AN EVALUATION OF EUGENE, OREGON'S AIRCRAFT RESCUE & FIRE FIGHTING (ARFF) PROGRAM:

SERVICES - STAFFING - FUNDING

EXECUTIVE LEADERSHIP

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ABSTRACT

The purpose of this research was to evaluate the Eugene, Oregon Fire Department's Aircraft Rescue & Fire Fighting (ARFF) program, and compare it to other Federal Aviation Administration (F.A.A.) designated Index "B" and "C" airports.

The problem is that there has never been a comparative analysis made of Eugene's ARFF program and questions have arisen about services, staffing, and cost.

Evaluative research methodology was employed to answer three research questions: Should other services, in addition to aircraft rescue and fire fighting, be delivered by Eugene's ARFF personnel? What is the appropriate ARFF staffing level for the Eugene Airport? Are Eugene's ARFF services adequately funded, and what funding sources are employed in the industry?

The procedure used in this research involved a literature review of applicable Federal Aviation Administration regulations, National Fire Protection Association recommendations, other materials obtained through a literature search, and a survey of the twenty-four (24) F.A.A. designated Index "B" and "C" airports located in the F.A.A.'s Northwest Mountain Region.

The major findings were that ARFF personnel should assume more job responsibilities to create operational efficiencies; that a minimum ARFF staffing level of between two and six fire fighters should be maintained at F.A.A. Index "B" and "C" airports; that most airports in the survey population were unable to identify their true ARFF program costs; and that there is a need for the industry to diversify its revenue sources.

The major recommendations were that; Eugene's ARFF personnel assume additional responsibilities; that current staffing levels are within market and should be maintained; and that the current funding system should be modified so that general aviation pays their share of

the cost.

Specific recommendations for next steps include; an evaluation of general airport duties to determine what can legitimately be absorbed by ARFF firefighters to promote efficiencies; evaluate how many of the current twenty-seven (27) certified ARFF firefighters are necessary to maintain adequate staffing for Eugene's ARFF program; and to work with Eugene Airport management to develop a diversified funding system that taps general aviation.

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INTRODUCTION

The problem is that aircraft rescue and fire fighting (ARFF) services at the Eugene, Oregon Airport have never been compared to similar ARFF services at other airports. With the cost of Eugene's ARFF program on the rise, the cost curve has out-paced revenues generated for this program by the Eugene Airport's Enterprise Fund. In fact, the Eugene Fire Department has augmented the FY '00 ARFF budget by approximately $40,000 dollars to sustain the service at its current level.

Approximately 90% of the authorized ARFF budget is allocated for personnel costs and services. At the same time, the Federal Aviation Administration (F.A.A.) does not provide staffing guidelines for establishing staffing levels. This situation has created a level of tension between the fire department, airport management, and the commercial air carriers. The fire department wants to sustain current staffing levels or increase them while airport management is interested in decreasing the staffing level and hours of service. The commercial air carriers are interested in any changes that improve efficiency and decrease their overhead.

The purpose of this research was to evaluate the Eugene Fire Department's aircraft rescue and fire fighting (ARFF) program and to determine what appropriate services should be provided by ARFF personnel, identify what the appropriate staffing level should be for Eugene in comparison to other F.A.A. Index "B" and "C" airports, determine if Eugene's ARFF program is adequately funded, and identify alternative funding sources.

Evaluative research methodology was used to perform this analysis, and the following research questions were applied to the information and data obtained in the course of this research project:

1. Should other services, in addition to aircraft rescue and fire fighting, be delivered by Eugene's ARFF personnel?
2. What is the appropriate ARFF staffing level for the Eugene Airport?
3. Are Eugene's ARFF services adequately funded, and what funding sources are employed in the industry?

Information was obtained from a literature review, the Code of Federal Regulations FAR Part 139, and recommendations from the National Fire Protection Association (NFPA) as they pertain to aircraft rescue and fire fighting services. A survey was also mailed to all Index "B" and "C" airports located in the F.A.A.'s Northwest Mountain Region, in which the Eugene Airport is assigned. The results were then used to assist in answering the research questions and in developing comparative data for evaluating Eugene's ARFF program in the areas of services, staffing and funding.

BACKGROUND AND SIGNIFICANCE

The Eugene Airport, which is designated by the Federal Aviation Administration (F.A.A.) as an Index "B" airport, serves an area that includes six cities and three counties. While the F.A.A. provides strict requirements under Title 14, Code of Federal Regulations, FAR Part 139, for ARFF response times, equipment types, firefighter training, and quantities and types of extinguishing agent that must be delivered in the event of an incident, it does not provide any guidance for staffing levels, nor does it specify any service delivery responsibilities beyond aircraft rescue and fire fighting.

The Federal Aviation Administration requires that an index be established for each airport that is a F.A.A. certificate holder. These indexes, and their associated requirements,

are determined solely by the length of the largest aircraft that has an average of five or more daily departures from the airport. (F.A.A., 1993)

Federal Aviation Administration - Airport Index Aircraft Length Criteria:

> *Index "A" - Includes aircraft less than 90 feet in length.*
> *Index "B" - Includes aircraft at least 90 feet but less than 126 feet in length.*
> *Index "C" - Includes aircraft at least 126 feet but less than 159 feet in length.*
> *Index "D" - Includes aircraft at least 159 feet but less than 200 feet in length.*
> *Index "E" - Includes aircraft at least 200 feet in length.*

Although the Federal Aviation Administration is the only agency that has the authority to mandate ARFF program and service requirements, there is a growing feeling amongst ARFF providers that the F.A.A. is out of touch with the challenges that face the industry and has not provided the guidance and regulation that is needed to manage this important service.

Franklin G. Ausmus, of the Norfolk International Airport Fire Department, Norfolk, Virginia, conducted a survey of 120 airport fire departments regarding the minimum requirements of FAR Part 139, and found that 76.9% of the survey respondents felt that the requirements did "...not adequately meet the needs of contemporary airport fire services." (Ausmus 1995) Ausmus went on to say that, "Title 14 CFR Part 139 should be evaluated to provide a more accurate assessment of the needs of aircraft rescue and firefighting and then (be) revised accordingly. Members of the professional airport fire service should have an active role in this revision process." (Ausmus 1995)

At the same time that no staffing or service criteria are mandated or even recommended by the F.A.A., increasing costs have placed pressure on the Eugene Fire Department's senior managers to lower the costs of their ARFF program. The implied message has been to cut service, staffing levels and possibly turn the service over to a private provider all together. Considering that, "the average ARFF budget is 90% personnel and payroll related costs," there is little in the way of reductions that can be made without reducing wages, benefits, or more

realistically, staffing levels. (Rural/Metro 1995)

Since the majority of the costs associated with Eugene's ARFF program are driven by staffing, senior fire department managers have elected to absorb increased costs into their department's general fund allocation to avoid reducing what they have identified as a base level service delivery system.

Currently the Eugene Fire Department's minimum ARFF staffing level is two personnel, twenty-four (24) hours per day, seven days per week, 365 days per year. The ARFF operation has fluctuated between minimum staffing levels of two and four firefighters over the years, which has been driven by a fluctuation in the Eugene Airports F.A.A. index rating between an Index "B" and "C."

In addition to the two ARFF firefighters assigned to each of three shifts, the Eugene Fire Department maintains current ARFF certifications and provides annual training to at least twenty-seven (27) firefighters, with nine (9) being assigned to each shift. These additional firefighters are generally assigned to stations which respond in support of the airport station.

Although this adds to the cost of the program, fire managers have felt this is an important practice to adequately provide for relief, and more importantly, to provide adequate levels of competent support during aircraft incidents since the airport station has the department's lowest staffing level, and is located to the northwest of the city beyond the department's response area. In fact the airport itself, which is City of Eugene property, is completely surrounded by a rural volunteer fire protection district.

During the past ten years, there have been numerous discussions between airport and fire department managers over staffing levels, hours of coverage, the general costs of the ARFF program, and the limited services provided by the firefighters assigned to the airport station.

Since the Eugene Airport serves a regional population base about double the size of the City, the airport operation, along with the Fire Department's ARFF program, are funded almost entirely by an enterprise fund. This enterprise fund is comprised of revenues generated by lease agreements, airline gate fees, parking fees, fuel flowage and passenger boarding taxes to name a few sources.

While the Airport Enterprise fund is supported by a number of fees, the ARFF program is funded entirely by the commercial air carriers except for the FY'00 $40,000 contribution made out of the fire department's general fund. Eugene's ARFF funding dilemma is not unique in the industry.

The concern over increased costs and the pass through effect to the flying public is of concern to the airlines when developing schedules and determining the size of aircraft to assign to a particular route. When an airport increases its F.A.A. Index rating, there are usually significant costs associated with this change. At present, most Eugene flights are full or very close to it, as relayed by Mike Coontz. (M. Coontz, Airport Operations Manager, personal communication, August, 2000)

In a study conducted by Rural/Metro Corporation, a private fire service provider based in Scottsdale, Arizona, the following was summed up in their report.

> Airports are concerned over increased federal regulations and what impact these increases will have on their operation. Many airlines are currently experiencing operating losses and are looking for ways to lower their expenses. If airports are forced

> to increase landing fees to pay for increased services, the impact will be transferred from the airport to the airline to the passenger. The change in Index requirements is a major issue on the mind of today's airport executives. (Rural/Metro 1995)

This research project was prompted by a series of challenges directed at the Eugene Fire Department's current ARFF operation. From these challenges, it was determined by senior fire managers that an evaluation of its ARFF program was needed, and that this evaluation should include a comparison to other ARFF operations. By comparing Eugene's ARFF operation with other similarly situated F.A.A. Index "B" and "C" operations, it was believed that the current program would either be validated, or information would be obtained to help improve operational efficiency and lower costs. The three research questions were then designed to provide the framework for this evaluation in three general areas; breadth of services, staffing levels and funding.

The importance of having sufficient information to make good decisions, and applying the Rational Decision Making Model, were concepts which were presented in the Executive Leadership course taught at the National Fire Academy, and were included in course unit number three. The Executive Leadership course was attended in May of 2000.

LITERATURE REVIEW

The literature review for this research was acquired from a variety of sources including Federal Aviation Administration regulations and advisory circulars, National Fire Protection Administration recommendations, fire service periodical literature, and several independent research efforts. The variety and scope of literature accessed in the literature review helped provide the basis for developing the research survey, and ultimately assisted in developing the recommendations presented at the conclusion of this paper.

To aid in assimilation, the acquired information was subdivided into three main sections which followed the research questions previously listed.

