Firefighter Physical Fitness Programs: Looking for a Standard

EXECUTIVE DEVELOPMENT

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Abstract

Firefighting is a dangerous and physically demanding occupation. In emergency operations a firefighter's physical capacity serves as a valuable resource during fireground operations. At times a firefighter's physical capacity can mean the difference between saving their own lives, or the lives of their coworkers.

The problem that prompted this research was the lack of a definitive standard on firefighter physical fitness programs. The purpose of this project was to evaluate the Range Complex Fire Department's physical fitness program, and to determine if personnel have benefited from participation in the program. The study also evaluated national trends in firefighter physical fitness programs. The descriptive and evaluative research methods were used. The research questions were:

1. What are the components of the fire department physical fitness program?
2. Have there been significant improvements in personnel fitness levels since the physical fitness program was implemented?
3. Should a physical ability test be use as an evaluation tool in a physical fitness program?
4. Should physical fitness programs be mandatory or voluntary?
5. Should aging be considered in the evaluation of personnel fitness levels?

A literature review and four interviews were conducted to locate and identify physical fitness components and to answer the questions raised for this project. One hundred and fifty five survey instruments were utilized to try and measure fire department personnel's perception of the program, as well as determine national trends in firefighter physical fitness programs.

The results of the study identified the components of the department's physical fitness program, and indicated significant improvement in personnel fitness levels. Survey results of department personnel indicated that they had benefited from participation in the program. National survey results identified a trend toward physical fitness programs, with seventy percent of the respondents identified as having a program in place.

This study also determined that content-validated physical ability tests should be used as an evaluation tool in physical fitness programs; physical fitness programs should be mandatory for all personnel, and aging should not be considered in the evaluation of personnel fitness levels.

The recommendations were, that the Fire Department form a fitness committee comprised of all ranks within the department. Department leaders should implement the use of the department's physical ability test for incumbent firefighters at least annually. Fire Service administrators should review National Fire Protection Standard 1500. The National Fire Protection Association should take a more active role in identifying to the fire service that a draft document is available for review on firefighter physical fitness programs.

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Introduction

Firefighting is a dangerous and physically demanding occupation. In emergency operations a firefighters physical capacity serves as a valuable resource during fireground operations. At times a firefighters physical capacity can be the difference between saving their own lives, or the lives of their coworkers. When firefighters arrive on the fireground, they do so in their "business suits"; each person is wearing approximately fifty pounds of personal protective equipment, (PPE) to include: self contained breathing apparatus (SCBA). Once on scene, firefighters are deploying charged handlines, forcible entry equipment, as well as other specialized equipment that may be needed.

All of these actions are being accomplished before entry into a building is made. Those personnel not in good physical condition are most often physically spent by the time actual firefighting and rescue begins. How many times have we all seen the more physically fit personnel take up the slack for those personnel operating at reduced physical capacity?

The fire service has standards that cover nearly all aspects of fire protection. There are standards for our daily work uniform, inspection and testing of sprinkler systems, as well as the apparatus that transports us to the emergency. The apparatus standard gives us guidelines on how often the apparatus is tested, what equipment is needed to conduct the test, as well as pass/fail criteria. If the apparatus does not pass, it is rehabilitated, retested, and either brought back in service or retired. Fire service personnel are our most valuable resource.

The problem that prompted this research project was the lack of a definitive standard on firefighter physical fitness programs. The purpose of this research was to evaluate the Range

Complex Fire Department (RCFD) physical fitness program, and through surveys determine RCFD personnel's perception of the program, and if they feel they have benefited from participation in the program. A national survey was also conducted to determine fire service trends in physical fitness programs. To complete this study the descriptive and evaluative research methodologies were used to answer the following questions:

1. What are the components of the RCFD physical fitness program?
2. Have there been significant improvements in RCFD personnel fitness levels since the program was implemented?
3. Should a physical ability test be used as an evaluation tool in physical fitness programs?
4. Should physical fitness programs be mandatory or voluntary?
5. Should aging be considered in the evaluation of personnel fitness levels?

Background and Significance

The idea for this project was inspired by a team exercise during the Executive Development course, as part of the Executive Fire Officer Program at the National Fire Academy. The team exercise involved communicating a controversial idea to a classmate and try to have that person understand your point of view on the subject. The subject was mandatory physical fitness programs. During the course, each student is required to present a Management Innovation from their department. My presentation involved the RCFD physical fitness program and its affect on personnel fitness levels. After completing the presentation many of my classmates and I had several interesting discussions, both pro and con on

physical fitness standards in the fire service. The team I was involved with, eventually completed a class project on Entry Level Physical Ability Testing, which led to this paper.

The RCFD is a federal fire department located in Nevada. The initial mission of the RCFD was to provide aircraft crash firefighting and structural fire protection. Over the years the department has evolved to provide additional services such as: hazardous materials response and mitigation, medical response and transport, as well as a number of specialized rescue services. It is understood that information such as population served, when the fire department was organized and other information about the organization is generally discussed in this section. Due to security constraints this information cannot be discussed in this paper.

In the mid 1980's the RCFD administration had attempted to impress upon it's personnel the value of physical fitness as it relates to the job. This was done by utilizing timed smokehouse evolution's in which groups of two firefighters were required to enter a smoke filled maze, locate two victims and remove them within a specific time frame. It became obvious that some personnel were clearly not physically able to perform this task.

The administration of the RCFD has always supported personnel in their endeavor to maintain high levels of fitness. Personnel were allowed and encouraged to use exercise facilities located on the immediate area. However, "not all personnel chose to take advantage. It had become obvious through observations of emergencies and training scenarios that a number of personnel were not up to the task physically to perform" (Roland Benton, Chief RCFD, personal interview, April 10, 1998).

A physical ability test was directed by the chief through our training/safety officer. The test was required of all personnel on a semi-annual basis. The test consisted of: a ladder raise and climb,

deployment of a fifty foot section of three inch hose, the moving of a fifty pound block of wood ten feet with a three pound sledge hammer, the deployment of one hundred feet of inch and three quarter charged hose line, and finally dragging a one hundred seventy five pound rescue mannequin twenty five feet around a cone and back. The test was required to be completed in twenty minutes or less. Those unable to complete the ability test were referred to the department physician for a fitness for duty evaluation. Unfortunately the test was not validated and there were safety issues with timing a ladder climb.

