Initial and Recurrent Training for ARFF
Highlights of International Differences

ASO Dan Pierce

ARFF Solutions
www.arffsolutions.com

Table of Contents

Tables and Charts

1.0   Introduction

When the alarm sounds and aircraft rescue fire fighters (ARFF) are called to duty, they must use the skills they have learned through experience and training to save lives and to protect property. Because the aviation industry is well regulated, it is a relatively rare occurrence when ARFF equipment is called into action on an actual aircraft accident involving a commercial airliner.

It is most likely that an airport firefighter will work an entire career without having to respond to a large frame aircraft accident resulting in a hull loss or significant loss of life, also known as a mass-casualty incident. It is just as likely that flight crews operating a large frame commercial aircraft will not be involved in a similar scenario. It is for this reason that airport fire fighters rely on initial and recurrent training to prepare them for a wide spectrum of aircraft emergencies should one occur.

Today's standards used by airport fire departments worldwide for airport fire fighter training have many similarities yet differ substantially. This paper will examine initial and recurrent training conducted by various states contracted to the International Civil Aviation Organization (ICAO) Standards and Recommended Practices. These states/countries are listed in the Supplement to Annex 14, Volume 1,Third Edition.

2.0   The International Standard

The international standard most widely accepted for ARFF is written in the ICAO International Standards and Recommended Practices Aerodromes - Annex 14 to the Convention on International Civil Aviation-Volume 1 Aerodrome Design and Operations. ICAO Standards and Recommended Practices for the ICAO Council first adopted Aerodromes on 29 May 1951 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation held in Chicago in 1944. The Amendments to Annex 14 Standards and Recommended Practices for ARFF services were established 9 March, 30 July, and 15 November of 1990. The latest Amendment to Annex 14 (Amendment 4) became applicable on 1 November 2001.

Many states/countries have contracted with ICAO to implement the Standards and Recommended Practices of Annex 14. Where there are differences, they have been identified in the latest Supplement to Annex 14. Many states/countries have given reasons for not being able to comply with these international standards. According to the latest Supplement to Annex 14, no states/countries of the 190 that are contracted to ICAO have indicated that they were *not* in compliance with ICAO ARFF training standards and/or recommended practices.

This is good. This indicates that fundamentally, there are no worldwide disagreements or regulations that prohibit the implementation of ICAO Standards and Recommended Practices for ARFF training.

2.1   Annex 14 ARFF Training Information

When we look at the current information for Standards and Recommended Practices identified in Annex 14, we see that the information for ARFF training is very limited.

Section 9.2.34 of Annex 14 states that

> All rescue and fire fighting personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and type of fire fighting equipment in use at their aerodrome, including pressure-fed fuel fires.
>
> > Note 1. - Guidance to assist the appropriate authority in providing proper training is given in Attachment A, Section 16 of this volume of Annex 14; Airport Services Manual, Part 1; and Training Manual, Part E-2.
> >
> > Note 2. – Fires associated with fuel discharged under very high pressure from a ruptured fuel tank are known as "pressure-fed fuel fires.

Attachment A, Section 16.2 of Annex 14 states that

> The training curriculum should include initial and recurrent instruction in at least the following areas:
>
> a.) Airport familiarization;
> b.) Aircraft familiarization;
> c.) Rescue and fire fighting personnel safety;
> d.) Emergency communications systems on the aerodrome, including aircraft related alarms;
> e.) Use of the fire hoses, nozzles, turrets and other appliances required for compliance with Chapter 9, 9.2;
> f.) Application of the types of extinguishing agents required for compliance with Chapter 9, 9.2;
> g.) Emergency aircraft evacuation assistance;
> h.) Fire fighting operations;
> i.) Adaptation and use of structural rescue and fire fighting equipment for aircraft rescue and fire fighting;
> j.) Dangerous goods;
> k.) Familiarization with fire fighter's duties under the aerodrome emergency plan;
> l.) Protective clothing and respiratory protection.
>
> Note- Attachment A does not specify frequency or competency requirements.

2.2   ICAO Airport Services Manual-Part1 Training Information

In ICAO *Airport Services Manual Part 1 Rescue and Fire Fighting Third Edition – 1990*,   Doc 9137-AN/898 Part 1 (Amended 14 November of 1995)
Chapter 14 elaborates on the information regarding training found in Annex 14.
In this chapter ICAO has detailed many areas for ARFF training that are significant for an efficient and safe response to an aircraft accident.