1) Should other services, in addition to aircraft rescue and fire fighting, be delivered by Eugene's ARFF personnel?

In a report and survey prepared by Rural/Metro Corporation in 1995, it was concluded that, "More efficient use of personnel was prevalent in all categories of responses from Index 'A' to 'E.' Essentially, airports are looking to increase productivity and efficiencies in all ways." (Rural/Metro 1995) The report went on to say that, "Comments (from respondents) included better utilization of management and front-line ARFF personnel." (Rural/Metro 1995)

While there may be room for efficiencies and increased productivity, these efficiencies must not displace what is necessary to meet the primary ARFF mission. According to the National Fire Protection Association's publication, NFPA 402, "The primary objective of ARFF personnel at the scene of any aircraft accident is to control and extinguish the fire to enable safe evacuation of the aircraft." (NFPA 402 8-4.1, 1996) This fact is reaffirmed by Federal Aviation Administration and prescribed in FAR Part 139.

In addition to fire control and rescue, aircraft rescue and fire fighting personnel must face a number of other emergency response issues associated with an airplane accident. "Other issues to consider are the need to blend haz. mat. operation protocols with multiple-casualty rescue and evacuation, and how to manage large numbers of contaminated emergency personnel and their equipment." (Hilvers 1995)

"An aircraft on the ground is a unique structure, surrounded by fuel. ARFF personnel must, therefore, be trained and certified in structural firefighting and it is also necessary that

structural firefighters who respond to airports be trained in aircraft firefighting strategy and tactics." (Buonome 1991)

But should the aircraft rescue and fire fighting personnel stationed at our nations airports have other life safety or service responsibilities beyond their primary duties associated with ARFF?

Over the past twenty years, the fire service has experienced a significant diversification in the services it delivers to the public. Although aircraft rescue and fire fighting is a very specialized part of this service, this first research question asks what level of services should be expected from Eugene's firefighting personnel?

In an Aircraft Rescue and Fire Fighting survey conducted by the Rural/Metro Corporation, a correlation was found between the budget and the size of the ARFF department, and the size of the airport and the duties assigned to the ARFF personnel. "The smaller the airport, the more 'outside' duties the ARFF staff is responsible for." (Rural/Metro 1995)

But not just small airport ARFF services perform a diversified set of duties beyond aircraft rescue and fire fighting. The Bradley International Airport Fire Department in Connecticut, with thirty-two paid personnel, "...responds to all structure fires in Windsor Locks," and provides paramedic services as well. (Buonome 1991)

While the F.A.A. does not mandate staffing levels, which will be discussed under the second research question, they do mandate response times under FAR Part 139. Although there may be personnel resource capacity in some ARFF service systems, there is a question of what is appropriate work, and does this work interfere with ARFF personnel's primary responsibility?

What complicates the issue for smaller airports are the utilization of personnel for more

than one job function. For example, if a field maintenance person is cross utilized for ARFF, what impact does it have on the response time to emergencies? If that person is on a mower in a remote area of the airport, they will likely not be able to meet the mandated response times. (Rural/Metro 1995)

2) What is the appropriate ARFF staffing level for the Eugene Airport?

During the literature search, an attempt was made to identify the various standards that apply to Aircraft Rescue Fire Fighting. Although there are undoubtedly additional recommendations that have been made by various supporting associations, three were selected during the literature search. Two organizations, the National Fire Protection Association (NFPA), and the International Civil Aviation Organization (ICAO) provide recommendations only. The Federal Aviation Administration (F.A.A.), was the only organization with regulatory authority for setting actual regulations, requirements, and providing enforcement. The regulations are set in Federal Aviation Regulations FAR Part 139.

While the F.A.A. specifies equipment, suppression product, training and response times, they fall short of specifying minimum staffing for the five levels of indexed airports. Nevertheless, adequate ARFF staffing is a key component to increasing survivability in the event of an air carrier accident occurring on airport property.

"There's only one chance to put out a post-crash fire, and a very limited amount of time to do it." (Williams 1989) But what are the statistical odds of surviving such an accident? "A review of air carrier accidents reveals that 80% of aircraft accidents occur on or within 3,000 feet of the runway during takeoff or landing and most occur at a relatively slow speed and are survivable, 15% of the accidents occur in the approach area and are generally fatal, "5% of the accidents occur en route and are most likely to be fatal." (Lindemann 1996)

Brian Boucher, representative of the Canadian Air Line Pilots Association and Chair of the NFPA ARFF technical committee, supports Lindemann and contends that "85% (of aircraft accidents) happen on takeoff or landing, and most of those are survivable." (Scott 1997)

In addition, "Aircraft are being designed to increase the chance of survival. Exit doors are bigger. Seats are designed to better withstand crashes. And egress times have been boosted by fire-blocking materials incorporated into the seat backs." (Scott 1997)

The controllable variables of a successful aircraft accident outcome, occurring on airport property, appear to include a rapid ARFF response, fire control capability, and an adequate number of trained firefighters to physically engage the problem.

> The survivable atmosphere inside an aircraft fuselage involved in an exterior fuel fire is limited to approximately three minutes if the integrity of the airframe is maintained during the impact. This time is substantially reduced if the fuselage is fractured. When the aluminum skin is directly exposed to flame, burn through will occur within sixty seconds or less while windows and insulation may withstand penetration for up to three minutes. (NFPA 402 4-1.1, 1996)

But the Federal Aviation Administration, the one agency that does regulate airports and Aircraft Rescue Fire Fighting services, does not provide any staffing level criterion. The only portion of the code which makes any reference toward quantifying staffing levels is found in FAR Part 139, Sub-part D -- Operations, 139.303, Personnel: "Each certificate holder shall maintain sufficient qualified personnel to comply with the requirements of its airport certification manual or airport certification specifications and the applicable rules of this part." (FAR Part 139.303, 1989)

However, to help clarify the intent of FAR Part 139, which is a part of the Code of Federal Registry, the F.A.A. issues periodic advisory circulars. The literature search produced one F.A.A. advisory circular that was particularly noteworthy in regards to deployment capability, which has a necessary component of staffing. AC No: 150/5210-6C recommends that for "Index "B" (airports) and above, the number of trucks should be based on protecting both sides of the aircraft fuselage at the same time." (AC No: 150/5210-6C 1985)

This same advisory circular states as its purpose that, "This advisory circular (AC) outlines scales of protection considered as the recommended level compared with the minimum level in Federal Aviation Regulation Part 139." (AC No: 150/5210-6C 1985) While this statement does not specifically address staffing levels, it does indicate that the F.A.A. prefers that ARFF services providing protection at F.A.A. Index "B" and above airports will be able to respond at a certain level. It should be noted that FAR Part 139.317 only requires one ARFF vehicle for Index "B" airports.

Further supporting the need for adequate staffing is that, "Aircraft crashes are, by virtue of the fuel involved and the construction and system components, haz. mat. incidents." (Hilvers 1995)

At the same time, ARFF apparatus has become more automated and efficient in its deployment of suppression product over the years. Most modern ARFF response units are equipped with remote turrets which can rapidly apply fire suppression product to cover escape routes for aircraft occupants. The use of remote turrets can be effective in controlling exterior cabin fires, and can be operated with a relatively small crew in most cases.

However, "turrets should be used only as long as they are being effective. After initial knockdown of the heat and flame, use of hand lines to maintain control of evacuation areas

can be a key to a successful rescue operation." (NFPA 402 8-8.1, 1996) An important consideration when using high flow turrets is the limited time frame during which they can be operated. "When pumping at capacity they will exhaust their on board water supply within two minutes." (Hilvers 1995) Unlike urban structural fire fighting, which normally relies on a municipal water delivery system, aircraft rescue fire fighters are limited to the 1,000 to 3,000 gallons of water and foam concentrate that they carry with them.

At the same time, a Boeing 737, 727, DC-9, or MD-80 aircraft, commonly used by air carriers and frequently scheduled at both FAA Index "B" and "C" airports, can carry sixty to two-hundred passengers, and have a fuel capacity of 5,000 to 12,000 gallons of Jet-A fuel. (Hilvers 1995)

Additionally, to engage in any interior cabin operations, ARFF crews must be in sufficient numbers to exit their apparatus, and make a coordinated entry into the aircraft while wearing the appropriate personal protective equipment. "Life safety could demand that the firefighter enter the super heated fuselage or contact the radiant heat that still exists..." (Williams 1989)

Captain William Wekenborg, Assistant Chief in charge of training at the Dallas/Fort Worth Airport, was quoted as saying that, "The days of just driving up and throwing foam on an aircraft is gone. In many cases, an aggressive interior attack and evacuation support is necessary too." (Scott 1997)

This same notion is supported by Bradley International Airport Fire Department Fire Chief Peter Buonome, who also stressed the importance of engaging an interior attack on aircraft fires.

> The traditional ARFF tactics of surround and drown are no longer a logical or safe tactical norm. Recent aircraft accidents and cabin fires have shown that it is absolutely critical for ARFF teams to immediately gain entry into the aircraft, perform size-up and begin immediate attack on the interior fire to maintain a survivable atmosphere, while protecting exterior exposures. (Buonome 1991)

Likewise, NFPA 403, Standard for Aircraft Rescue and Fire-Fighting Services at Airports, lists in its standards that ARFF personnel, "...will, by whatever means necessary, and to the extent possible, enter the aircraft and provide all possible assistance in evacuation of the occupants." (NFPA 403 1-3 1998)

To provide some reference for what it can minimally take to engage in an interior aircraft fire control and rescue operation, the National Fire Protection Administration provides a specific example in their publication, NFPA 402. This specific rescue operation consists of:

> Four ARFF personnel equipped with full protective clothing and positive pressure self-contained breathing apparatus (SCBA). Two of the persons are hand line operators and precede the other two, who are equipped with appropriate hand-held tools needed for forcible entry, extrication, and making access to hidden fuselage fires behind panels, floors, and compartments. (NFPA 402 8-4.4, 1996)

"In the event of an aircraft interior fire you must allow the occupants of the aircraft to evacuate. After all occupants have evacuated, enter the cabin wearing full protective clothing, self-contained breathing apparatus, [carrying] a hand line, and with another firefighter wearing the same equipment you are. With two firefighters aboard, they can protect each other." (Lindemann 1996)

One governmental agency that does indirectly address staffing levels is the Oregon Occupational Safety and Health Administration (OR-OSHA), under its "2-In/2-Out" rule. Under "2-In/2-Out," fire fighters to have "two firefighters stationed outside an IDLH (Immediately Dangerous to Life and Health) atmosphere, prepared to initiate rescue for firefighters inside the hazard zone." (OAR 437-002-0182)

Although ARFF is specifically listed as an exempted activity, the regulation goes on to state that, "when a public fire department elects to participate in one or more of the exempted fire fighting activities, that fire department shall comply with all of the provisions of OAR 437-002-0182. (OAR 437-002-0182(1)(a)(A)(Exception) The Eugene Fire Department is a public fire department, and structural firefighters are used to augment the basic ARFF response, therefore, the Eugene Fire Department is subject to this requirement.