As part of the RCFD's ongoing goal of full compliance with National Fire Protection Association (NFPA) 1500 standard on Occupational Safety and Health Program, a physical fitness coordinator was appointed and directed to implement a mandatory physical fitness program. The Chief of the department indicated that the lack of any definitive standards made implementation of a physical fitness program a difficult issue to address.

An outside program, developed by exercise physiologists specializing in firefighter physical fitness, was eventually purchased. The program, ARA/Human Factors Healthfit®, was used to train our physical fitness coordinator and four assistants.

The relevance for this project is twofold. First, when implementing a program that impacts personnel greatly, that program should be measurably evaluated for its effectiveness on members. Secondly, it is important to compare the program with other departments to determine what changes, if any, are needed to improve the program.

This project is necessary to satisfy the requirements of the of the Executive Fire Officer Program course titled "Executive Development". The project is directly related to unit nine of the Executive

Development student manual, Organizational Change and Development, which relates to evaluation of organizational goals and objectives.

Literature Review

The literature review was intended to gain insight into physical fitness programs in the fire service, and to determine if the RCFD physical fitness program is effective. There was an extensive amount of published material on firefighter physical fitness. The bulk of the material was written by two people; Jack O'Connor, Ph.D., and Paul Davis, Ph.D. Both are exercise physiologists specializing in firefighter physical fitness.

The literature review is divided into five sections; the first four sections cover issues raised by the research questions. The last section relates to the problem statement.

Components of Physical Fitness Programs

The components of a physical fitness program vary widely from department to department. It was decided to start with one of the recognized experts, Dr. Paul Davis. In an interview conducted in April 1998; Dr. Davis indicated that components differ depending on the type of program that a department wants to implement. For purposes of this project Dr. Davis outlined the following components as being "essential" to a successful program.

A telephone interview was conducted with Dr. Davis on April 3, 1998. Dr. Davis identified the following components as essential to a successful program. "The components are: the formation of a committee to plan and implement the program, budgeting, formal written policy, assignment of a health

and fitness coordinator, health risk screening, medical physicals, technical assistance and testing" (telephone interview, Dr. Paul Davis, April 3, 1998).

"The formation of a program committee should be the first step in implementing a program" (Rubin, Nugent, 1992, p. 34). The committee should include all ranks and divisions within the department. "Nothing of importance is going to happen without the consensus of labor and management. It should be agreed that there will be a program; the outcome should never be in question" (Davis, 1997, p. 26). In an article for Health and Safety magazine, Walterhouse (1996) states: "the committee approach allows all who stand to benefit from the program to contribute and "buy into" the program" (p. 1).

Budgeting is vital to the implementation of a fitness program. Without funding there is no program. "Costs include such line items as multiphasic health screenings, fitness coordinator training and exercise equipment purchases" (Davis, 1997, p. 26). Initial start-up costs can be relatively inexpensive compared to overall fire department budgets. The Stillwater Oklahoma Fire Department recently implemented a wellness and physical fitness program. "The initial cost of the program was $41,119, which included the purchase of workout equipment, fire fitness instructor training and compensation, physical exams and other tests, renovation, and program development" (OSU Wellness Staff, 1998, p. 26).

A formal written policy needs to be in place and expectations laid out in a realistic time frame. "The responsibility for planning, implementing and overseeing the fitness program needs to be officially and properly placed within the organization"…(Davis, 1997, p. 26). Dr. Davis goes on to say: "The

point is that responsibility should be placed somewhere by the chief, and program implementation has to be followed closely" (Davis, 1997, p. 26).

Identifying a fitness coordinator is usually accomplished through the fitness committee. The fitness coordinator … "needs to be endorsed by the department's administration and empowered with the appropriate level of authority and responsibility" (Rubin, Nugent, 1992, p. 34). The fitness coordinator should then be trained through an appropriate certification program. "Any training certification program for fitness coordinators should include instruction on how to perform a fitness assessment and use that information to prescribe exercise" (Davis, 1996, pp. 32, 34). Dr. Davis (1994) goes on the say: "Fire suppression personnel who cannot meet minimum performance requirements should be prescribed individualized progressive exercise programs for rehabilitation" (p. 26).

Health risk appraisal and screening are necessary to ensure that fitness program participants do not do further damage to themselves because of physical or health preconditions. In an article for Fire Chief Magazine, Dr. Davis (1994) discusses the issue of screening personnel.

> A good screening program will also have a plan for handling any firefighters found to have significant physical problems including high blood pressure or a heart condition. The process should lead to medical assistance or advice from qualified health professionals, as well as a determination as to immediate and long-term fitness for duty. Also, this process should be as unobtrusive and confidential as possible to avoid embarrassing the firefighter or making a big deal about the problem. (p. 28)

A medical physical should also be conducted on all personnel in the department. NFPA 1500 states: "All members who engage in fire suppression shall be medically evaluated periodically as

specified by NFPA 1582, Standard on Medical Requirements for Fire Fighters, on at least an annual basis"…(NFPA 1500, 1992, p. 1500-24). The physical becomes… "the baseline document for a member's fitness history file" (Rubin, Nugent, 1992, p. 33).

In an interview with Dr. Davis, the issue of technical assistance was discussed. "Any department implementing a program who does not have an expert in fitness employed should seek assistance from exercise specialists and the medical community. Help can be obtained from hospitals, universities or independent contractors. The training of in-house fitness coordinators is one way of providing in-house technical support". (Dr. Paul Davis, telephone interview, April 3, 1998).

Testing is the final component listed as "essential" to a fitness program. Two types of tests are used in the evaluation of personnel; Physical Fitness Assessments (PFA), and Physical Performance Assessments (PPA). "The fitness test is health-based and the performance test is job-based" (Davis, Lecuyer, 1995, p. 22).

