescue harness	1

Pliers, side cutting (tin snips)	1
Set of assorted screw drivers	1
Harness knife with sheath	2
Gloves (Fire resistant)	2
SCBA (complete)	2
Power cutting tool	1

Note:

a. For access to casualties in an aircraft on its side.

b. This equipment is required for each helideck crew member.

1.7 FUELLING SAFETY MEASURES:

1. Ensure before any refuelling that the fuel in the storage tank is properly settled.
2. Passengers shall normally be disembarked from the helicopter and shall be clear of the helideck before refuelling commences.
3. Fire team shall be in attendance at all times during any refuelling operation.
4. Proper procedures shall always be applied.
   - Know quantity of fuel required
   - Correct grade of fuel
   - Bonding to helicopter earthing point
5. Once any abnormally is observed the off switch shall immediately be operated and fire team alerted.
6. If the aircraft captain has decided for safety reasons that the refuelling shall be carried out with passengers embarked, the following additional precautions shall be undertaken:
   I. Maintaining constant communication between the aircraft captain and the refuelling crew.
   II. Passengers shall be briefed.
   III. Emergency exits opposite the refuelling point shall be clear and ready for use.
   IV. Passengers' seat belts shall be undone.
   V. There shall be a competent person ready to supervise disembarkation in the event of an emergency.

1.8 Training

1. Aerodrome operators shall ensure that participating personnel are trained and competent in the operation of the RFFS equipment provided at the aerodromes, taking into account the hazards likely to be experienced.

2. The aerodrome operator shall ensure that the health and safety risks arising from training are assessed and addressed.

3. The aerodrome operator shall nominate a competent person(s) to conduct training.

4. Assessment of the competency of the person(s) determining, evaluating and conducting training shall be the responsibility of the aerodrome operator. NCAA may ask for details of that assessment.

5. Personnel shall receive training prior to initial participation and periodically thereafter. Periodicity will be determined by the aerodrome operator or his nominated competent person.

6. Inexperienced operatives shall receive detailed theoretical and practical training relevant to their role. An example of the topics to be included in a balanced training programme is given below:

1.9 Typical Course Syllabus (Lower Category Aerodromes)

1. Aerodrome operator's Safety Policies.

2. Hazards Arising from Aircraft Operation and Safety-related Procedures

3. Chemistry of Combustion

4. Extinguishing Agents – Use and Methods of Application

5. First Aid Fire Extinguishers

6. Fire Hose

7. Fire Appliances and Equipment:

8. Selection, Storage and Handling, Use, Inspection and Test, Maintenance and Record Keeping

9. Personal Protective Equipment

10. Aircraft Construction

11. Aircraft Familiarisation

12. Aerodrome Topography

13. Fire and Rescue Procedures

14. Fixed Wing Aircraft (Tactics and Techniques):

15. Appliance Positioning, External/Internal Fires, Access, Forcible Entry, Assistance with evacuation.

16. Rotary Wing Aircraft (Tactics and Techniques)

17. First Aid and Casualty Handling

18. Emergency Planning

19. Statutory Obligations

20. Air Navigation Order, Certification Requirements, Aerodrome Manual, Fire Prevention, Health and Safety at Work etc. Act Duty of Care.

21. Theoretical, Practical, Written and Oral Assessment

22. Issue and Amendment of Personal Training Record(s)

Personnel shall be given every opportunity to familiarize themselves with all equipment on a regular basis. Some of the topics listed above may be more specific to initial rather than recurrent training where the effectiveness of personnel operating as a team may be more important.

1.10 Emergency Planning/Emergency Orders

1. Emergency Orders, which form part of the Aerodrome Manual, shall include arrangements for alerting the facility, for the immediate notification of other key aerodrome personnel and for summoning externally based emergency services. These Orders shall detail procedures for anticipated emergency situations including accidents/incidents which occur up to 1000 metres from the runway threshold. The areas within which a response will be made shall be shown in the Aerodrome Manual.

2. Off-aerodrome emergency services shall be given the opportunity to familiarize themselves with the emergency procedures as well as the topography of the aerodrome.

3. The RFFS shall operate as an effective unit. The aerodrome operator shall be required by the NCAA to demonstrate that effectiveness from time to time.

1.11 Inspections of the RFFS by Inspectors of the NCAA Aerodrome Standards Department

1. At aerodromes where the RFF category is 1 or 2 the NCAA will, prior to initial certification, be required to be satisfied that off-aerodrome emergency services are familiar with the emergency procedures and the topography of the aerodrome.

2. Prior to initial certification, aerodrome operator will be required to demonstrate the effectiveness of the RFFS to operate as an effective unit. This may require the participation of the local emergency services at an operational demonstration of the aerodrome emergency plan.

APPENDIX X

Training of RFFS Personnel at All Licensed Aerodromes

1.1 Introduction

1. Firefighting personnel require proper training if they are to operate in an effective manner. All personnel engaged on rescue and firefighting duties must receive initial and recurrent competence-based training relevant to their role. Details of these are given in ARFFP Training Guide. Criteria by which the NCAA will judge the suitability of training providers and assessors are also provided.