This same requirement effects structural fire fighters and requires at least two personnel to make entry, for a total of four firefighters, to initiate any type of interior operation. The federal OSHA regulations, that OR-OSHA draws from, recognize deviations to these regulations in, "an emergency operation where immediate action is necessary to save a life. However, such deviations from the regulations must be exceptions and not defacto standard practices. In fact, OSHA may still issue 'de minimis' citations for such deviations from the standard, meaning that the citation will not require monetary penalties or corrective action." [29 CFR 1910.134(g)(4)(Note 2)]

This Federal OSHA approved plan is prescribed by the OR-OSHA "Two-In/Two-Out" requirements, and meets or exceeds the federal requirement as prescribed in [29 CFR 1910.134(g)(4)(i)]. Based on this requirement, four ARFF qualified firefighters should be on scene before interior rescue and firefighting operations can be initiated in IDLH atmospheres.

These same safety practices are spelled out in the Eugene Fire Department's Two-In/Two-Out rule and provided in Standard Operating Procedure SOP 3-1-6.

Determining the appropriate staffing level for ARFF service, while facing very real budget constraints, is an issue for the smaller airports (Index A & B primarily) according to the results of the 1995 Rural/Metro survey and report. (Rural/Metro 1995) The average staffing number for Index "B" airports, identified by Rural/Metro Corporation, was thirteen which represents an increase of four positions over what they had identified as the average staffing level at FAA Index "A" airports. The survey report also indicated that "...many F.A.A. Index 'B' airports augment the ARFF staff with other airport personnel during emergency responses." (Rural/Metro 1995)

Rural/Metro also found there were staffing concerns in many of the F.A.A. Index "C" airport ARFF operations as well.

> The number of personnel on duty, available to respond to emergencies, is an issue linked directly with the staffing of the department. During an actual emergency, all available personnel will be needed and many airports expressed concern over adequate personnel, on duty, to deal with the emergency. This concern, was expressed in many of the survey responses. (Rural/Metro 1995)

The average staffing number for Index "C" airports identified by Rural/Metro Corporation was twenty-two (22), which represents an increase of nine positions over what they had identified as the average staffing level at F.A.A. Index "B" airports. (Rural/Metro 1995) When analyzing causes for staffing cutbacks at Index "C" airports, as expected, Rural/Metro attributed these causes to fiscal limitations.

> Staffing cutbacks at the Index "C" level seem to be linked to budgetary constraints and echo the concerns of Index "A" and "B" airports. Index "C" level airports, however are increasingly less dependent on cross trained staff and utilize full-time fire fighters more regularly. Many airports at this level, however, still maintain only one person assigned per shift per vehicle. (Rural/Metro 1995)

But regardless of budget constraints, it still takes an adequate number of firefighters to get the job done. Lindemann recommends that, "All airport fire trucks should be manned by a minimum of two qualified ARFF personnel, a driver and a hand line operator." (Lindemann 1996)

Assistant Fire Chief Dominick Landolfi, from the Patrick Air Force Base in Florida recommends a minimum staffing level of four firefighters to be on duty at F.A.A. Index "B" airports. (Landolfi 1998) Even with four firefighters on scene, Chief Landolfi emphasizes the limited capacity of deploying only one hose line. (Landolfi 1998)

In addition to the initial aircraft rescue and firefighting component, the ARFF crew "...is almost always the initial command agency for large plane crashes. Often the response will involve multiple jurisdictions as well as multiple agencies performing a variety of functions. Such large operations bring an endemic problem for incident command." (Hilvers 1995)

3) Are Eugene's ARFF services adequately funded, and what funding sources are employed in the industry?

As the cost of aircraft rescue and fire fighting service delivery increases, the tendency is to downsize staffing or reduce training for the personnel assigned to this responsibility. "Hard pressed state and local governments are constantly on the hunt for budget savings. Not only does that often hit the ARFF training budget, but it increasingly means that an apparatus may

be manned by a single firefighter, all but eliminating any interior aircraft firefighting capability." (Scott 1997) Scott goes on to state that, "In some airports, ARFF services are being phased out completely." (Scott 1997)

"The ARFF debate intensifies when the issues of money and personnel are thrown into the equation. ARFF crews stationed at larger airports (F.A.A. Indexed airports) are required under F.A.A. rules to practice on one live spill fire a year. But the cost of such training keeps rising." (Scott 1997)

"The average ARFF budget is 90% personnel and payroll related costs." (Rural/Metro 1995) Therefore, the cost associated with Aircraft Rescue and Fire Fighting is almost entirely driven by the staffing levels needed to provide an effective service delivery system. Because of this fact the airline industry, airport manager associations, and ARFF service providers need to identify new methodology for redistributing the associated costs.

The Federal Aviation Administration also recognizes the significant cost associated with Aircraft Rescue Fire Fighting, and to date, has successfully avoided specifying staffing levels at indexed airports. A statement made by the F.A.A. and found in the comments section of FAR Part 139 helps provide some perspective into their "hands off" approach in addressing this staffing controversy.

> ...we continue to be sensitive to the cost to the airports of providing an adequate rescue and firefighting capability. While the F.A.A. has responsibility to ensure that adequate safety standards are maintained, we are equally cognizant of the need to minimize costs. If, in the future, there appears to be a method of achieving adequate airport fire safety that is less burdensome on certificate holders, we will consider modifying our requirements accordingly. (FAR Part 139, 1987)

The fact that smaller airports assign more outside duties to their Aircraft Rescue Fire Fighting personnel is an indication that, "the only way a smaller airport (Index A & B primarily) can afford an 'on-airport' ARFF service is by increasing their value/productivity through other duties." (Rural/Metro 1995)

Some Aircraft Rescue Fire Fighting services have experienced consolidations or changes in service providers as a strategy to reduce the cost. In Santa Barbara, California, the ARFF service, which previously was a stand-alone service, was moved into the City's Fire Department to improve budgetary control.

> On July 1, 1990, the Santa Barbara City Fire Department assumed the Aircraft Rescue and Firefighting (ARFF) duties at the Santa Barbara Airport. For more than twenty-five years these duties had been provided for by contract to the Santa Barbara County Fire Department. The reason for the change was an economic one. Since the airport is operated by the city, it was felt that keeping all the essential services in the city "family" would allow airport management greater control over operating expenses. (Dumas 1990)

One funding source that can be used for ARFF vehicles, and large equipment purchases, is the Federal Grant-in-aid assistance program for Airport Improvement Planning (AIP). For accessing federal Grant-in-aid assistance for Crash Fire Rescue vehicles, John C. Carr and Leslie P. Omans, with Aviation Emergency Training Consultants, advise equipment procurement officers to begin by consulting with the F.A.A. "...Safety/Compliance Division officer assigned to your airport. This individual is extremely important: He or she will give final approval for any unique optional items you may request." (Carr 1992)

PROCEDURES

The procedures used in this evaluative research involved a literature review of applicable Federal Aviation Administration regulations, National Fire Protection Association recommendations, and other applicable material obtained through a literature search. Following the literature search and review, a draft survey containing twenty-four (24) questions was developed to determine statistical information to compare airports, levels and types of service provided by ARFF personnel, staffing levels, and funding levels and sources. The survey areas were then refined following the three research questions, and the format used in the presentation of the literature was followed to provide a level of continuity.

The three research questions were:

1. Should other services, in addition to aircraft rescue and fire fighting, be delivered by Eugene's ARFF personnel?
2. What is the appropriate ARFF staffing level for the Eugene Airport?
3. Are Eugene's ARFF services adequately funded, and what funding sources are employed in the industry?

Additional questions were then added outside of the research scope to help determine statistical similarities such as annual commercial flight volume and governmental structure in addition to the F.A.A. Index requirements. This was done to aid in the comparison of the Eugene Fire Department's ARFF program to the survey population, and to help establish a relevant set of benchmarks. This information was presented under a separate category titled, "General Information," and found in the "Results" Section of this research paper.

The draft instrument was then administered to one Eugene Fire Department chief officer, also in the NFA Executive Fire Officer Program, the department's Administrative Services Manager, and the department's Budget Manager for review and comment prior to

distribution. These staff personnel provided additional advice which helped improve and further refine the instrument.

The final survey instrument was then mailed to all twenty-four (24) F.A.A. designated Index "B" and "C" airports, with scheduled flights, in the F.A.A.'s Northwest Mountain Region, and was also completed internally by the Eugene Fire Department's Budget Manager.

Of the twenty-four (24) surveys mailed, fifteen (15), including Eugene, Oregon, were returned. This provided a survey return rate of 63%. Of these fifteen (15) surveys, thirteen (13) were from F.A.A. Index "B" airports, and two were from F.A.A. Index "C" airports. Eugene's data was also included in the survey population data base. Although unsolicited, a number of agencies provided additional comments in responding to some questions which helped to provide a better understanding of their staffing, operations and funding of services.

The following are the twenty-four (24) F.A.A. Northwest Mountain Region Index "B" and "C" airports listed by state. The fifteen (15) airports which responded to the survey request are indicated in bold print:

1. COLORADO

Aspen - Pitkin County Sardy Field	Index "B"	Scheduled
Colorado Springs - City of Colorado Springs Municipal	Index "C"	Scheduled
Durango - Durango/La Plata County	**Index "B"**	**Scheduled**
Eagle - Eagle County Regional	Index "C"	Scheduled
Grand Junction - Walker Field	**Index "B"**	**Scheduled**
Gunnison - Gunnison County	**Index "B"**	**Scheduled**
Hayden - Yampa Valley	Index "B"	Scheduled
Montrose - Montrose Regional	Index "B"	Scheduled
Pueblo - Pueblo Memorial	**Index "B"**	**Scheduled**

2. IDAHO

Boise - Air Terminal/Gowen Field	Index "C"	Scheduled

3. MONTANA

Billings - Billings Logan International	**Index "C"**	**Scheduled**
Bozeman - Gallatin Field	**Index "B"**	**Scheduled**
Butte - Bert Mooney	**Index "B"**	**Scheduled**
Great Falls - Great Falls International	**Index "C"**	**Scheduled**
Helena - Helena Regional	**Index "B"**	**Scheduled**
Kalispell - Glacier Park International	**Index "B"**	**Scheduled**
Missoula - Missoula International	**Index "B"**	**Scheduled**

4. OREGON

Eugene - Malon Sweet Field	**Index "B"**	**Scheduled**
Medford - Rogue Valley International	Index "B"	Scheduled
Redmond - Roberts Field	**Index "B"**	**Scheduled**

5. UTAH

No airports designated F.A.A. Index "B" or "C"

6. WASHINGTON

Bellingham -Bellingham International	**Index "B"**	**Scheduled**
Pasco - Tri-Cities	Index "B"	Scheduled
Spokane - Spokane International	Index "C"	Scheduled

7. WYOMING

Jackson - Jackson Hole	**Index "B"**	**Scheduled**

The survey findings were then presented in the "Results" section of this paper. Each survey question was placed appropriately into one of three categories that followed the research questions, plus an additional category for providing general information about the airport served and governmental authority that operated the airport. In addition to incorporating Eugene's survey response into the data base, the Eugene ARFF program was identified separately as a comparison since this agency was established as the baseline of comparison for this research project.