Physical fitness assessments, also known as construct tests are the more traditional and well known of the two types of tests. Construct tests, use exercise components such as push-ups, sit-ups, and running or walking. These tests are used in initial baseline evaluations of personnel, and serve as the basis for exercise prescription by a fitness coordinator. "All members should undergo a preliminary personal fitness assessment examining the major fitness dimensions" (Davis, Gerkin, 1997, p. 26).

Dr. O'Connor (1994), in an article for Firefighter News discusses and identifies the components of fitness, and how the components are utilized in a fitness program. "Technically there are five components of physical fitness that determine an individuals ability to perform physical work: aerobic capacity, muscular strength, muscular endurance, flexibility and body composition" (p. 38). Dr.

O'Connor goes on to discuss the utilization of the components of fitness in evaluating personnel through the use of a PFA, and why the PFA should only be used to determine general fitness. Physical fitness assessments are…

> excellent for the relative evaluation of individual conditioning but are not necessarily job-related measurements. They should be part of each departments supporting physical conditioning program but not used to evaluate job fitness. The real value of construct fitness tests is to establish individual training programs and to track improvements in relative fitness. (O'Connor, 1996, pp. 22, 23)

In reviewing the material on PFA, the use of these tests is important in identifying an individuals general fitness levels. However, there is little evidence that these tests are good predictors of actual job performance. Dr. Davis, (1996) in an article for Health and Safety Magazine expands on Dr. O'Connors point of predicting job performance based on the PFA by stating:

> Physical fitness tests …are instructive, but not exhaustive in their ability to identify deficiencies. Translated to the practical application, a fitness test will provide useful information relative to the general dimensions of personal fitness. However, based upon current research, the ability to predict job performance from such tests has an accuracy of only 65%. (p. 12)

> The second type of test used in a fitness program involves the use of a physical performance assessment (PPA), also known as a criterion based test. These tests use job tasks that are low skilled, such as: victim drag, hose pull, and ladder raise, and are conducted against a time requirement. These tests are commonly referred to as physical ability or agility tests. Most

departments utilize these tests as part of the hiring process. Research indicates that these tests are a valid indicator of an individuals ability to do the job.

Any department implementing the use of PPA, is required to follow applicable federal laws. "The Age Discrimination in Employment Act (ADEA), Americans with Disabilities Act (ADA), and the Civil Rights Act of 1991 (CRA, 1991) all speak of the issue of "essential functions and job-related standards" (Davis, 1994, p. 14).

The ADA defines essential functions… "as those functions that the individual who holds the position must be able to perform unaided or with the assistance of reasonable accommodation" (Equal Employment Opportunity Commission, U.S. Department of Justice, 1991, p. 50). However, under Title II of the ADA, where reasonable accommodation cannot be made, the use of qualification standards, job test, or selection criteria can be use to screen out or deny a job to an individual… "only where such standards, tests or criteria are job related. Job related means related to the actual performance of the essential functions of the job consistent with a business necessity where such performance cannot be accomplished by reasonable accommodation" (Adaptive Environments Center, 1992, p. 30).

The ADA also speaks of indicators of essential functions. For example: "Time spent performing an essential function may be an indicator whether that function is essential" (Equal Opportunity Employment Commission, U.S. Department of Justice, 1991, 50). A section in the ADA that should be of particular interest to the fire service concerning an indicator of an essential function is, the consequences of failing to require an employee to perform the function. The section states:

> The consequences of failing to require the employee to perform the function may be another indicator of whether a particular function is essential. For example, although a firefighter may not

> regularly have to carry an unconscious adult out of a burning building, the consequence of failing to require the firefighter to be able to perform this function would be serious. (Equal Opportunity Employment Commission, U.S. Department of Justice, 1991, p. 50)

When fire departments utilize a PPA or physical ability test, the test must be validated according to the Uniform Guidelines on Employee Selection Procedures. The guidelines speak of content-validity which must show job sampling as a means of validating tests with employment implications.

> To demonstrate content validity of a selection procedure, a user should show that the behaviors demonstrated in the selection procedure are a representative sample of the behavior(s) of the job in question or that the selection procedure provides a representative sample of the work product of the job. (Burns, 1996, p. 2)

Most fitness experts agree that the PPA is the best method for determining a persons physical ability. Dr. O'Connor (1996), expresses his opinion on the subject by stating:

> …the best test for a firefighter is a job-related task test performed in full turnout gear with SCBA. This is the only type of test that will determine if an individual has the physical capacity to perform fireground tasks. The test should include only low skill tasks, such as lifting, pulling or carrying, arranged in sequential order so that different muscle groups are exercised. Performance times are the most useful criteria. The test should be graded pass or fail with a single standard for all firefighters. (p. 22)

Dr. Davis (1994), goes on the say: "Performance testing is the only objective method by which to establish competency" (p. 26).

Performance testing is widely used in the fire service to determine if a candidate has the physical ability to perform the essential functions of firefighting. However, the issue of evaluating incumbents based on performance testing is a much more controversial subject in the fire service. Experts agree, however, that the PPA is a viable method to determine if personnel can do the job throughout their career's. Walterhouse (1996), in article for Health and Safety Magazine discusses the issue of candidates and incumbents performance testing. "Current firefighters must be evaluated annually by the same validated task-oriented fitness test that is administered to candidate firefighters" (p. 5). Dr. Davis echo's Walterhouse by stating:

> If essential functions can be identified and testing for competence measured for hiring purposes, then the same instrument(s) can be used to determine whether incumbents can still perform the job. The law allows for this, and numerous legal cases recognize that physical performance tests are valid instruments for employment decisions. And as a practical matter, how can we require applicants to posses abilities that the incumbents can't demonstrate. (Davis, 1994, p. 14)

Testing is an integral part of any fitness program. Testing serves as a measure for the individual as well as the department of where you are physically. The literature supports the use of fitness assessments and performance assessments; they are related, but different types of tests. The physical fitness test tells you what your fitness level is, and the performance test answers the question; can you still perform the essential functions of the job.

The literature review indicated those components deemed essential to physical fitness programs, and how those components are related to one another. Testing appears the most critical component of a

program. Fire departments must have a method of monitoring and documenting progress and success of personnel.