Note-ICAO has identified course instruction for airport fire fighter as ICAO course 111. This course of instruction is available in many countries. However the course curriculum and syllabi vary immensely as well as costs. For example, here is ICAO course 111 information shown by state/country. (http://www.icao.org/anb/peltrg/td/rslten.cfm)

State/Country	School	Course Duration/Tuition
United Kingdom	International Fire Training	6 weeks/$10,784 U.S.
Indonesia	Indonesia Civil Aviation Institute	8 weeks/$2,400 U.S.
Netherlands	Netherlands Institute for Fire Service and Disaster Management	Course customized!
United States	Aviation Emergency Response Group	40 Hours/$500 U.S.

Other ICAO Courses include   112-Airport Fire Officer (Junior)

113- Airport Fire Officer (Senior)   119-Other

2.3   NFPA Standards

The National Fire Protection Association (NFPA), founded in 1896, has written and published standards also known as NFPA Codes. This organization was instrumental in developing life safety fire codes in the U.S.A. soon after a fire in a nightclub in 1941 (Coconut Grove) occurred that killed 492 people. Various NFPA committees write NFPA codes and standards for ARFF. The international committees of professionals are selected by the NFPA Standards Council with regard to the individuals' knowledge, experience and expertise in aviation fire fighting. Today the NFPA's comprehensive Codes and Standards are widely accepted in the United States and are becoming more popular on an international basis as well. The Federal, State, Municipal or private authority having jurisdiction (AHJ) must adopt NFPA Codes. Many ARFF departments have adopted NFPA Standards for training. The NFPA Standards used for ARFF training include

- *NFPA 405 – Recommended Practice for the Recurring Proficiency Training of Aircraft Rescue and Fire-Fighting Services-1999 Edition*

This NFPA document has recently been upgraded to a standard that provides detailed information on ARFF recurrency training. NFPA 405 could be used to supplement existing ICAO Annex 14 Attachment A recommendations.

- *NFPA 1003-Standard for Airport Fire Fighter Professional Qualifications-2000 Edition*. This NFPA Standard details initial ARFF training requirements.

Only recently, the NFPA has been able to add a staffing level requirement to the appendix of one of its documents *NFPA 403-Standard for Aircraft Rescue and Fire-Fighting Services at*

Airports-2003. Typically, airport management will only provide the minimum requirements required by ICAO standards and recommendations or aviation authority regulations. Staffing plays an integral role in training and ARFF response. Many of the larger airports in the country recognize this need and attempt to staff ARFF equipment at higher levels that are not based solely on federal ARFF equipment index requirements.

2.4   International Fire Service Training Association (IFSTA)

The International Fire Service Training Association (IFSTA) was established in 1934. It is an entity of Oklahoma State University in the United States of America. IFSTA is a non-profit organization dedicated to upgrading firefighting techniques and safety through training. They have produced fire service texts providing essential curriculum for ARFF training. One of the most current publications, *Aircraft Rescue and Fire Fighting-Fourth Edition* (ISBN 0-87939-192-8) published by Fire Protection Publications, is a comprehensive text used by many progressive departments worldwide as an essential training reference for ARFF.

3.0   Different States, Different Training Standards

Although ICAO has gone to great lengths to provide a basic international standard that is comprehensive enough to provide vital information for ARFF training, many states/countries/cities have deviated from these standards one way or another. Some ARFF departments have included all of the ICAO Standards and Recommended Practices as a minimum part of their overall training program while others have omitted these Standards and Recommended Practices to suit their departmental training agendas. Some states/countries (authorities having jurisdiction-AHJ) have adopted all or in part, NFPA Codes. Lets take a look at some of the differences in ARFF training standards in different states/countries.

3.1   United States of America

In the United States of America, the authority having jurisdiction (AHJ) over all of the certificated airports (airports that fly scheduled flights with aircraft that have more than 30 seats) where on-airport ARFF protection is required, is the Federal Aviation Administration (FAA). The FAA has adopted the ARFF training recommendations of ICAO found in Annex 14, Attachment A, Section 16.2 (See Above) in Federal Air Regulation (FAR) 139.319.
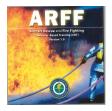
All certificated airports use this FAR for minimum ARFF training requirements. Many airports have supplemented this training requirement using NFPA 405 as a standard for recurrent training. Some departments use NFPA 1003 for an initial ARFF training standard. There seems to be what I will call a "Cafeteria" effect that is prevalent in the U.S. ARFF departments will pick and choose different standards, like assorted food items at a cafeteria, to suit their needs using FAR 139.319 as a minimum standard. IFSTA ARFF standards are commonly referred to for training. The FAA only cares to check that the federal regulation FAR 139.319 is in compliance.