Limitations:

The major limitations experienced in this research included the difficulty in comparing programs due to the wide variable in airport sizes, number of flights, and complexity of the various operating environment. Although the F.A.A. index system, which regulates ARFF services, was the most logical indicator for selecting the survey population, there was a wide variation in levels of service delivery sophistication.

Another limitation that effected the research was the difficulty in most agencies being able to clearly delineate the true costs associated with their aircraft rescue and fire fighting programs. This was especially true for those agencies that utilized their firefighting personnel for general airport operational duties in addition to aircraft rescue and fire fighting.

The fact that the survey population was limited to the F.A.A. Northwest Mountain Region limited the survey population to just twenty-four (24) airports. Although the number of surveys returned, fifteen (15), for a return rate of 63% was good, the small survey population may have produced findings that are not representative of a broader group of Index "B" and "C" airports.

RESULTS

The results from this research have been presented in a format which follows the research questions for easy reference and continuity. Where applicable, the central tendency and statistical findings are provided with the survey data.

Following the presentation of the results for each survey question, is information about Eugene's ARFF program as an evaluative comparison point of analysis. As described in the "Procedures" section of this research paper, the Eugene Fire Department's ARFF program, which can also be considered the Eugene Airport's ARFF program, was used as a baseline for comparison.

General Information:

Survey Question #1: What authority operates your airport?

Of the fifteen (15) responses, five (5), or 33% were operated under a port authority or special district; four (4), or 27% were operated by a city municipality; three (3) or 20% were operated by a city/county joint powers authority; two (2), or 13% were operated by an independent airport authority; and one, or 7% was operated exclusively by county government.

As a comparison, the Eugene Airport is operated under the authority of city government. Specifically, the Eugene Airport is currently a division within the City's Public Works Department. Although this structure has been in place since the early 1980's, it is currently under review.

Survey Question #2: Who provides ARFF services at your airport?

Of the fifteen (15) responses, seven (7), or 47% of the ARFF services were provided by either a port authority, airport authority or special district; three (3), or 20% were provided by a city fire department, three (3), or 20% were operated by an airport district; one each, or 7% was provided by either a dedicated airport fire department, or non-fire department affiliated city employees.

As a comparison the ARFF services at the Eugene Airport are provided by the city fire department.

Survey Question #3: How many commercial flights did your airport receive in 1999?

Of the fifteen (15) responses, one respondent did not provide this information. Of the remaining fourteen (14), the highest number of commercial flights was 29,381, and the lowest number of annual commercial flights for 1999 was 950.

The "mean," or average number of annual commercial flights was, 9,034.69. The "mode," or number of annual commercial flights most commonly experienced by the survey respondents was placed in a range of between 5,000 and 10,000. Seven (7), or 50% of the fourteen (14) respondents providing this information, fell into this range. The "median," or mid point value at which 50% of the respondents experienced more commercial flights, and 50% of the respondents experienced fewer commercial flights was 5,400. As a comparison, the Eugene Airport experienced the highest number of commercial flights for the survey population at, 29,381.

After a review of the completed survey instruments, the two most similar airport ARFF systems in comparison to the system in place at the Eugene Airport were:

1. Roberts Field in Redmond, Oregon
2. Pueblo Memorial in Pueblo, Colorado.

Research Question #1: Should other services, in addition to aircraft rescue and fire fighting, be delivered by Eugene's ARFF personnel?

Survey Question #14: Please indicate all services provided by ARFF firefighters in your jurisdiction:

From the fifteen (15) survey responses, the two most common services provided by ARFF response personnel, in addition to ARFF response, were fire safety inspections and runway inspections. Twelve (12) of the fifteen (15) survey respondents indicated that these services were provided by their ARFF personnel. Spill control/hazardous materials response,

and emergency medical response were the next most frequent services identified by the survey respondents at eleven (11) each. The third most frequently identified services were; structural firefighting, perimeter checks, and pavement checks at ten (10) each.

As a comparison, in addition to aircraft rescue and firefighting response, firefighters assigned to Eugene's Airport provide structural firefighting on airport property, emergency medical response, spill control and hazardous materials response, fire safety inspections, and fire extinguisher training to the fixed base operators (FBOs).

TABLE - 1
(Survey Question #14)

Structural Firefighting on Airport Property	10
Structural Firefighting off of Airport Property	2
Emergency Medical Response	11
Spill Control and Hazardous Materials Response	11
Security	7
Fire Safety Inspections	12
Runway Inspections	12
Perimeter Checks	10
Pavement Checks	10
Snow Removal	8
NOTAM Distribution	9
Fire or EMS Training to Fixed Base Operators	9
Grounds Maintenance (other than fire station)	9
Other	4

The following is descriptive verbiage that was provided under the "other" category on the survey response instruments:

"Any operations function."
"Ground transportation enforcement, e.g. buses, taxis, etc."
"Janitorial."

Survey Question #15: Yes or no, are your ARFF personnel assigned to perform work outside of your airport's designated SIDA security area?

From the fifteen (15) survey responses, thirteen (13), or 87% indicated that ARFF personnel are assigned work outside the airport SIDA security area, while two (2) or 13% indicated no.

As a comparison, firefighters assigned to Eugene's Airport are not assigned routine work outside of the SIDA security area due to response time concerns. ARFF firefighters do respond to emergency incidents, on airport property, outside of the security area.

Survey Question #16: If ARFF personnel are assigned work outside of the SIDA security area, what type of work is assigned?

The following is descriptive verbiage that was provided directly on the survey response instruments:

"After the last scheduled air carrier flight, ARFF personnel (1), are assigned miscellaneous maintenance."
"EMS and Fire Protection."
"Pavement repair, tower building repair, lighting repair and general maintenance."
"Airport wide fire response and inspection."
"All duties."
"All types of airport operations and maintenance duties."
"Maintenance, public safety, janitorial."
"Snow removal."
"Mowing, security, snow removal and airfield maintenance."

Survey Question #17: Yes or no, if ARFF personnel are assigned to work outside of the SIDA security area, is there a minimum number of personnel that are required to remain with the ARFF response units to maintain the F.A.A. three (3) minute response time?

From the fifteen (15) survey responses, eleven (11), or 73% indicated that a minimum number of personnel were required to remain with the ARFF response units, while four (4), or 27% indicated no such requirement.

The second part of the question asked for the minimum number of personnel required to stay with the ARFF response units. Of the eleven (11) responses indicating this was a requirement at their airport, the highest number was five (5) personnel, the lowest was one. The "mean," or average number was 1.55, while the "mode" and "median" numbers were both placed at one.

As a comparison, the two firefighters assigned to each shift at the Eugene Airport are always required to remain in close proximity to their response unit.

Survey Question #18: How many ARFF response units do you normally staff?

Of the fifteen (15) survey responses, thirteen (13) provided this information. Of the thirteen (13) responses, the largest number of ARFF response units staffed was indicated in a range of four (4) to six (6), while the lowest number of staffed ARFF response units was reported as one. The "mean," or average number of staffed units was 1.92. Both the "mode" and the "median" number of staffed response units were two.

The Eugene Fire Department staffs one primary ARFF response unit, a 3,000 gallon Oshkosh, with its two assigned firefighters. An engine company also responds from another station and staffs an additional ARFF response unit, 1,500 gallon Oshkosh, during a declared emergency. Due to the distance from the airport, this second unit can take up to ten minutes to respond, staff the second ARFF unit, and be operational. Additional structural units fill out the rest of the response for a commercial air carrier event, and include a truck company, one or more water tenders, and one or more medic units.

Research Question #2: What is the appropriate ARFF staffing level for the Eugene Airport?

Survey Question #4: Please identify the type of work force that provides ARFF services at your airport:

This survey question was developed to identify the various employee groups used to provide ARFF services. Of the fifteen (15) survey responses, eight (8), or 53% indicated that they employ general airport staff assigned primarily to other airport functions. Five (5), or 33% exclusively employ full time professional firefighters dedicated to ARFF services, and two (2), or 13% employ a combination of full time professional firefighters that are augmented by general airport maintenance or support staff.

As a comparison, the Eugene Airport employs professional firefighters that are provided by the City's fire department. The table below provides the specific break down of survey responses.

TABLE - 2
(Survey Question #4)

Full time professional ARFF firefighters who staff an airport fire station	5
Full time professional ARFF firefighters who staff an airport fire station and are augmented by other airport employees functioning as firefighters	2
ARFF standby provided by firefighters responding from a fire station off airport property for scheduled commercial flights	0
Response from a station off airport property that has a larger response area	0
Airport staff assigned primarily to other job functions	8
Other	2

"Rural volunteer department provides EMS."
"Montana National Guard (are) stationed at the airport and assist with response."

Survey Question #5: What is your minimum staffing level per work shift?

Of the fifteen (15) survey responses, the highest minimum staffing level was five (5) personnel, the lowest was one. The "mean" or average minimum staffing level was two (2). The "mode," or the minimum staffing number most commonly found in the survey responses was also two (2). The "median," or mid point value at which 50% of the survey responses indicated a

minimum staffing level above, and 50% of the responses indicated a minimum staffing level below was also two (2).

The two Index "C" airports, Great Falls, Montana and Billings, Montana, indicated minimum staffing levels of five (5) and two (2) respectively. As reflected in the survey numbers above, they were both incorporated into the general survey population in calculating the statistical information.

As a comparison, the Eugene Airport has a minimum ARFF staffing level of two (2) personnel.