Benefits of Increasing Fitness Levels

Research indicates that the formation and implementation of physical fitness programs benefit the individual, the organization, and the citizens of the community the fire department serves. Numerous studies indicate monetary savings for departments in the form of reduced workers compensations costs.

A significant reduction in workers compensation costs, compared with physical fitness programs costs, was shown in a study conducted by Ron Bennett of the Aurora Fire Department, Aurora Colorado. The study indicated that between 1991 and 1996,

> Average cost per year for the six year period for workers compensation was $80,974.75. The average costs of the physical fitness program was $5000.00. A six year physical fitness program cost of $30,000 compared to a savings of workers compensation expenses of $184,464.36. (Bennett, 1997, p. 29)

Walterhouse (1996), goes on to discuss the benefits of participating in a fitness program by stating: “The one common element of reduced work capacity, fatalities, injuries and illness is that they are all affected by improved physical fitness of firefighters, which reduces the adverse affects that protective equipment and the work environment have on firefighters” (p. 1).

Dr. O’Connor discusses the benefits of improving the components of fitness in articles for Firefighter News, and how improvement in fitness levels can reduce injuries and improve efficiency on the fireground.

Muscular strength is considered to be the most important component of fitness on fireground operations. “The basic interface between you and the fire is the equipment you wear and use. It is the equipment that drives the physical fitness requirement and affects performance in firefighting” (O’Connor, 1994, p. 38). Dr. Davis expands on Dr. O’Connor’s point by stating: “Increasing your overall strength will allow for greater efficiency in the movement and use of tools and equipment on the fireground, as well as being able to sustain physical effort for longer time periods than less fit individuals” (telephone interview, Dr. Paul Davis, April 3, 1998).

Muscular endurance is considered the next most important component of fitness. Dr. O’Connor (1994), discusses the issue of muscular endurance by stating:

> The muscle groups of the upper body (arms, shoulder girdle, back) are continually working as tasks are performed. Poor muscular endurance means short work periods and long recovery times - a luxury usually not available at a working fire.
>
> The consequences of not having sufficient muscle endurance to bring the equipment to bear on the fire are obvious: the effectiveness of the attack is reduced and the fire isn’t put out. (p. 38)

As with muscle strength, increasing muscle endurance allows for longer work periods and shorter recovery times.

Research indicates that Aerobic fitness has a greater impact on your general and long-term health than any of the five components of fitness. Again, Dr. O’Connor (1996), discusses aerobic fitness by stating:

> By definition, the greater the capacity of the cardiovascular system, the greater your aerobic, or CV fitness and the better your ability to sustain physical performance over time without becoming fatigued. A high aerobic capacity also permits someone engaged in an intense physical activity to recover quickly. The benefits of a high state of CV fitness for performance on the fireground should be obvious, even though muscular strength and endurance are probably more important for individual task performance. (p. 20)

Aerobic capacity refers to the maximum amount of oxygen that can be used by a person, stated in liters per minute or milliliters per kilogram of body weight per minute. "Most experts agree that 40 to 45 milliliters of oxygen per kilogram of body weight per minute is needed to function effectively on the fireground wearing SCBA" (O'Connor, 1994, p. 39). O'Connor continues by stating: "This level of aerobic capacity also provides a reserve capacity that facilitates quick recovery from the short but highly intense evolution's that define firefighting" (O,Connor, 1994, p. 39).

In an article titled "The Joy of Flex" Dr. O'Connor (1996), discusses the issue of flexibility and it's relationship to fireground operations. "Good flexibility is important for everyone engaged in dynamic activity, but critical for those who's jobs require lifting, reaching, climbing and other tasks where their bodies bend and move appendages beyond normal ranges. All of these actions define firefighting" (p. 22).

O'Connor (1994), goes on the point out, that "A lack of flexibility in the low back increases the chance of injury and reduces the efficiency of movement" (p. 39). "…fit and flexible individuals recover quicker from musculoskeletal injury" (O'Connor, 1996, p. 23).

The last component of fitness is body composition. A person's body composition is "…usually exhibited as fat, requires a greater energy expenditure to carry around added weight that has no active function in work performance" (O'Connor, 1994, p. 39). Dr. O'Connor (1994), goes on to summarize: "That excess fat is the number one fitness problem in the fire service, as well as the most common risk factor for heart disease" (p. 39). Actively participating in aerobic conditioning, will not only affect your ability to recover quicker from intense physical work, but will also play a major role in weight control.

Dr. Davis (1994), summarizes points made by Dr. O'Connor by stating:

> Ascending levels of fitness correspond with increased fire suppression capacity. In fact, studies examining the relationship between task accomplishment and fitness have demonstrated that a physically fit person can accomplish the same tasks in as little as one-third the time it takes an out of shape person. (p. 18)

Based upon the review, when personnel enter into organized physical fitness programs that target the components of fitness, work related injuries can be reduced, and increased efficiency on fireground operations can be expected. Additionally, departments and the communities they serve, can expect cost savings in workers compensation costs, as well as increased productivity.

Mandatory or Voluntary Fitness Programs

When implementing a physical fitness program, the issue of whether or not the program should be mandatory or voluntary is a question fire service administrators must answer. The program should target those individuals in most need of the program. Walterhouse (1996), makes a case for mandatory

programs by stating: “Many individuals are not motivated to exercise on there own. It is therefore, important that physical fitness programs in the fire service be mandatory and incentives for participation and goal attainment be considered” (p. 1). Walterhouse goes on to point out that “NFPA 1500 specifies mandatory physical fitness training and annual medical evaluations for all firefighters” (Walterhouse, 1996, p. 4).

The issue of performance standards is discussed by Dr. O’Connor (1995) in an article for Firefighter News. Dr. O’Connor supports the issue of performance standards for fitness programs. He promotes the following point: “An objective and logical review of the issue of performance standards and firefighting can yield but one conclusion - - there must be standards for physical performance because successful firefighting is directly dependent on physical ability” (p. 31).