Regarding training fires for ARFF in the U.S., it must be noted that most of the ARFF crews are now training at propane training facilities to complete an annual FAR 139.319 requirement for live training fires. There is much controversy as to the quality of training received at these facilities. The FAA certifies some of them while others they do not. The intensity and quality of

training varies widely between facilities. The cost for this training is also a factor. While propane has proven to be a more economical and environmentally efficient fuel to produce a useful ARFF training environment, it is not a good substitute to simulate hydrocarbons in the hostile environment encountered at an actual aircraft accident. Many of today's ARFF crews that train only with propane will not be familiar with how hydrocarbons behave when burning at an aircraft accident. The BTUs released as heat is lessened while smoke generation is significantly decreased. Practical training of foam application is compromised. This lack of training with hydrocarbons may compromise firefighter safety and effectiveness from improper agent application. Propane training neither satisfies the requirements of ICAO Annex 14, Chapter 9, 9.2.34 regarding extinguishment of a pressurized fuel tank fire, nor NFPA 1003 Section 3-3.4 for initial fire training with hydrocarbons.

FAR 139.319 is vague in the respect that it does not indicate standard levels of competency, training frequency, duration of training and training curriculum. It does not mandate a record-keeping format for ARFF training. FAR 139.319 only mirrors the basic categories of training found in ICAO Annex 14, Attachment A. The U.S. FAR does add an additional requirement for a single person trained in basic emergency medical care to be on duty during flight operations. Many individual states in the U.S. have established certification criteria for airport fire fighters.

Certificated airports in the U.S. are also required to demonstrate their ability to comply with the FAR required Airport Certification Manual by conducting an annual ARFF response and a triennial exercise that tests the airport's ARFF response and Airport Emergency Plan (AEP).

The FAA has recently distributed a three-CD set for computer based training to certificated airport fire departments. The CD set covers all of the required training mandated in FAR 139.319 and much more. The FAA has set has a precedent by using computer technology to elaborate on standards established in FAR 139.

A U.S. Aviation Regulatory Affairs Committee (ARAC) has been formed in the U.S. to try and work with the FAA in updating the existing FAR 139 to more comprehensive training and operational standards. To date the committee has been ineffective in getting the FAA to make any changes for ARFF training. The current problem seems to be that the FAA has difficulty passing any new regulations that would be economically acceptable for all certificated airports. This enables the current U.S. regulation to be mostly in conformance with ICAO standards, and economically flexible enough for the smallest of certificated airports (Index A) to be in compliance with the FAR.

ICAO Attachment A | U.S. FAR 139.319

ICAO Attachment A	U.S. FAR 139.319
a.) Airport Familiarization; ⟶	(2)(i.) " "
b.) Aircraft familiarization; ⟶	(ii.) " "
c.) Rescue & fire fighting personnel safety; ⟶	(iii.) " "
d.) Emergency communication systems on the aerodrome including aircraft fire related alarm; ⟶	(iv.) " "
e.) Use of fire hoses, nozzles, turrets and other appliances required for compliance with Chapter 9, 9.2; ⟶	(v.) " "
f.) Application of extinguishing agents; ⟶	(vi.) " "
g.) Emergency evacuation; ⟶	(vii.) " "
h.) Fire fighting operations; ⟶	(viii.) " "
i.) Adaptation and use of structural rescue and fire fighting equipment for aircraft rescue fire fighting; ⟶	(ix.) " "
j.) Dangerous goods; ⟶	(x.) Aircraft cargo hazards
k.) Familiarization with fire fighters' duties under the Aerodrome Emergency Plan; and ⟶	(xi.) " "
l.) Protective clothing. ⟶	Deleted

(3)   All rescue and firefighting personnel participate in at least one live-fire drill every 12 months.

(4)   After January 1, 1989, at least one of the required personnel on duty during air carrier operations has been trained and is current in basic emergency medical care. (40 Hrs.)

3.2   United Kingdom

The United Kingdom Civil Aviation Administration (CAA) has set the bar to one of the highest training standard levels known internationally with the new Civil Aviation Publication CAP 699. This 156-page document details every conceivable area for initial and recurrent RFFS competency requirements. The ARFF service is referred to as the RFFS in the U.K. CAP 699 consists of several parts.