2. The following list of topics is representative but not exhaustive. This list may be used to construct a balanced on-station local training programme.

1.2 Aerodrome familiarisation

Recognise the runway and taxiway identification system and associated pavement marking, lighting and signs. Comply with local rules regarding vehicle movements and access. Locate a given point on the aerodrome using references given by ATC. Locate all emergency access routes and other nonstandard routes used to traverse areas where aircraft accidents may occur including difficult environs and runway undershoot/overshoot areas. Understand and comply with special procedures during low visibility conditions. Identify areas where hazardous materials including freight may be stored.

1.3 Aircraft Familiarisation

Locate normal entry doors and emergency exits for aircraft normally using the aerodrome and describe methods of operation. Describe slide deployment and methods of evacuation.
Identify aircraft seating and cargo configurations.
Locate and utilise aircraft break-in areas where installed.
Locate and utilise battery isolators.
Locate and utilise installed aircraft fire protection systems.
Identify types of fuel and locations of fuel tanks.
Identify component parts of aircraft using correct terminology.
Identify aircraft construction materials and describe the hazards arising from aircraft construction.

1.4 Emergency Plan

Recognise different types of emergency contained in the emergency plan.
Comply with role as described in emergency plan.

Understand relevant roles of other aerodrome departments and/or external agencies.

1.5 Communications

Identify relevant radio frequencies.
Demonstrate correct radio procedures, terminology, and standard messages.
Demonstrate hand signals used to communicate with air crew.

1.6 Personal Safety

Identify the hazards arising from aircraft incidents and aircraft systems.
Demonstrate correct and expeditious use of personal protective equipment.
Understand the limitations of personal protective equipment.
Demonstrate techniques to be used when working in confined areas.
Demonstrate techniques to be used when trapped or disoriented.
Describe the purpose and limitations of self-contained breathing apparatus (SCBA).
Demonstrate correct and expeditious donning and start up procedures for SCBA.
Demonstrate use of SCBA in actual or simulated conditions i.e. smoke, heat and humidity etc.
Demonstrate correct techniques when working as a team in SCBA.
Demonstrate emergency actions to be taken in the event of; low air, DSU operations, unit malfunction, face mask displacement, etc.

1.7 Fire Behaviours

Demonstrate an understanding of causes of fire development, heat transfer and fire classification.
Demonstrate an understanding of the fire characteristics of materials used in aircraft construction including aviation fuel.

1.8 Extinguishing Agents

Understand the principles of fire initiation, spread and suppression/extinction.
Understand the various types of extinguishing agents commonly available.

1.9 Foam Monitors/Bumper Turrets

Demonstrate operation of foam monitors in jet and dispersed pattern.
Demonstrate correct application methods.
Demonstrate judicious use of extinguishing agents.
Understand effects of wind on foam monitor use.

1.10 Hand Line Use

Demonstrate selection and deployment of hand lines.
Demonstrate correct application of foam, foam solution and water.
Demonstrate judicious use of extinguishing agents.
Understand effect of wind on hand line and branch pipe effectiveness.

1.11 Complementary Agent

Select and deploy complementary agents carried.
Demonstrate correct application of complementary agents.
Demonstrate tactics for dual agent application.
Understand effects of wind on complementary agent application.

1.12 Tools/Equipment

Identify and locate each tool carried.
Demonstrate an understanding of the safety procedures necessary when operating equipment.
Demonstrate tactical use of each tool carried.

1.13 Vehicle Replenishment

Identify location of local water supplies.
Demonstrate procedures for replenishment using local water supplies (hydrants, tanks, static water, etc.).

1.14 Fire Fighting Operations

Demonstrate correct firefighting tactics for a variety of scenarios involving aircraft normally using the aerodrome (engines, undercarriage, APU, cargo hold, avionics, etc.).
Demonstrate tactics for securing and maintaining rescue paths.
Demonstrate tactics necessary to protect fuselage from fire exposure.
Demonstrate tactics necessary to control/extinguish three dimensional fires.
Describe the procedures for maintaining integrity of foam blankets.
Describe procedures for controlling/containing fuel spillage.
Demonstrate casualty handling and removal from an aircraft fuselage.

1.15 First Aid

Carry out primary and secondary surveys for life threatening injuries.
Establish airway.
Carry out cardiopulmonary resuscitation.
Identify and treat internal/external bleeding. Identify and treat casualty suffering from shock. Identify injuries to skull, spine, chest and extremities. Identify internal injuries.
Place casualties in recovery position.
Move casualties.
Treat burns.
Understand particular problems related to injured children/babies.
Manage unconscious casualties.

1.16 Vehicle Driving

Correctly operate all vehicle controls.
Drive vehicle within limits of design.
Drive vehicle in compliance with legislation and local by-laws.
Operate vehicle to traverse difficult terrain.
Correctly position vehicle at an aircraft incident.
Pump 'on the move'.

1.17 Supervision/Command

Ensure adherence to safety procedures.
Assess tactical priorities to maximise passenger survivability.
Select, deploy and direct firefighting tactics.
Manage resources to ensure effectiveness.
Communicate with external agencies