Dr. Davis supports and expands Dr. O’Connor’s point on fitness standards. “The purpose of adopting physical fitness standards is to ensure that firefighters posses and maintain the physical ability to perform their jobs without undue risk to themselves or others” (Davis, 1996, p. 12). Continuing, Dr. Davis (1996) makes the point that: “A department without clearly defined standards (sometimes known as performance standards) cannot know if its members are truly capable of meeting the arduous demands of fire combat” (p. 12).

Goodson (1994) states: “Only mandatory programs will work because the reality is that those who need exercise the most, those in poor physical condition, are the ones least likely to participate in a voluntary program (p. 21). In an article for Minnesota Fire Chief, Dr. Davis (1996) echo’s Goodson by stating:

> There is only one type of physical fitness program that can be fully successful. A mandatory one. Voluntary programs historically fail because they cannot require unfit individuals to participate. They are precisely the individuals who need to be identified and helped. Voluntarily permitting the lowest performers to choose whether or not they will meet necessary job standards is contrary to sound leadership and sows the seeds of dissent if not disaster. (p. 13)

Dr. Davis (1996), continues the discussion further by stating that physical fitness standards: …"provide the only realistic way to verify that every firefighter possesses the physical ability to perform the job" (p. 13).

The review pointed out, that voluntary programs are less effective than mandatory programs because, those in most need of an exercise program cannot be forced to participate. The major benefit of mandatory programs are, that they are all inclusive, everyone, specifically those in most need of exercise are required to maintain minimum fitness levels established by the program.

Aging

Age is often raised as a consideration when evaluating personnel fitness and performance levels. The point most often made is that older personnel tend to lack the same physical capacity as younger personnel. In an article for Minnesota Fire Chief Magazine Dr. Davis discusses the issue of aging as it relates to federal employment law and fireground functions. Dr. Davis refers to the seven year exemption from the Age Discrimination in Employment Act (ADEA) for public safety organizations ending in 1994. Dr. Davis (1994), goes on to say:

> In an earlier amendment to ADEA, congress tasked the secretary of labor and the Equal

> Opportunity Commission to conduct a study on the feasibility of performance based tests as an alternative to mandatory retirement based on age. The study disproved the myth that public safety is compromised by the continued employment of older workers. The report also noted the accumulated deficits in abilities are only marginally associated with chronological age and can be documented with available tests that are better predictors than age. (p. 14)

Davis and Gerkin (1997), go on to discuss the ability of older workers to slow down the aging process by stating: "Advancing age is clearly a factor in diminished performance, but advanced age per se does not have to affect performance. Ample evidence exists that the effects of aging can be ameliorated through a regular program of physical activity" (pp. 24, 26). Dr. Davis (1994) in an article titled: "Must physical ability decline with age?" states:

> …medical science has amassed evidence that individuals may virtually choose not to age. Said another way; while you can't stop the superficial processes of graying hair or wrinkling skin, you can preserve and extend your underlying functional work capacity. (Davis, 1994, p. 14)

Davis and Gerkin (1997), discuss the issue of job tasks staying the same regardless of who is performing the tasks. "The most obvious is that the job requirements are independent of who is performing the job. In other words, the fire doesn't care who's performing the suppression effort the job is the job" (p. 24). Davis goes on to state: "The exculpatory provisions of the ADEA are being superseded by the ADA and CRA of 1991. These address issues of testing for essential functions and do not allow for different passing standards for the same job" (Davis, 1994, p.56).

The literature reviewed on aging was important for several reasons. First, the literature identified federal employment laws that verify the use of testing to identify if an individual is capable of performing the essential functions of the job. The review also pointed out that a single standard should be used for everyone. The review also identified that the job is the same for everyone. Fireground tasks must still be performed regardless of who is doing the task. And finally, through a regular program of exercise, individuals can slow down the aging process and increase their underlying work capacity.

National Firefighter Fitness Standards

The current standards available to the fire service are: NFPA 1500 Standard on Fire Department Occupational Safety and Health Program, and NFPA 1582 Standard on Medical Requirements for Fire Fighters. Chapter 8 of NFPA 1500 specifies the requirements for fire departments physical fitness programs by stating:

> The fire department shall establish and provide a physical fitness program to enable members to develop and maintain an appropriate level of fitness to safely perform their assigned functions. The maintenance of fitness levels specified in the program shall be based on fitness standards determined by the fire department physician that reflect the individual's assigned functions and activities, and that are intended to reduce the probability and severity of occupational injuries and illnesses. (NFPA 1500, 1992, p. 1500-24)

As pointed out earlier in the review, NFPA 1500 specifies that physical fitness programs be mandatory for all personnel.

NFPA 1582 Medical Requirements, discusses the issue of a fire department fitness coordinator interfacing directly with the fire department physician by stating: "An individual from within the department should be a assigned the responsibility for managing the health and fitness program, including the coordination and scheduling of evaluations and examinations" (NFPA 1582, 1992, p. 1582-22).

In August of 1994 an NFPA subcommittee presented a draft document for review. The document titled: NFPA 1583- ROP, Recommended Practice for Fire Fighter Physical Performance and Conditioning Programs was made available for public comment. For the first time the fire service had a document that would expand on NFPA 1500 and 1582, and give clear guidance on fitness program components and evaluation of personnel. "The major thrust of 1583 is emphasizing the injury-preventing nature of fitness and the value of rehabilitation" (Davis, 1994, p. 26). The document also emphasized performance standards and the use of PPA for evaluation of candidates and current firefighters.

The issue of performance standards became a controversial issue for groups such as Women in the Fire Service (WFS) and the International Association of Firefighters (IAFF) after the initial 1583 document was released. "The WFS and the IAFF were opposed to the language in the document that contained provisions for fitness and performance standards. Both groups were completely against the use of a PPA in employment decisions" (John Lecuyer, telephone interview, June 3, 1998).