- **Part 1** - Introduction to the Standards for the Competence of RFFS Personnel

- **Part 2** - Procedures for the Approval of Aerodromes and Training Providers carrying out training for which Certificates of Competence are required for personnel engaged on Rescue and Firefighting duties at United Kingdom Licensed Aerodromes.

- **Part 3** - Standards for the Competence of Rescue and Firefighting Service Personnel Employed at UK Licensed Aerodromes.

- **Part 4** - Guidance on the Process of Delivering Structured Learning Programmes for Aerodrome RFFS Personnel.

RFFS personnel can begin training on an entry level at an International Fire Services Training Center like one located at Teesside that is an Approved Training Provider (ATP). The comprehensive curriculum at Teesside offers training for new and experienced RFFS personnel to maintain high levels of competency. The British Aviation Authority (BAA) is also an ATP that delivers comprehensive training at Lakenheath. RFFS personnel must complete a very regimented course of instruction for basic and recurrent training for fire fighters and fire officers.

Basic and recurrent training to achieve a Structured Level of Proficiency (SLP) certification that is valid for four years, must be completed by RFF personnel at aerodromes categorized RFF index 3-9. SLP certificates of competency may be granted for

- Firefighter (Lower Category Aerodrome)
- Supervisor (Lower Category Aerodrome)
- Firefighter
- Supervisor (Crew Commander, Watch Commander)
- Manager (Operational/Non-Operational Station Commander)

RFF personnel may complete training through an ATP or an approved ongoing training and assessment process approved by the CAA. The CAA endorses certificates of competency granted by the ATP or aerodrome licensee. A designated fire officer who holds a current Lower Categorized Aerodrome Supervisors Certificate or other person deemed competent by the licensee, may conduct SLP training at lower category aerodromes categorized Special, 1 and 2. These lower category certificates of competency are valid for 2 years, only at the aerodrome from which they were issued. On-going training to maintain proficiency of skills is also mandated. The Aerodrome Standards Department (ASD) of the CAA's Safety Regulation Group (SRG) is responsible for the initial setting and on-going monitoring of CAP 699 Standards at all UK licensed aerodromes.

All RFFS personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and types of fire fighting equipment in use at the aerodrome, including pressure fed fuel fires. (CAP 699, Compliance with Statutory Requirements, 3.1)

This CAP 699 mandate clearly parallels ICAO Annex 14 Chapter 9, 9.2.34 to insure compliance.

RFFS personnel must also complete training in the twelve categories identified in Annex 14, Attachment A. A comprehensive list of driver/operator competency requirements are also identified in CAP 699. Role maps have also been created for reference to skills competency. Live Fire Training is indicated in Part 3, Unit 2, Element 2.1.

Actual work performance is required for at least one fire incident. Simulation and questioning is acceptable for all other contexts and hazards.

Consistent performance evidence obtained from workplace experiences is essential in confirming competence in every function of an individual's role (CAP 699, Part 1, 1.3)

3.3   Canada

Canadian ARFF training standards at the civil airports are regulated by the Canadian governmental agency Air Transport Canada. Requirements for Canadian ARFF training are established in Canadian Aviation Regulations (CAR) Part III, Subparts 303.14 and 323.14.

CAR 303.14 states that,

The operator of a designated airport or of a participating airport or aerodrome shall insure that all personnel assigned to aircraft fire-fighting duties are trained in accordance with the aircraft fire-fighting standards. These standards are established in CAR 323.14.

CAR 303.16 states that airport operators must maintain firefighter training records detailing the training that airport fire-fighters have received up to three years after they have left the service of the airport or at the request of the Minister, provide the Minister with a copy of the training record.

CAR 303.18 states that the aerodrome operator must conduct an annual response test every 12 months.

CAR 323.14-*Training of Personnel*, outlines ARFF training requirements to satisfy ICAO requirements identified in Annex 14.

(1) Knowledge and Skill Training

Training shall be provided in the following areas:

(a) Generic Training

(i)   AFF Vehicles and equipment,
(ii)   Emergency Communications Systems Including Fire Alarms,
(iii)   Fire-Fighting Personnel Safety,

(iv)   Fire Behavior,
(v)   Extinguishing Agents,
(vi)   Portable Fire Extinguishers,
(vii)   Fire Hoses, Nozzles, Turrets, and Other Appliances for Fire-Fighting,
(viii)   Fire-Fighting Operations,
(ix)   Emergency Aircraft Evacuation Assistance,
(x)   Aircraft Cargo Hazards,
(xi)   Live-Fire Training, and
(xii)   First Aid.