Survey Question #6: Is your minimum staffing level maintained twenty-four (24) hours per day?

Of the fifteen (15) survey responses, seven (7), or 47% indicated that they maintain a minimum ARFF staffing level twenty-four (24) hours per day, although in some cases, this minimum level is lower during periods of time when commercial flights are not scheduled. Eight (8) survey responses, or 53%, indicated that minimum staffing is not maintained twenty-four (24) hours per day.

As a comparison, the Eugene Airport maintains a constant minimum ARFF staffing level of two personnel twenty-four (24) hours per day.

Survey Question #7: Do you maintain ARFF qualified firefighters at locations other than the airport?

From the fifteen (15) survey responses, only five (5) maintain ARFF qualified firefighters at locations other than the airport, while ten (10), or 67%, do not. As a comparison, the Eugene Airport ARFF program maintains ARFF certified firefighters at additional fire stations off of the airport property.

*Survey Question #8: If your answer to question #**7** is yes, how many qualified firefighters do you have in your program?*

This companion question to *Survey Question #7* above attempts to quantify how many additional ARFF certified firefighters are retained at other locations for those airports that follow this practice. Of the five (5) respondents that indicated they do so, only four responded with the number of personnel. Of these four responses, twenty-seven (27) personnel was the highest, and thirteen (13) personnel was the lowest. The "mean" or average number of personnel in programs meeting this criteria was 21.75.

As a comparison, the Eugene Airport maintains twenty-seven (27) personnel meeting the F.A.A. training requirements in its ARFF program, and deploys them at surrounding stations to the Eugene Airport.

Survey Question #9: What type of shift or work schedule do your ARFF personnel work?

From the fifteen (15) survey responses, nine (9), or 60% of the ARFF programs assign their personnel to a forty (40) hour work week, three (3), or 20% a fifty-six (56) hour work week, one each, or 7%, work a fifty-three (53) hour work week, a forty-eight (48) hour work week with four twelve hour shifts, or split shift of two-sixteen hour combined with one-eight hour shift.

As a comparison, the Eugene Airport ARFF program follows the city fire department's standard fifty-six (56) hour work week, with twenty-four (24) hours on duty, and forty-eight (48) hours off duty.

Survey Question #10: Do structural firefighters from other stations and/or jurisdictions, off of airport property, respond in conjunction with your airport's ARFF firefighters to aircraft emergencies?

From the fifteen (15) survey responses, fourteen (14), or 93% indicated that they do rely on a structural fire department response component from other stations and/or jurisdictions, while only one response, or 7%, indicated that they did not rely on any additional support.

As a comparison, the Eugene Airport ARFF response system relies heavily on additional units from other city stations and one rural fire protection district which covers the area immediately surrounding the airport property.

Survey Question #11: What would your average response be for an inbound Boeing 737-200 declaring an in-flight emergency?

Survey Question #11 also asked that the average response be identified by number of fire suppression units and number of suppression personnel. The highest number of suppression units indicated for this response was fifteen (15), and the highest number of personnel was thirty (30). The lowest number of suppression units indicated for this response was two (2), and the lowest number of personnel that would be a part of this response was also two (2).

The "mean" or average number of fire suppression units indicated for this response was five (5), and the "mean" or average number of personnel that would be assigned was 9.57. One survey respondent left the number of response personnel blank and indicated that they

were unsure of the correct number. In those instances where a respondent provided a range, an average number within that range was factored into the calculations.

The "mode" and the "mean" number for both fire suppression units and the number of personnel assigned to the response was five (5) and ten (10) respectively.

As a comparison, the Eugene Fire Department would provide an initial response package of five (5) fire suppression units staffed with fourteen (14) fire personnel, plus a rural protection response component that varies according to the availability of volunteer staff.

Survey Question #12: Are your airport's ARFF firefighters employed by a fire department or fire district separate from your airport?

From the fifteen (15) survey responses, four (4), or 27%, indicated that their ARFF personnel were employed by a fire department or fire district separate from the airport, and eleven (11), or 73% indicated that their ARFF personnel were not.

As a comparison, the firefighters assigned to the Eugene Airport are employed by the city fire department and are International Association of Fire Fighters (IAFF) unionized employees.

*Survey Question #13: Yes or no, if the answer to question **#12** is yes, are they regularly rotated out of the airport?*

As a companion question to *Survey Question #12* above, four (4) respondents provided information. Of the four (4) responses, two (2) indicated that their firefighters were routinely rotated out of the airport assignment, and two (2) respondents indicated that their firefighters were not.

As a comparison, firefighters assigned to Eugene's Airport serve a two year minimum rotation period with periodic individual shift assignments into one of the city stations for training and proficiency maintenance purposes.

<u>Research Question #3</u>: Are Eugene's ARFF services adequately funded, and what funding sources are employed in the industry?

Survey Question #19: What is your annual ARFF operating budget?

This survey question contained three parts. The first part asked for the total ARFF operating budget for which most survey respondents were either unable to break out their costs for ARFF service delivery from the operational portion of their budget, or expressed that they were unable to identify all costs. Of the fifteen (15) survey respondents, nine (9) were able to identify all, or a portion of their associated costs, five (5) provided an explanation for the lack of data, and one provided no data or explanation.

Since the reliability of the data for this question was highly suspect, the specific responses, along with verbiage provided by the respondents, is listed below, but no attempt was made to further analyze the response information for this part of the question.

TABLE - 3
(Survey Question #19)

Billings, Montana	$60,000	"Does not include personnel costs."
Pueblo, Colorado	$497,480	
Grand Junction, Colorado	$15,000	
Kalispell, Montana	$120,000	
Gunnison, Colorado	$92,000	
Great Falls, Montana	$2,200,000	
Butte, Montana	$210,000	
Jackson Hole, Wyoming	$20,000	"Does not include salaries."
Eugene, Oregon	$490,000	"Does not include general fund assistance."

Verbiage found on survey instruments under this question in lieu of specific budget information:

"Unable to quantify."
"Difficult to split out because it is included in maintenance budget."
"Not separate from the general budget."
"No separate budget."
"Never been broken down, mixed with other operations."

As a comparison, the annual ARFF operating budget for the Eugene Airport is $490,000. This amount is also augmented by an additional $40,000 dollars from the Fire Department's general fund.

This survey question also asked for a break down of the ARFF operating budget through the following two sub-questions:

A) *What percentage of your annual operating budget is for personnel?*

For the second part of this question, of the fifteen (15) responses, eight (8), or 53%, indicated either a percentage of budget dedicated to personnel costs, or a dollar amount which was then converted to a percentage for the purpose of reporting consistency. Of the eight (8) responses, 96% was the highest percentage of budget, and 35% was the lowest.

The "mean" or average percentage of budget directed towards personnel costs was 60.25%. The "mode," or percentage of ARFF operating budget most commonly identified by the survey respondents for personnel costs was 40%. The "median," or mid point value at which 50% of the respondents appropriated more for personnel costs, and at which 50% of the respondents appropriated less for personnel costs, was also 40%.

As a comparison, the percentage of the Eugene Airport ARFF budget directed towards personnel costs is 85%.

B) *What percentage of your annual operating budget is for training?*

For the third and final part of this question, of the fifteen (15) responses, nine (9), or 60%, provided either a percentage of budget dedicated to training costs, or a dollar amount which was then converted to a percentage for the purpose of reporting. Of the nine (9) responses, 53% was the highest percentage of budget identified, and 2% was the lowest.

The "mean" or average percentage of budget directed towards training costs was 17.17%. The "mode," or percentage of ARFF operating budget most commonly identified by the survey respondents as being directed towards training was 5%. The "median," or mid point value at which 50% of the respondents appropriated more towards training costs, and at which 50% of the respondents appropriated less towards training costs was 8%.

As a comparison, the percentage of the Eugene Airport ARFF budget directed towards training costs is 4%.

Survey Question #20: Yes or no, do you feel that your budget is adequate to fund your ARFF program?

From the fifteen (15) responses, ten (10), or 67% of the survey respondents answered yes while five (5), or 33% of the respondents felt that their budget was inadequate to fund their ARFF program. The most frequent comment was, "need more money for training."

As a comparison, the Eugene Airport falls under city government jurisdiction. Specifically, the Eugene Airport is currently a division within the City's Public Works Department. While fire department managers consider the ARFF operating budget under funded, and in fact augment it by $40,000 out of the fire department's general fund, airport management has traditionally held the position that the ARFF program is over budgeted and too expensive.

Survey Question #21: Please indicate, by percentage how your ARFF services are funded:

Although this particular survey question requested a response by percentage of funding, only one respondent provided data in this manner. Therefore, the following represents the frequency that each revenue source was identified as being utilized by the respondents.

TABLE - 4
Survey Question #21

Property Tax	1
Port or Special District Tax	0
Passenger Boarding Tax	1
Airline Gate Fees	7
Fees for Service	6
Fueling Fees	7
Rental Agreements	6

Verbiage found on survey instruments under this question:

"100% funded through rates and charges."
"No breakout." There were two (2) responses with this verbiage.
"Landing fees." There were two (2) responses with this verbiage.
"Airport contract."
"Airport owns several federal office buildings" (receives rent).
"100% fees for service."
"Majority funded through military joint-use agreement."
"Airlines pay for all ARFF services."

As a comparison, the Eugene Airport's ARFF budget is 100% funded by airline gate fees and commercial air carrier space rental.

Survey Question #22: Does general aviation pay any portion of your airport's ARFF service?

Of the fifteen (15) responses, five (5), or 33% of the respondents answered yes, general aviation does pay a portion of their ARFF costs, while ten (10), or 67% of the survey respondents answered no. As a comparison, the Eugene Airport does not charge general aviation for ARFF services.

*Survey Question #23: If the answer to question #**22** is yes, how does your airport collect this revenue?*

This companion question to *Survey Question #22* above produced several methods for generating revenue from general aviation. Of the five (5) respondents who indicated that general aviation was charged, four (4), or 80% identified "fuel flowage" fees and lease or rental agreements, and one, or 20% identified aircraft "tie down" fees as a source of revenue.

As a comparison, the Eugene Airport directs no revenue from general aviation towards ARFF services.

DISCUSSION

The Federal Aviation Administration (F.A.A.) categorizes airports accepting commercial air traffic into five indexes, "A" through "E," under the Federal Aviation Regulations (FAR) Part 139. Although staffing is not specified in these regulations, the size, number and capacity of ARFF response units, response times, and training standards are. These F.A.A. indexes, and the airports that fall within them, are determined by the size of the largest aircraft, which has a minimum of five (5) scheduled daily flights. Although this standard provides a methodology for determining some ARFF standards, it falls short of providing local jurisdictions with a clear set of operating and staffing guidelines, especially when there is pressure from the airlines and airport managers to keep the cost down.