Dr. O'Connor (1995), in an article for Firefighter News took the opposite view of the WFS and the IAFF by stating:

> Recently, a few "politically correct" action groups assaulted the NFPA 1583 committee in an attempt to influence the outcome on the committee's work of developing recommendations for

> physical performance and conditioning programs for their own purposes. They have every right to do so. However, I find it troubling that there is a chance that politics could prevail over science and common sense. There is something innately wrong with arguing for lowering standards and advocating tests that have no meaning when the fact and reality point to the opposite. (p. 30)

In 1996 the original 1583 committee was disbanded without obtaining approval for the document. In the same year a new committee was formed. "Ironically, the new committee is chaired by the president of the WFS and a majority of the committee members are from those organizations that were opposed to the initial 1583 draft document" (John Lecuyer, telephone interview, June 3, 1998).

The new task group postponed the work conducted by the initial committee on physical performance assessments. "The group will concentrate instead on developing more general health and fitness guidelines for fire service personnel" (Ostrow, 1996, p. 15). Ostrow (1997) goes on to discuss the comments made by the new NFPA 1583 task group chair person.

> …the task group agreed that before the fire service might embrace physical fitness testing for recruitment and retention of its personnel, it first must be convinced that physical fitness plays an important role in the health, well-being and effectiveness of its members. (p. 15). "The new NFPA 1583 standard will not set minimal fitness standards, nor will it be intended to disqualify anyone from working on the fireground, the task group agreed" (Ostrow, 1997, p. 15).

The literature review pointed out that NFPA 1500 and 1582 were not definitive with regards to components of fitness programs; the documents only point out that a program should be in place.

NFPA 1583 was the first definitive document attempted, but failed for various reasons. “The new 1583 document is now available for public comment, but this fact is not widely known” (John Lecuyer, telephone interview, June 3, 1998). Research indicates the need for a clear and common consensus on firefighter physical fitness standards.

Procedures

Literature Review Methodology

The first step in the research process was to locate any books, professional journals, and Executive Fire Officer (EFO) research papers related to firefighter physical fitness. An initial computer search was conducted in January 1998 at the Learning Resource Center, located at the National Emergency Training Center in Emmitsburg, Maryland. A review of reference lists of EFO papers helped identify additional references not identified by the computer.

Computer searches were also conducted in February and March 1998 at the Clark County Public Law Library in Las Vegas Nevada, and the National Emergency Training Center’s Learning Resource Center on-line card catalog, to locate additional material. The on-line card catalog was located on the world wide web, (Internet) at the following electronic address: http://www.lrc.fema.gov.

Survey Methodology

Two survey instruments were used in the preparation of the project. The first, (appendix A) was intended to gather information on a national level for firefighter physical fitness programs; specifically

with regards to evaluation of personnel. The national survey instrument contains seven questions. Five questions required a yes or no response, and two contained multiple choice. A pilot survey was conducted on six RCFD personnel to see if there were any mistakes. Personnel indicated that the surveys were understandable and free of mistakes.

The target population of the national survey was career-paid departments in large metropolitan cities throughout the country. This population was chosen because the RCFD is a career-paid department. The survey was also used to compare our program with other similar departments. Addresses were obtained through the world wide web, utilizing America on-line (AOL) Net Find, at the following electronic address: http://www.aol.com/netfind. Packets were mailed to seventy eight departments on March 23 1998. Each packet contained the survey instrument, cover letter, (appendix B) and a self-addressed stamped envelope. Self addressed stamped envelopes were used to aid in increasing responses. Sixty four surveys were returned by the due date of April 25, 1998, for a return rate of eighty two percent.

The second survey instrument (appendix C) was used to gauge the RCFD personnel's perception of the current fitness program. A pilot survey was conducted on six firefighters. They were asked to review the survey for mistakes. The firefighters indicated that the survey was free of mistakes and understandable. The survey contained nine questions. Four questions were yes or no; four were multiple choice, and the last was open-ended to allow for personal viewpoints.

Seventy seven surveys were distributed on March 9, 1998 with a return date of March 23, 1998. Fifty nine surveys were returned by the due date, for a return rate of seventy five percent. It should be noted that the surveys were conducted one month prior to the April 1998 fitness evaluations.

Interview Methodology

Four interviews were conducted between April and June 1998. Two interviews were conducted in person, and two by telephone. The purpose of the interviews were to obtain answers to the questions raised by the research project. Three of four persons interviewed were asked the following questions: What are the components of a physical fitness program? Should a physical ability test be used as an evaluation tool in a physical fitness program? Should physical fitness programs be mandatory or voluntary? And finally, Should aging be considered in the evaluation of personnel fitness and performance levels? In addition, each was asked general information questions regarding their area of expertise.

The four persons interviewed were: Chief Roland Benton, RCFD, Captain Jeffery Whisenant, RCFD Health and Fitness coordinator. Captain Whisenant also provided most of the fitness level data used in this project. Paul Davis Ph.D. and President of ON/TARGET CHALLENGE, Inc., Burtonsville, Maryland. And finally, Lieutenant John Lecuyer, Health and Fitness coordinator for the Aurora Fire Department, Aurora, Colorado. Lieutenant Lecuyer has a Masters degree in Exercise Kinesiology, and was an initial NFPA 1583 committee member.

Definition of Terms

VO_2 Max.: the maximum amount of oxygen that can be used by a person stated in liters per minute or milliliters per kilogram of body weight per minute. It is the best single measure of cardiovascular (aerobic) fitness.

Physical Fitness Assessment: a test of a persons general fitness level. Assesses aerobic capacity, muscular strength, muscular endurance, flexibility, and body composition.

Physical Performance Assessment: often referred to as a physical ability test. A series of simulated job tasks performed against a time criteria, in full protective equipment to include: self contained breathing apparatus. Measures a persons ability to perform essential functions of firefighting.

Par-Q: a series of yes or no questions given to each fire department member before participating in the fitness assessment. A yes response to any of the following questions will require approval from the fire department physician before participation is allowed.

1. Has your physician ever said you have heart trouble ?
2. Do you frequently have pains in your heart and chest?
3. Do you feel faint or have spells of severe dizziness?
4. Has a physician ever said your blood pressure was too high?
5. Has your physician ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise or might be made worse by exercise?
6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?

7. Are you over age 65 and not accustomed to vigorous exercise?

The Par-Q questionnaire was developed and copyrighted by the British Columbia Ministry of Health. The Par-Q is part of the RCFD health risk screening appraisal for personnel.