Notice that items vi, xi and xii have been added to the requirements listed in ICAO Annex 14, Attachment A while protective clothing and respiratory protection have been deleted.

(b) Site-Specific Training

(i)   Familiarization with the airport or aerodrome where the firefighter will be carrying out fire-fighting duties,
(ii)   Familiarization with the types of aircraft regularly operating at the airport or aerodrome where the firefighter will be carrying out fire-fighting duties, and
(iii)   Familiarization with fire-fighting duties under the *Aerodrome Emergency Response Plan* for the airport or aerodrome where the firefighter will be carrying out fire-fighting duties.

In CAR Part III, Subpart 323.14 (2)-*Level of Achievement to be Attained*, Transport Canada has written a comprehensive regulation that lists many tasks that ARFF personnel must demonstrate, explain, describe and/or identify to exhibit competence at three-year intervals.

Live fire training is required annually to "simulate a realistic fire-fighting situation, and be of sufficient size and intensity to provide a challenge to the firefighter in relation to the equipment used," **[CAR Part III, Subpart 323.14(4)(b)]**

3.4   Australia

In Australia the Civil Aviation Safety Authority Australia (CASA) regulates ARFF services at commercial airports. Standards for ARFF competency and training are found in (Manual of Standards) MOS Part 139H-*Standards Applicable to the Provision of Aerodrome Rescue and Fire Fighting Services* **Sections 18.1.1 and 20.1.3**. (http://www.casa.gov.au/avreg/rules/1998casr/139/mosH.htm)

CASA Regulations (CASR) mandate that

18.1.1.1   All operational fire fighting staff must hold the appropriate competencies, which is commensurate with the functional position to be occupied.

18.1.1.2   This will be detailed and recorded to include, but not restricted to:

(a) AFC qualifications;
(b) Local and general ratings;
(c) Special skills if required;

(d) Drivers license;
(e) Aerodrome license;
(f) Aerodrome security number;
(g) 90-day competency checks.

It is interesting that CASA regulations mandate 90-day competency checks for ARFF personnel. Also, Australian ARFF personnel must hold Australian Fire Competency (AFC) certificates for the type of work they are performing. The Australian Fire Competencies (AFC) comprises the knowledge, skills and application to perform firefighting roles safely and effectively. They are available in six levels, supported by training module specifications and assessment templates. The competency standards range from Level 1, which is the first level of operations, to Level 6, which incorporates significant management responsibilities.

18.1.1.6 The following AFC qualifications as prescribed by the Australian Qualification Framework (AQF) apply: (See page10)

(AFC-1) AFC Certificate 2 (fire fighting operations)

(AFC-2) AFC Certificate 3 (fire fighting operations)

(AFC-3) AFC Certificate 4 (fire fighting supervision)

(AFC-4) AFC Diploma (fire fighting management)

(AFC-5) AFC Advanced Diploma (fire fighting management)

18.1.1.11 The CASA ARFFS minimum requirements of the AFC Training Modules for fire fighters, fire officers responsible for any of the activities of a crew and the fire officer in charge of ARFFS are identified in the following schedule. (Fig. 1)

The Australian Fire Authorities Council (AFAC) "…is a peak representative body for fire and emergency services and land management agencies in the Australasian region. It was established in 1993 and has 24 full members and 10 associate members, including Australian fire and emergency services and land management agencies and the New Zealand, Papua New Guinea, Singapore and Hong Kong Fire Services." (http://www.ausfire.com/)

AFAC develops competency standards, and competency based national fire curriculum and assessment for application by fire agencies throughout Australia. "The Australian Fire Competencies (AFC) comprises the knowledge, skills and application to perform firefighting roles safely and effectively. They are available in six levels, supported by training module specifications and assessment templates. The competency standards range from Level 1, which is the first level of operations, to Level 6, which incorporates significant management responsibilities. (http://www.ausfire.com/comp_trn.htm)