Where the F.A.A. falls short in providing clear guidelines, the National Fire Protection Administration (NFPA), provides more clarity in their standards, but unfortunately only provides advisory recommendations, and does not have statutory authority like the F.A.A. to mandate standards and enforce their compliance.

While the twenty-four (24) F.A.A. Index "B" and "C" airports that fall within the F.A.A.'s Northwest Mountain Region present a logical survey population for bench marking Eugene, Oregon's ARFF services, there is at least one fundamental difference between these small and medium sized airports, and Eugene, Oregon, that must be taken into consideration. This most obvious difference is the variation in annual commercial flight volume between airports.

The survey showed that Eugene had the highest volume of annual commercial flights for 1999, at 29,381. The airport with the lowest number of annual flights, for this same time period, reported only 950. The "mean," or average number of annual commercial flights reported by the survey respondents was, 9,034.69, still less than a third of the volume experienced in Eugene.

The "mode," or number of annual commercial flights most commonly reported by the survey respondents was placed in a range of between 5,000 and 10,000. Seven (7), or 50% of the fourteen (14) respondents providing this information, fell into this range. The "median," or mid point value, at which 50% of the respondents experienced more commercial flights, and 50% of the respondents experienced fewer commercial flights, was only 5,400, about one-sixth the volume experienced in Eugene.

Although commercial flights are the only flights the F.A.A. considers in establishing an index rating, and the Eugene Airport is one of the busier commercial airports in the Northwest Mountain Region, it also experienced 1,944 military flights and 82,017 general aviation flights for a total annual flight volume of 113,342 in 1999.

While commercial flight volume is only one consideration, it is a significant issue when considering the number of times each day that on duty ARFF personnel must be prepared for response to an aircraft incident. One must also take into consideration that Eugene's ARFF personnel respond to all aircraft incidents, not just commercial air carrier problems.

Further complicating this situation is the fact that the basket of services that is, or should be provided by aircraft rescue and fire fighting personnel, has been debated by Eugene's airport management and fire management for some time. Similar debates, or differences in opinion, may be even more pronounced at those airports that operate at the lower end of the F.A.A. index system, and must live within the constraints of an even smaller operating budget.

In a report and survey prepared by Rural/Metro Corporation in 1995, they found that, "More efficient use of personnel was prevalent in all categories of responses from Index 'A' to 'E.' Essentially, airports are looking to increase productivity and efficiencies in all ways." (Rural/Metro 1995)

At the same time, aircraft rescue and fire fighting personnel exist for the primary purpose of providing rescue and fire protection to the flying public at our nation's airports. This purpose of mission is emphasized by both the National Fire Protection Association, and the Federal Aviation Administration. According to the National Fire Protection Association's publication, NFPA 402, "The primary objective of ARFF personnel at the scene of any aircraft accident is to control and extinguish the fire to enable safe evacuation of the aircraft." (NFPA 402 8-4.1, 1996) This fact is reaffirmed by Federal Aviation Administration and prescribed in, FAR Part 139.

So what services can and should appropriately be provided by ARFF firefighters? How are the small and medium size airports handling this dilemma? The survey responses from the F.A.A. Northwest Mountain Region showed that most ARFF firefighters are in fact used in other capacities in addition to traditional ARFF services at this region's airports. While a number of airports utilize their ARFF resources in multiple capacities, the vast majority of the

survey responses indicated that their ARFF personnel were assigned primarily to other traditional fire service responsibilities.

From the fifteen (15) survey responses, the two most common services provided by ARFF response personnel, in addition to ARFF response, were fire safety inspections and runway inspections. Twelve (12) of the fifteen (15) survey respondents indicated that these services were provided by their ARFF personnel.

The survey also identified spill control and hazardous materials response, along with emergency medical response, as the next most frequent services identified by the survey respondents at eleven (11) each. The survey did not delineate between emergency and non-emergency duties in the survey questions.

The third most frequently identified services were; structural firefighting, perimeter checks, and pavement checks at ten (10) each. Facilities and ground maintenance functions were less frequently identified as duties assigned to ARFF personnel, and were found primarily in the airports with less commercial flight volume.

Although there are some legitimate arguments that can be made regarding ARFF personnel work load, available capacity and the fiscal constraints of many operating budgets, the question is what work should or could be aligned with ARFF responsibilities? A natural delineation can be made at the SIDA security fence line at most airports. Although the survey did not support this assertion, thirteen (13), or 87% indicated that their ARFF personnel regularly performed routine work outside of the airport SIDA security area, while only two (2) or 13% indicated that their personnel did not leave the security, the Eugene ARFF program and its deployment of resources, are centered entirely around the three minute response time criteria.

Although the majority of the survey respondents indicated that ARFF personnel were assigned work outside of the security fence line, eleven (11), or 73% indicated that a minimum number of personnel were required to remain with the ARFF response unit(s), for the purpose of response time, while four (4), or 27% indicated that they had no such requirement.

The second part of this same question asked for the minimum number of personnel required to stay with the ARFF response units. Of the eleven (11) responses indicating this was a requirement at their airport, the highest number was five (5) personnel, the lowest was one. The "mean," or average number was 1.55, while the "mode" and "median" numbers were both one. But does only one ARFF firefighter provide an adequate initial response to an aircraft emergency?

"There's only one chance to put out a post crash fire, and a very limited amount of time to do it." (Williams 1989) But what are the statistical odds of surviving such an air carrier accident? Even a slight delay in deploying ARFF personnel in adequate numbers to effect a rescue can mean the difference between life and death.

Like structural fire fighting, aircraft rescue and fire fighting take a tremendous amount of resources to properly handle extreme situations. To provide some reference for what it can minimally take to engage in an interior aircraft fire control and rescue operation, the National Fire Protection Administration provides a specific example in their publication, NFPA 402. This specific rescue operation consists of:

> Four ARFF personnel equipped with full protective clothing and positive pressure self-contained breathing apparatus (SCBA). Two of the persons are hand line operators and precede the other two, who are equipped with appropriate hand-held tools needed for forcible entry, extrication, and making access to hidden fuselage fires behind panels, floors, and compartments. (NFPA 402 8-4.4, 1996)

But what is the likelihood of an aircraft accident even occurring on airport property? "A review of air carrier accidents reveals that 80% of aircraft accidents occur on or within 3,000 feet of the runway during takeoff or landing and most occur at a relatively slow speed and are survivable, 15% of the accidents occur in the approach area and are generally fatal, "5% of the accidents occur en route and are most likely to be fatal." (Lindemann 1996)

Brian Boucher, representative of the Canadian Air Line Pilots Association and Chair of the NFPA ARFF technical committee, contends that "85% (of aircraft accidents) happen on takeoff or landing, and most of those are survivable." (Scott 1997)

While these incidents may be survivable, without an adequate number of trained rescue personnel on scene, within a short period of time and properly equipped to handle the emergency, the odds of survivability will be reduced. The fact that the Eugene Airport is located as much as ten (10) minutes from its closest fire suppression support exacerbates the problem of getting adequate fire suppression personnel and resources on scene in a timely manner. No specific studies could be located that measured the variable of aircraft rescue and fire fighting intervention verses no intervention, however, the implications from the literature are clear.

Although there may be personnel resource capacity in some ARFF service systems and the ability to increase value and productivity, what is appropriate work, and does this work interfere with ARFF personnel's primary responsibility, emergency response?

> What complicates the issue for smaller airports are the utilization of personnel for more than one job function. For example, if a field maintenance person is cross utilized for ARFF, what impact does it have on the response time to emergencies? If that person is on a mower in a remote area of the airport, they will likely not be able to meet the mandated response times. (Rural/Metro 1995)

Base level staffing for ARFF services is also an essential component to the response system. In Eugene's experience, airport management has traditionally focused on the bottom line in an effort to contain costs, which is a large part of their responsibility. Their position has been that meeting the F.A.A.'s FAR Part 139 can be done with a minimal staff. Fire management's position has been that maintaining a minimum level of staffing, currently two personnel twenty-four (24) hours per day, and remaining within the SIDA security area during their shift is essential to maintaining response system integrity and providing for a degree of safety for its personnel.

Although the Eugene Fire Department has traditionally held the perspective that even two personnel are inadequate, the survey responses seemed to support this minimum staffing level. From the survey, the highest minimum staffing level was five (5) personnel, the lowest was one. The "mean" or average minimum staffing level was two (2), and the "mode," and "median" were also two (2).

While two personnel is the standard at the Eugene Airport, and also appears to be the standard in the F.A.A.'s Northwest Mountain Region, Assistant Fire Chief Dominick Landolfi, from the Patrick Air Force Base in Florida, recommends a minimum staffing level of four firefighters to be on duty at F.A.A. Index "B" airports. (Landolfi 1998) Even with four firefighters on scene, Chief Landolfi emphasizes the limited capacity of deploying only one hose line. (Landolfi 1998)

This on going debate could more readily be resolved if the Federal Aviation Administration would take a position and designate staffing levels. The fact that this agency has remained silent on this specific issue has helped create this antagonistic system of trying to balance cost and safety.

One could speculate that the Federal Aviation Administration has avoided specifying staffing levels, in part, because of the cost implications for the nation's airports, airlines, and ultimately the flying public. This speculation is supported in part by a statement referenced in the literature review, and found in the comments section at the end of, FAR Part 139.

> ...we continue to be sensitive to the cost to the airports of providing an adequate rescue and firefighting capability. While the F.A.A. has responsibility to ensure that adequate safety standards are maintained, we are equally cognizant of the need to minimize costs. If, in the future, there appears to be a method of achieving adequate airport fire safety that is less burdensome on certificate holders, we will consider modifying our requirements accordingly. (FAR Part 139, 1987)

While the F.A.A., which has legal authority to enforce its standards but has remained silent on staffing, and the NFPA, which has no legal authority has developed standards and made recommendations on staffing, a third organization, the Oregon State Occupational Safety and Health Administration (OR-OSHA), addresses numbers of personnel needed to engage in certain types of work. Under this regulation, fire fighters employed by public fire departments must have two firefighters stationed outside an IDLH (Immediately Dangerous to Life and Health)

atmosphere, prepared to initiate rescue for firefighters operating inside the hazard zone. (OAR 437-002-0182)

Although the regulation exempts ARFF activities, the exemption specifically states that "when a public fire department elects to participate in one or more of the exempted activities, that fire department shall comply with all of the provisions of OAR 437-002-0182. (OAR 437-002-0182(1)(a)(A)(Exception) The Eugene Fire Department is a public fire department, and

structural firefighters are used to augment the basic ARFF response, therefore, the Eugene Fire Department is subject to this requirement.