RISKO â -Heart Disease risk profile: is the second part of the RCFD health risk screening appraisal for personnel. The profile is a chart with a number value given to the following items: age, heredity, weight, tobacco smoking, exercise, cholesterol and/or % of fat in diet, blood pressure, and sex. Anyone with a score of 31 or higher must obtain medical clearance to participate in the fitness assessment. RISKO® was developed by the Michigan Heart Association with Modifications by ARA/HUMAN FACTORS.

Limitations

Although there was a large amount of material available on the subject of firefighter physical fitness, most was written by a small group of people. Because of this, it was difficult to get a wide range of viewpoints on the subject. Inexperience and a lack of training in interview and survey methodology may have hindered this project to some degree.

Results

Survey results

The national survey revealed that seventy percent of the respondents (45 of 64) had a fitness program in place. Thirty percent (19 of 64) indicated they had no program.

Question two asked: Is your program mandatory or voluntary? Fifty six percent (25 of 45) indicated that they had a mandatory program. Forty four (20 of 45) percent responded that they had a voluntary program.

Question three relates to time intervals for fitness evaluations. Seven percent (3 of 45) performed fitness evaluations on a quarterly basis. Seven percent (3 of 45) were conducted semi-annually. Sixty seven percent (30 of 45) were conducted annually, and nineteen percent (9 of 45) responded to "other"; of those, two stated that medical evaluations are used to evaluate fitness, the other seven responded by stating: that no evaluations were conducted.

Question four asked: Does your department utilize a physical ability test? Eighty four percent (38 of 45) responded yes, while sixteen percent (7 of 45) responded no.

Question five asked: Is the physical ability test part of your department's physical fitness evaluation? Forty percent (18 of 45) responded yes, while sixty percent (27 of 45) responded no.

Question six related to aging and fitness, and asked: Is age a factor in the evaluation process? Thirty three percent (15 of 45) responded yes, while sixty seven percent (30 of 45) responded no.

The final survey question was used to verify the type of department and if the survey had reached the intended target group. One hundred percent (64 of 64) indicated that they belonged to a career-paid department.

A further breakdown of the survey was done to determine differences between those departments with mandatory programs as opposed to those with voluntary programs. The breakdown will cover Questions two through six of the national survey.

Figure 1.0
National Survey Question # 2

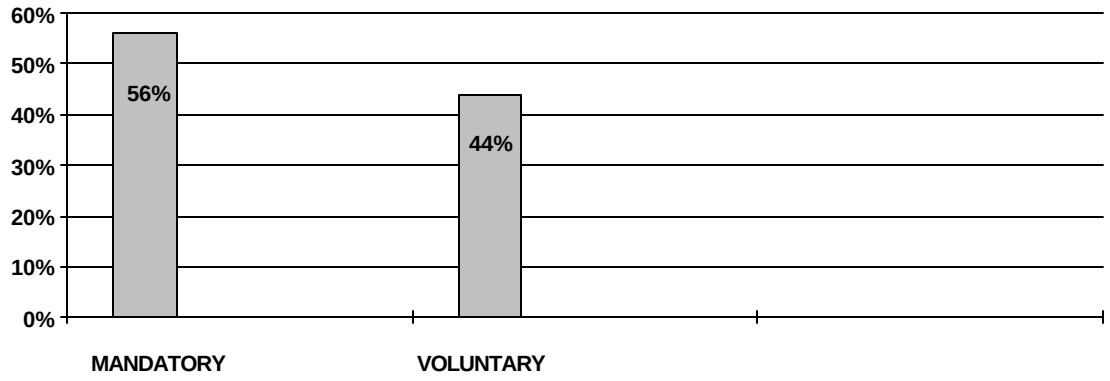

Figure 1.0 shows that fifty six percent (25 of 45) indicated that they had mandatory programs. Forty four percent (20 of 45) indicated that their program was voluntary.

Figure 1.1
National Survey Question # 3

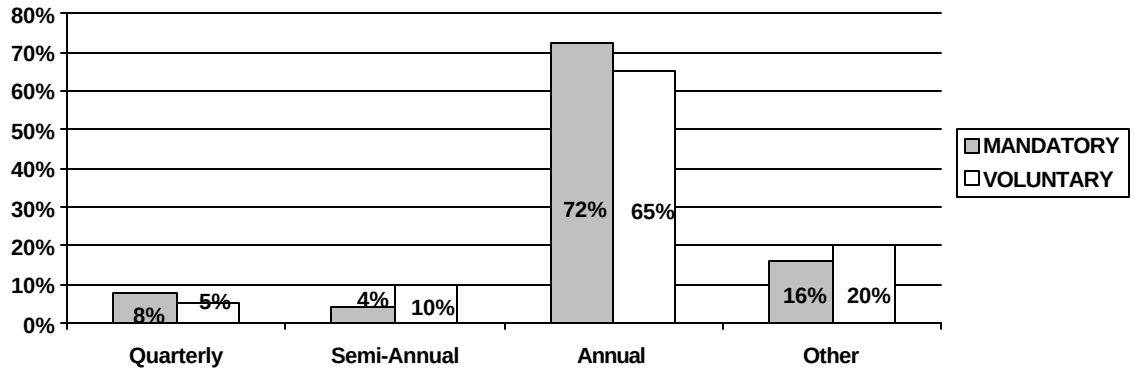

Figure 1.1 indicates the time intervals for fitness evaluations of personnel in mandatory as opposed to voluntary fitness programs. The majority of both programs conduct evaluations on an annual basis. Of the sixteen percent (4 of 25) in the "other" category in mandatory programs, one utilized a physical examination and the other three indicated that there was no evaluation. Of the twenty percent (4 of 20) in the "other" category in volunteer programs, one utilized a physical examination, and the other three indicated that no evaluation was conducted.