Certificate II	Certificate III	Certificate IV	Diploma	Advanced Diploma
1.01 Health & Fitness 1.02 Preparation cleaning & Maintenance of Equipment, appliances and facilities 1.05 Alarms & Sprinklers 1.06 Occupational Hazards 1.07 Personal Protection 1 1.10 Building Structures 1 1.1 Urban Fire Suppression 1 1.15 Open Circuit Breathing Apparatus 1.16 Casualty Assistance 1.17 Emergency Care 1.22 Fire Service Awareness 1 1.23 Work Teams Communications 2.05a Emergency Life Support Techniques 2.15a Salvage & Overhaul 2.15b Ventilation 2.16 Dangerous Substances 1 2.34 Aviation Fire Suppression 1	1.04 Driving Vehicles 1 1.19 Communication Systems 1.21 Workplace Communications 2.02 Inspect & Test Equipment 2.03a Drive Vehicles on Road 2.03b Drive Vehicles off Road 2.04 Operate Pumps 2.05b Operate Life Support Equip 2.07 Occupational Hygiene 2.08 Detection & Suppression Systems 2.09 Building Evacuation Systems 2.10 Mechanical Venting & Air Handling 2.11 Building Structures 2 2.12 Structural Fire Behavior 2.13 Fire Suppression 2 2.20d Foam/Water Tender 2.21 Fire Prevention 1 2.24 Fire Agency Awareness 2 2.25 Present Information (Public Education)	3.01 Occupational Health & Safety 3.04 Fireground Operations 3.06 Aviation Fire Suppression 2 3.07 Dangerous Substances 2 3.09 Workplace Trainer Category A 3.10 Writing Workplace Documents 3.12 Dealing with Conflict 3.13 Negotiation Skills 3.14 Leadership 3.15 Supervising Teams 3.21 Introduction to Fire Law 3.22 Workplace Assessment 4.04 Incident Control Systems – Agency Specific	*3.05 Building Fire Safety 1 4.02 Pre Incident Planning 1 4.03 Operational Management *4.07 Fire Prevention 2 *4.08 Building Fire Safety 2 *4.09 Building Fire Service 4.11 Communication 1 4.12 Interviews 4.13 Workplace Trainer Category B 4.16 Leadership & Team Management 4.18 Human Resources Management 1 5.02 Incident Planning 5.03 Logistics Management 5.04 Incident Management Skills 5.05 Operational Analysis	4.01 Resource Evaluation 5.01 Resource Upgrading and Development Management 5.06 Project Management 5.07 Communication 2 5.08 Public Relations B 5.09 Team Performance 5.10 Managing Finance-Budget 5.11 Human Resource Management 2 5.12 Planning and Managing Change 5.13 Occupational Health and Safety Management 6.01 Pre-Incident Planning 2 6.02 Major Operations Management

	Certificate III Notes	Certificate IV Notes	Diploma Notes	
	Note 1: Hazmat responses will Require additional Modules 2.06 – Personal protection 2. **Note 2**: Inshore rescue responses will require additional Modules 2.20d. Part A – IRM and 2.20d, Part B – Launch and Operate IRB	**Note 1**: Module 3.09 – Workplace Trainer Category A allows for training on a one on one basis. For Training programming and design, Module 4.13 – Workplace Trainer Category B must be achieved.	**Note 1**: For the development and management of agency procedures And emergency plans, Advanced Diploma Modules; 4.01 -Rescue Evacuation 6.01 - Pre-incident Planning 2 6.02 – Major Operations Management must be achieved. **Note 2:** * Denotes Modules that are required id aerodrome facilities are established and is location Specific.	

3.5   South Africa

The South African Civil Aviation Authority (SACAA) regulates ARFF training in South Africa. The SACAA regulation for ARFF is found in CAR 139.02.7

The Civil Aviation Safety Authority has written additional CAA inspection requirements regarding ARFF training in the ARFF Manual of Procedure-R&FFS doc 1. The procedures established refer to the ICAO Annex 14 standard and guidance found in ICAO Doc 9137-AN/898 Parts 1 & 7 as well as ICAO document Doc 7192-An 837 Part E2. (http://www.caa.co.za/)

3.6   Singapore   (Changi International Airport)

The Civil Aviation Authority of Singapore (CAAS) enforces ARFF training Standards at Changi International Airport. Changi is a category nine airport. Airport Emergency Service (AES) fire fighters are divided into three categories. Listed below are the three levels of service and the basic requirements for direct entry.

1)   Airport Emergency Officer (Fire Fighter and Driver/Operator) SAEO – At least a good university degree from a Singapore recognized university.

2)   Specialist (Junior Supervisory Grade (Sgt. and above.) AEO – At least a diploma from a Singapore Polytechnic.

3)   Senior Airport Emergency Officer (Lt. and above.) AEO – At least Cambridge Certificate "O" level.