This same requirement effects structural fire fighters and requires that at least two personnel be positioned outside as a safety, before two additional personnel can make entry into an IDLH environment. This means that a total of four firefighters must be on scene prior to initiating any type of interior operation, including interior aircraft rescue and firefighting, except under certain exemptions as provided for in the standard. This Federal OSHA approved plan is prescribed by the OR-OSHA, in its "Two-In/Two-Out" requirements, and meets or exceeds the federal requirement as prescribed in [29 CFR 1910.134(g)(4)(i)]. Based on this requirement, four ARFF qualified firefighters are needed on scene before safe interior firefighting operations can be initiated in IDLH atmospheres.

Because of this regulation, and what constitutes good safety practices, ARFF firefighters find themselves pinched on both sides of the staffing dilemma. On one hand they are frequently under staffed to a point where function is hampered, and on the other hand, they are regulated by OSHA in performing certain interior operations.

Most ARFF systems are thus designed around a larger response system that includes firefighters from surrounding fire departments, districts or stations to augment their on site ARFF staff. This assumption was supported by the survey responses which showed that fourteen (14), or 93% do rely on a larger response from a structural fire department or from other stations and/or jurisdictions, while only one response, or 7%, indicated that they did not rely on any additional response support.

The fact that an aircraft accident is resource intensive supports these larger responses. However, while this system may be an acceptable method of obtaining adequate fire suppression resources during a "declared emergency," one in which the pilot radios some

distance from the airport and reports in-flight problems, it is not an adequate staffing practice to handle an "undeclared emergency," one in which an aircraft accident occurs without any prior warning.

While service levels and staffing translate into effective ARFF delivery, the challenges of maintaining adequate funding lie at the heart of these issues. "The average ARFF budget is 90% personnel and payroll related costs." (Rural/Metro 1995) Therefore, the cost associated with Aircraft Rescue Fire Fighting is almost entirely driven by the staffing levels needed to provide an effective service delivery system. Because of this fact the airline industry, airport manager

associations, and ARFF service providers need to identify new methodology for redistributing the associated costs.

These costs can be extremely high considering the level of training and sophistication ARFF personnel bring to the service. This is especially true when ARFF personnel are career firefighters that are cross trained in the multiple disciplines found in today's fire service. When asked whether or not the survey respondent felt their ARFF budget was adequate to fund their ARFF program, ten (10), or 67% of the survey respondents answered yes while five (5), or 33% of the respondents felt that their ARFF budget was inadequate. The most frequent comment made by those who felt their budget was inadequate was, "need more money for training."

One factor that may have contributed to this surprising response is that of the fifteen (15) returned survey instruments, ten (10) were completed by airport managers, four (4) by fire managers, and one by a joint public safety manager. With two exceptions, the responses were polarized along the lines of airport management, "adequately funded," verses fire management, "inadequately funded."

While the costs of ARFF services are high, the question can legitimately be raised, should the costs for these services be solely borne by commercial air carriers? Should general aviation pay their fair share of ARFF services, and how many airports tap this potential funding source?

The survey responses showed that only five (5), or 33% of the responding airports charged general aviation any fees that were directed towards ARFF services, while ten (10), or 67% did not. Of the five (5) respondents who indicated that general aviation was charged, four (4), or 80% identified "fuel flowage" fees and lease or rental agreements as revenue sources, and one, or 20% identified aircraft "tie down" fees as contributing to ARFF service costs.

The fact that smaller airports also assign more outside duties to their aircraft rescue and fire fighting personnel is an indication that, "the only way a smaller airport (Index A & B primarily) can afford an 'on-airport' ARFF service is by increasing their value/productivity through other duties." (Rural/Metro 1995) Although this is a way to save costs, it produces other problems as was discussed above about the appropriate assignment of work to ARFF personnel.

One possible cost reduction strategy is the reconfiguration of work shifts for ARFF personnel. Eugene currently follows the traditional shift structure utilized by all of its line firefighting personnel, twenty-four (24) hours on duty, forty-eight (48) hours off duty. This includes duty time between the hours of 2330 and 0530 hours, when generally there are no scheduled commercial air carriers flying into, nor out of the Eugene Airport. The rationale for retaining this schedule for ARFF personnel has been to maintain a seamless system between the airport and city, and the fact that millions of dollars of infrastructure, aircraft and bulk fuel storage are always on site and at risk.

Although Eugene's approach has been to maintain shift consistency and a static staffing level, the survey showed that nine (9), or 60% of the respondents assign their personnel to a forty (40) hour work week, three (3), or 20% a fifty-six (56) hour work week, one each, or 7%, work a fifty-three (53) hour work week, a forty-eight (48) hour work week with four twelve hour shifts, or a split shift of two-sixteen hour personnel and one-eight hour person.

The survey also showed that only about half of the respondents, seven (7), or 47% maintain a minimum ARFF staffing level twenty-four (24) hours per day, and in some cases, this minimum level is reduced during periods when commercial flights are not scheduled. Eight (8)
survey responses, or 53% indicated that minimum staffing is not maintained twenty-four (24) hours per day, but no further staffing description was provided.

Another program design element that adds cost is the number of qualified ARFF firefighters maintained in the system. Eugene maintains twenty-seven (27) ARFF qualified personnel in its program, nine (9) on each one of the three shifts. There is a significant cost associated with meeting the F.A.A. annual training requirements for each employee. Under the Eugene system, these additional personnel are then deployed to surrounding stations to the Eugene Airport. While this has been Eugene's practice, the survey results showed that only five (5), or 33% percent of the respondents share this practice, while ten (10), or 67%, do not.

Of the five (5) respondents that indicated they do maintain additional ARFF qualified personnel, only four responded with how many. Of these four responses, Eugene was the highest with twenty-seven (27) personnel, and the lowest number of personnel in the ARFF program was thirteen (13). The "mean" or average number of personnel in programs meeting this criteria was 21.75.

But as Chief Buonome points out in a 1991 *Fire House Magazine* article, "An aircraft on the ground is a unique structure, surrounded by fuel. ARFF personnel must, therefore, be trained and certified in structural firefighting and it is also necessary that structural firefighters who respond to airports be trained in aircraft firefighting strategy and tactics." (Buonome 1991) This point adds some legitimacy to the Eugene Fire Department's current ARFF program size and deployment practices.

However, cost continues to be an issue. Rural/Metro Corporation determined that the average staffing number for Index "B" airports was thirteen (13) in their 1995 survey. This number represented an increase of four positions over what they had identified as the average staffing level at F.A.A. Index "A" airports. The average staffing number for Index "C" airports was twenty-two (22), which represents an increase of nine positions over what they had identified as the average staffing level at F.A.A. Index "B" airports. The survey report also indicated that "...many F.A.A. Index 'B' airports augment the ARFF staff with other airport personnel during emergency responses." (Rural/Metro 1995)

One funding source that was identified in the literature for ARFF vehicle procurement, and large equipment purchases, is the Federal Grant-in-aid assistance program for Airport Improvement Planning (AIP). For accessing federal Grant-in-aid assistance for Crash Fire Rescue vehicles, John C. Carr and Leslie P. Omans, with Aviation Emergency Training Consultants, advise equipment procurement officers to begin by consulting with the F.A.A. "...Safety/Compliance Division officer assigned to your airport. This individual is extremely important: He or she will give final approval for any unique optional items you may request." (Carr 1992)

While the Eugene Fire Department has been aggressive in apparatus and equipment procurement through a joint labor/management Apparatus Committee, funding has continued to be a challenge. Although Eugene's ARFF program coordinator has established a good working relationship with the assigned F.A.A. Safety Compliance Officer, the ten percent matching funds for apparatus and equipment remain in the city's airport budget, and are not under control of the fire department.

Another cost saving strategy identified in the literature involved consolidation or changes in service providers. In Santa Barbara, California, the ARFF service was moved into the city's fire department to improve budgetary control. Although this alternative is not a logical solution

for Eugene's current situation, it may be an alternative in some jurisdictions that have other service providers close at hand.

In general, there was very little literature available on ARFF funding, and even less on funding alternatives. While there was an abundance of redundant periodical literature that addressed the problem, there was little in the way of solutions offered to bridge the growing gap between the accelerating cost curve of most systems, and the stagnant, or in some cases, declining revenue stream generated primarily by commercial aviation. Thus the survey conducted for this research was ultimately the best information source identifying alternative funding sources, and making recommendations for the future.

RECOMMENDATIONS

The safety of the flying public and aircraft rescue and fire fighting personnel must be a primary consideration in the maintenance of any ARFF system, base staffing levels, and deployment. However, the realities of the operating environment and cost constraints may

limit the level of effectiveness of many ARFF programs. The fact that the Federal Aviation Administration has steered clear of the staffing level debate further exacerbates the problem.

According to the survey results, Eugene's minimum ARFF staffing level appears to be within market. At the same time, the number of trained firefighters the Eugene Fire & EMS Department maintains to provide this service, twenty-seven (27) in the program, or nine (9) per shift, was the highest of the survey responses, and should be reviewed for possible down sizing.

Further analysis is recommended in this area to see how many personnel are actually needed to fill vacancies and maintain an adequate pool of available certified personnel for airport duty as well as determine the necessity of maintaining ARFF certified personnel at the surrounding city stations. While nine (9) ARFF certified firefighters provides additional personnel in an aircraft emergency response, it does add to the cost for training. Therefore it needs to be determined if maintaining these extra qualified personnel is a necessity to the operation, or a practice that should be modified?

The current shift structure and configuration, which requires a constant static staffing level of two personnel, twenty-four (24) hours per day, is another practice that has been brought into question by airport management, and warrants further consideration. In a twenty-four (24) hour day there is a five to six hour time period between the last commercial flight in, and the first commercial flight out, where ARFF services are not required by the F.A.A. Further analysis needs to be done in this area and a risk/benefit assessment conducted. In conducting this assessment, the question needs to be asked, is the potential loss of property, given the extensive infrastructure and expensive aircraft located on site, worth the additional cost of maintaining continuous staffing? If so, should the commercial air carriers pay the entire cost, or should some or all of this operational expense be charged elsewhere?