AES candidates must pass a physical agility test. The requirements are similar to those required by NFPA 1001. Recurrent training is conducted to comply with ICAO Annex 14 requirements. AES staff attends classroom lectures daily. Training is conducted at the airport and the Singapore Aviation Academy (SAA). Other requirements for AES staff include

1)   Attend "Hot" fire drill quarterly.
2)   SCBA operations in heat and humid conditions.
3)   Attend two different aircraft familiarization classes per month.
4)   Attend one operational training course at SAA every five years.
5)   Yearly revalidation of the station plan, tactical plan and operational leadership ratings.
6)   120-day revalidation of driving and operations of ARFF vehicles.

All AES personnel receive some of their training at the Singapore Aviation Academy (SAA). Some of the courses offered at SAA include

- Advanced Airport Fire Fighter
- Rescue Fire Fighting (Refresher)
- Airport Fire Officer
- Senior Fire Officer
- Breathing Apparatus Operations
- Breathing Apparatus Supervisor
- Foam Tender Operations (Refresher)
- Operational Fire Command and Control
- Fire Prevention and Fire Fighting
- Confined Space Rescue

A comprehensive range of fire simulators is designed to fully train and test fire-fighting and safety skills of participants. The simulators are maintained at a dedicated fire training ground where participants undergo true-to-life simulated exercises involving undercarriage fires, internal aircraft fires, fires at fuel installations, a vertical fire wall and flashover fires.

SAA uses a "virtual" fire simulator for tactical command and control training. A controlled-environment breathing apparatus simulator is also used to provide rescue training in a realistic fire environment.

(http://www.saa.com.sg/)

Singapore AES personnel participate in live fire training with an aircraft simulator and a fire screen. The simulator has eighteen fire scenarios, 13 external and five internal. The external fire scenarios and fire screen use aviation fuel. The internal fire scenarios use LPG. The simulator is located on the airport near the South runway. The proximity of the fire training area to the runway minimizes live fire training to two nights a week after midnight when the runway is closed for maintenance.

3.7   Sweden

Sweden has established two levels of competency for ARFF. It is regulated by the Swedish Civil Aviation Administration and enforced by the Swedish Fight Safety Department.

- **Airport Fire Fighter**. Initial Swedish ARFF training is a six-week course of instruction for new candidates with no experience. If the candidate is a Swedish Rescue Board certified Fire Fighter, the initial ARFF course is one week in duration. After completion of initial ARFF training, ARFF personnel receive a competence certificate valid for four years. A one-week refresher course is required prior to competency certificate expiration for recurrent four-year competency certificate renewals.

- **Airport Rescue Leader**. To be certified as an Airport Rescue Leader the Airport Fire Fighter must complete a six-week Airport Rescue Leader course of instruction.
If the candidate is a Swedish Rescue Board certified Fire Fighter he must complete a six-week Airport Rescue Leader course of instruction.
If the candidate is a Swedish Rescue Board certified Rescue Leader (Leading Fire Fighter or Station Officer) he must complete a one-week Airport Rescue Leader course. A one-week refresher course is required prior to competency certificate expiration for recurrent four-year competency certificate renewals.
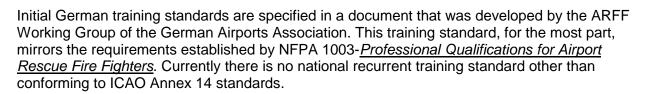
Swedish Airport Fire Fighters and Airport Rescue Leaders participate in several live fires for their initial and recurrent training.

New requirements for ARFF training beginning in 2004 include a forty-eight hour training class at the airport to prepare new students for initial training. After completion of this class students will progress to basic ARFF Stage-1 training.
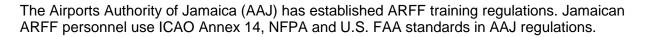
Stage-1 is a three-week course of instruction. If completed successfully, the student will receive a two-year competency certificate. After completion of this class the student must complete the basic ARFF Stage-2 training.

Stage-2 is a three-week class. This class must be taken anytime from six-months to two-years from completion of Stage-1. Stage-2 competency certificates are good for four-years. Airport Rescue Leader training requirements are similar to Airport Fire Fighter.

3.8   Germany

Initial German training standards are specified in a document that was developed by the ARFF Working Group of the German Airports Association. This training standard, for the most part, mirrors the requirements established by NFPA 1003-*Professional Qualifications for Airport Rescue Fire Fighters*. Currently there is no national recurrent training standard other than conforming to ICAO Annex 14 standards.

3.9   Jamaica

The Airports Authority of Jamaica (AAJ) has established ARFF training regulations. Jamaican ARFF personnel use ICAO Annex 14, NFPA and U.S. FAA standards in AAJ regulations.

3.10 Denmark

ICAO Annex 14 standards prevail. ARFF personnel are required to participate in recurrent training monthly for a minimum of two-hours each month. At the airport in Copenhagen ARFF personnel may train for up to four hours each shift.

3.11   Indonesia

Indonesia conforms to ICAO Annex 14 standards.

3.12   Northern Mariana Islands   (Saipan International Airport)

The Northern Mariana Islands are a Commonwealth in political union to the U.S. The airport in Saipan is an Index E/ Category 9.

ARFF training complies with U.S. FAR 139.

3.13   Mexico

The CREI (fire fighting and rescue corps) members conform to ICAO Annex 14 standards. Including

a.)	Initial training,	40-hours.
b.)	Recurrent training,	24-hour course annually.
		2-hours daily.
c.)	Physical training,	1-hour daily.

INTERNATIONAL TRAINING STANDARD REFERENCES

State/Standard	ICAO Annex 14	FAA FAR 139	Supplemental
Indonesia	X		
Jamaica	X	X	
South Africa	X		
Singapore	X		X
Germany	X		
Denmark	X		
Sweden	X		
Mariana	X	X	
Australia	X	X	X
Canada	X		X
U.S.A.	X	X	X
U.K.	X		X
Mexico	X		

4.0 ICAO TRAINAIR

"TRAINAIR is an ICAO Programme that was established with the goal of improving the safety and efficiency of air transport through the establishment and maintenance of high standards of training for aviation personnel on a global basis.

The challenges ahead for civil aviation training centers are considerable. They must meet an increasing demand for well-qualified personnel in a wide range of disciplines and emerging technologies. At the same time, the demands placed on many civil aviation-training institutions are greater than the resources available. A basic premise of the TRAINAIR Programme is, therefore, to enhance the cost-efficiency of training for the participating States in light of today's economic realities.

The TRAINAIR Programme is an international cooperative system for civil aviation training institutions. Members of the programme develop training packages to an international methodological standard, established by TRAINAIR. As the materials are prepared using the same process and standards they can easily be used by all members of the programme. An integral part of the programme is an international training resource sharing system administered by ICAO. The sharing system is highly efficient for members as they acquire many of the courses they need through the sharing system and need only prepare a limited number of courses themselves. Thus, TRAINAIR enables members to both enhance the quality and cost-efficiency of course development, while at the same time standardizing the instructional approach used by members worldwide."

(http://www.icao.int/anb/trainair/Home/Index.html)

5.0 Conclusion

ARFF training is certainly very far from being standardized internationally. Looking at the descriptions of training given by the various states/countries in this report it is easy to see that all signatory states/countries attempt to comply with minimum standards established by ICAO in Annex 14. Some states/countries have taken additional steps by supplementing minimum ICAO standards with additional training and education for airport fire fighters while others have taken very large steps at developing a comprehensive ARFF training and competency program that is regulated by their state government civil aviation authority.

It is interesting to note that the training standards established by various states/countries do not seem to increase in complexity based on the size of the aircraft using the airports, number of departures, number of airport fire fighters or the number of people that travel through the airports of these different states/countries.

In order to increase the overall worldwide quality and effectiveness of ARFF training for new ARFF personnel and recurrent training for existing airport fire fighters, International standards (ICAO) will have to be amended to eliminate the current ambiguity. In order to standardize ARFF training internationally, it is very important that specific standardized performance based

levels of competency are established. ICAO has established minimum requirements for ARFF appliance/vehicle response and ARFF training. The NFPA has established minimum requirements for ARFF training using a committee composed of international professionals. Some states/countries have realized the importance of competency based ARFF training and developed comprehensive performance based training requirements while others have not. Many states/countries are not reporting their non-compliance with ICAO standards for ARFF training. There is a lack of ICAO enforcement of Annex 14 ARFF training standards.

It is the intent of ICAO through international cooperation to standardize aviation travel worldwide and all related services. Developing a comprehensive ICAO TRAINAIR ARFF certification course of instruction may be a solution for the standardization of initial and recurrent training for ARFF. Adopting the standards established by other organizations may be another. As in many other cases, economic pressures may cause budgeting shortfalls that do not permit some states/countries to adopt more stringent training standards. Unless state governmental civil aviation authorities adopt and enforce more comprehensive unilateral standards for ARFF training, the traveling public and aircraft crews will neither be given the opportunity nor assured to receive the same level of service internationally in the event of an aircraft emergency.