Another issue that has been raised by Eugene Airport management, and was posed in the research, what services could legitimately be performed by ARFF personnel? Although a rationale argument can be made that airport firefighters have some available work load capacity and may assume more duties within their confines at the airport, the question is what work could or should be aligned with their primary ARFF responsibilities. After all, an increase in services performed by ARFF personnel produces increased efficiencies for airport operations. Increased efficiencies produce opportunities for work force consolidation and possibly a reduced number of general airport staff.

In considering what additional work to be analyzed there appears to be a logical delineation between appropriate and inappropriate work as determined by two factors: The SIDA security fence, which maintains a secure area around the air field but slows ARFF response time when personnel have to respond from outside of its confines; and work within the SIDA security fence line that pertains to public safety such as routine runway and pavement checks, safety training for airport, airline and fixed base operator (FBO) staff, fire and safety inspections, and pre-emergency planning functions.

It is recommended that Eugene fire management meet with both airport management and labor to determine what additional and appropriate duties can in fact be assigned to ARFF firefighters without compromising their primary mission of aircraft rescue and fire fighting.

Another recommendation to help contain costs is to stay abreast of new technologies as they are developed for ARFF apparatus and equipment, and to plan ahead for incorporating successful technology developments that promote efficiencies, into the equipment replacement program. As identified in the literature review, there have been some technological advances that make fewer firefighters more efficient in those first critical minutes of operation at an aircraft accident.

Although the Eugene Fire Department has traditionally been proactive in its equipment procurement, it is something that should be given special attention during specification development for new or replacement apparatus and equipment. Likewise, grants through the F.A.A. must be taken advantage of to their fullest extent whenever possible. The Federal Grant-in-aid assistance program for Airport Improvement Planning (AIP), is one such funding source that was identified in the literature. For accessing federal Grant-in-aid assistance, the organization must develop, and in the case of the Eugene Fire Department, maintain a good working relationship with their F.A.A. Safety Compliance Officer.

Although this research focused on existing ARFF systems within Eugene's F.A.A. designated region, this research should possibly be expanded to a larger geographical area to include more Index "B" and "C" airports, or even to include the flying public at some level to measure their sensitivity and concern about these issues. Political pressure from all areas could be of benefit in getting the Federal Aviation Administration to develop ARFF staffing standards.

Another area that warrants further study is a better delineation of the true ARFF operating costs within the region's airport budgets. This portion of the survey did not produce results of significance due to the high number of responses that indicated an inability to break out their ARFF costs from the greater budget. Possible next steps would be to expand the survey net, as identified above, or contact one of the national or international ARFF or airport organizations to obtain assistance in gathering this data.

While the capability to perform this level of cost analysis may be troublesome in smaller jurisdictions, it is something where general assistance, or templates to aid in data gathering, could be developed and provided by one or more of the various professional organizations.

Up to this point, most of the recommendations have been directed at efficiencies within Eugene's current ARFF program delivery system. The research also produced some innovative revenue sources that are currently in place at other airports in the survey population. "Fuel flowage" fees and lease or rental agreements were the most prevalent of these alternative revenue sources for ARFF programs. Another innovative revenue source directed towards ARFF, and in place at Durango, Colorado, is an aircraft "tie down" fee.

These types of revenues tap general aviation which do not pay any of the associated costs for ARFF services in Eugene. It is recommended that a joint working group be formed and comprised of Eugene Fire Department

and Airport staff to contact the airports which have these fees in place, and pursue these additional funding sources locally.

The five airports reporting general aviation fees were:

Great Falls International Airport; Great Falls, Montana (Index "C")
Durango-La Plata County Airport; Durango, Colorado (Index "B")
Gallatin Field; Bozeman, Montana (Index "B")
Glacier Park International Airport; Kalispell, Montana (Index "B")
Billings-Logan International Airport; Billings, Montana (Index "C")

Finally, until the staffing level issue is addressed formally by the Federal Aviation Administration, as the regulatory authority for ARFF services, the debate between ARFF fire service providers and airport managers will continue without proper resolution. To this end, the fire service, the National Fire Protection Association, and the various professional organizations associated with the fire service, should ban together to place pressure on the F.A.A. to provide this needed level of specificity. Until this event occurs, the staffing dilemma

will continue, and service levels may decline as budgets are unable to keep pace with the rising costs for service.

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APPENDIX - A

SURVEY INSTRUMENT
(Cover Letter and Survey Instrument)

Fire&Emergency Medical Services Department

Field Operations Division

1705 W. 2nd Avenue
Eugene, Oregon 97402-4177
(541) 682-7103
(541) 682-7116 Fax

31 August 2000

Dear Survey Recipient:

The Eugene, Oregon Fire & EMS Department provides aircraft rescue and firefighting (ARFF) services to the Eugene Airport, a regional facility which currently carries an FAA Index "B" designation. In recent years our organization has experienced a growing list of challenges in delivering ARFF services which can be placed into three general categories; services provided, staffing levels and funding. My inclination is that many of you have experienced similar trends, and share many of the same challenges.

In an effort to bench mark our ARFF service against other airports in the FAA Northwest Mountain Region, I have enclosed an ARFF service survey form which I ask you to either take a moment to complete, or forward to the appropriate person in your system. I have attempted to identify areas in which I feel that we need better knowledge of how similarly situated airports and their fire services are functioning. Although our airport currently carries an Index "B" designation, I am also including Index "C" airports in the survey population since we have been at that designation level in the past, and I anticipate being back up to that in the future.

It would be greatly appreciated if the completed survey could be returned by 25 September 2000, if at all possible, so that I can bring this project to conclusion. You may use the enclosed self-addressed stamped envelope, or fax the survey document to me at, (541) 682-7116. I would be happy to share the information I collect with you and your organization when I have completed the project. There is a place on the survey form to indicate if you want this information, and where and to whom you would like it sent.

Thank you in advance for helping me with this project and for taking the time to share this important information. If I can be of assistance to you or someone in your organization, I can be contacted at (541) 682-7103.

Sincerely,

Randall B. Groves
Deputy Chief, Field Operations

cc: file

Aircraft Rescue Fire Fighting (ARFF) Survey
F.A.A. Northwest Mountain Region
INDEX B & C AIRPORTS

Airport Name_____
ARFF Agency Name_____
Your Name/Title_____
Telephone Number_____

Please mark the appropriate response for each question and return this survey in the self addressed stamped envelop that has been provided. In order to complete this project in a timely manner, please mail by **25 September 2000**. Thank you in advance for taking the time to help with this project.

GENERAL INFORMATION:

1) What authority operates your airport?

_____ City Government
_____ County Government
_____ State Government
_____ Federal Government
_____ Port Authority/Special District
_____ Private Provider
_____ Other _____

2) Who provides ARFF services at your airport?

_____ City Fire Department/District
_____ County Fire Department/District
_____ Federal Fire Department
_____ Airport District
_____ Port Authority/Special District
_____ Private Provider
_____ Other_____

3) How many commercial flights did your airport receive in 1999? _____

PERSONNEL & STAFFING:

4) Please identify the type of work force that provides ARFF services at your airport:

_____ Full time professional ARFF firefighters who staff an airport fire station.
_____ Full time professional ARFF firefighters who staff an airport fire station and are augmented by other airport employees functioning as firefighters.
_____ ARFF standby provided by firefighters responding from a fire station off airport property for scheduled commercial flights.
_____ Response from a fire station off of airport property that also has a larger response area.
_____ Airport staff assigned primarily to other job functions.
_____ Other _____

5) What is your minimum staffing level per work shift?_____

6) Is your minimum staffing level maintained twenty-four (24) hours per day?_____

7) Do you maintain ARFF qualified firefighters at locations other than the airport?

_____YES _____ NO

8) If the answer to question number **#7** is yes, how many qualified firefighters do you have in your program? _____

9) What type of shift or work schedule do your ARFF personnel work?

_____ Forty (40) Hour Work Week
_____ Fifty-three (53) Hour Work Week
_____ Fifty-six (56) Hour Work Week
_____ Other. Please Describe:_____

10) Do structural firefighters from other stations and/or jurisdictions, off of airport property, respond in conjunction with your airport's ARFF firefighters to aircraft emergencies?

_____ YES _____ NO

11) What would your average response be for an inbound Boeing 737-200 declaring an in-flight emergency?

_____ Number of fire suppression units _____ Number of personnel

12) Are your airport's ARFF firefighters employed by fire department or fire district separate from your airport?

_____ YES _____ NO

13) If the answer to question number **#12** is yes, are they regularly rotated out of the airport?

_____ YES _____ NO

SERVICE DELIVERY:

14) Please indicate all services provided by ARFF fire fighters in your jurisdiction.

_____ Structural Firefighting on Airport Property
_____ Structural Firefighting off of Airport Property
_____ Emergency medical response
_____ Spill Control and Hazardous Materials Response
_____ Security
_____ Fire Safety Inspections
_____ Runway Inspections
_____ Perimeter Checks
_____ Pavement Checks
_____ Snow Removal
_____ NOTAM Distribution
_____ Fire or EMS Training to Fixed Base Operators (FBOs)
_____ Grounds Maintenance (other than the fire station grounds)
_____ Other_____

15) Are your ARFF personnel assigned to perform work outside of your airport's designated SIDA security area?

_____ YES _____ NO

16) If ARFF personnel are assigned work outside of the SIDA security area, what type of work is assigned?

_____

17) If ARFF personnel are assigned work outside of the SIDA security area, is there a minimum number of personnel that are required to remain with the ARFF response units to maintain the FAA three (3) minute response time?

_____ YES _____ NO _____ MINIMUM NUMBER?

18) How many ARFF response units do you normally staff? _____

_____ Water Capacity.
_____ AFFF Concentrate Capacity.
_____ Dry chemical Capacity.

FUNDING:

19) What is your annual ARFF operating budget? _____

A) What percentage of your annual operating budget is for personnel? _____
B) What percentage of your annual operating budget is for training? _____

20) Do you feel that your budget is adequate to fund your ARFF program?

_____ YES _____ NO

Please indicate, by percentage, how your ARFF services are funded. In other words, what is the fund split by percentage?:

_____ Property Tax.
_____ Port or Special District Tax
_____ Passenger Boarding Tax
_____ Airline Gate Fees
_____ Fees for Service
_____ Fueling Fees
_____ Rental Agreements

22) Does general aviation pay any portion of your airport's ARFF service?

_____ YES _____ NO

23) If the answer to question **#22** is yes, how does your airport collect this revenue?

_____

24) Would you like a copy of the survey results?

_____ YES _____ NO

If yes, please provide the following information:

NAME & ADDRESS

_____
_____
_____
_____
_____