Figure 1.2
National Survey Question # 4

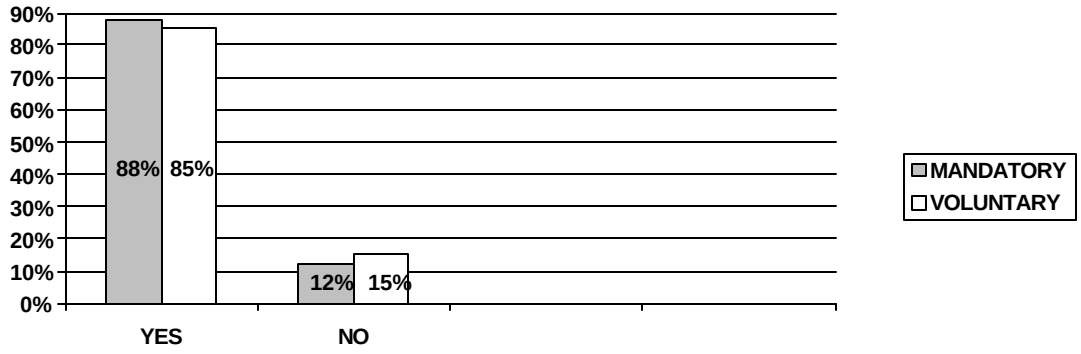

Figure 1.2 graphically illustrates that physical ability tests are widely use in the fire service. Eighty eight percent (22 of 25) of those in mandatory programs utilize the test, while eighty five percent (17 of 20) of those in voluntary programs utilize a physical ability test.

Figure 1.3
National Survey Question # 5

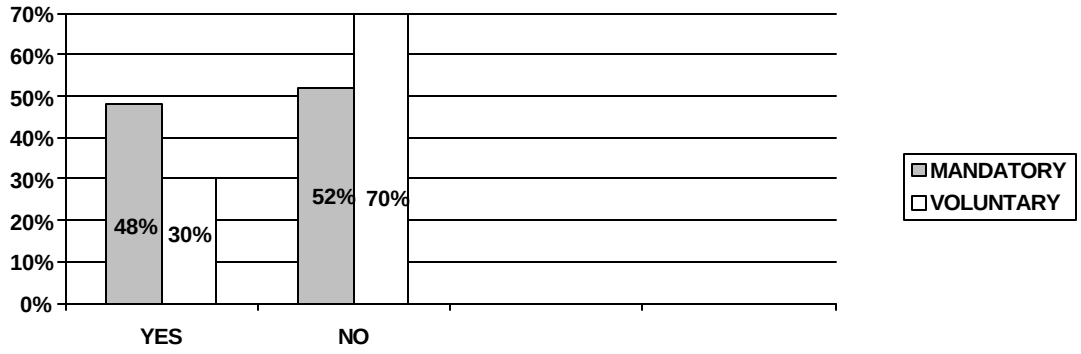

Figure 1.3 shows that forty eight percent (12 of 25) of those in mandatory programs utilize a physical ability test as part of their personnel's evaluation process. Only thirty percent (6 of 20) of those in voluntary programs utilize the test as part of the evaluation process.

Figure 1.4
National Survey Question # 6

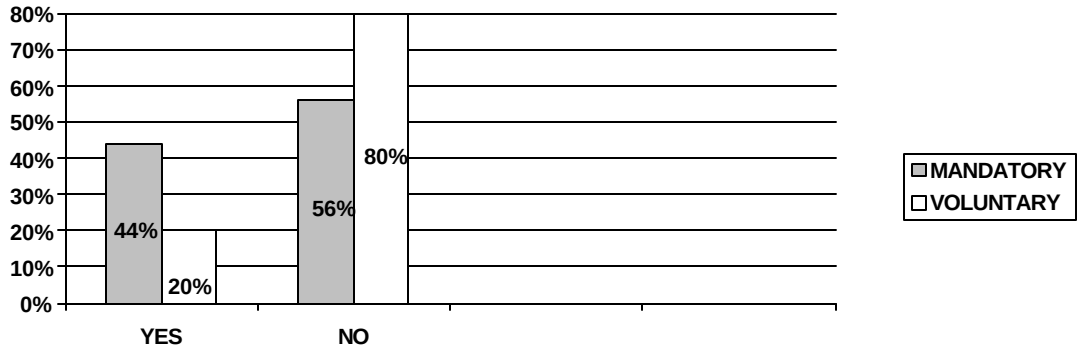

Figure 1.4 illustrates that the majority of both programs do not make allowances for aging in the evaluation process. Forty four percent (11 of 25) of mandatory programs do use age as a factor, while only twenty percent (4 of 20) of the voluntary programs make allowances for aging.

RCFD Survey Results

The survey of the RCFD personnel was conducted to gain insight into personnel's perception of their physical fitness program. Questions six and seven identify initial and current fitness levels, and will be graphically presented. The survey is broken down into two parts; the first part of the survey will show answers to the questions by all personnel. The second part of the survey focuses on initial baseline, and current fitness levels of personnel by age group and will be graphically presented.

Question one relates to the evaluation process. Personnel were asked if they thought the evaluation process was accurate in determining their fitness levels. Fifty eight percent (34 of 59) indicated that they thought the process was accurate. Forty two percent (25 of 59) indicated that the evaluation process was not accurate in determining fitness levels.

Question two relates to increasing time criteria for physical ability testing as you get older. Forty five percent (27 of 59) responded yes. Fifty six percent (32 of 59) indicated that no changes should occur.

Question three asked personnel if they are in favor of eliminating the physical ability test for those who meet and maintain acceptable fitness standards. Eighty five percent (50 of 59) responded yes. Fifteen percent (9 of 59) responded no to eliminating the test.

Question four asked if personnel have benefited from participation in the physical fitness program. Ninety two percent (53 of 59) indicated that they had benefited from participation. Eight percent (6 of 59) indicated they had not benefited.

Question five asked personnel if they thought that the physical fitness program should be mandatory or voluntary. Seventy eight percent (46 of 59) thought the fitness program should be mandatory. Twenty two percent (13 of 59) felt the program should be voluntary.

Questions six and seven are graphically presented to show personnel's initial baseline fitness levels compared with their current fitness levels. It should be noted that the survey was administered one month prior to the April 1998 fitness evaluations.

Figure 2.0
RCFD Survey Questions 6 & 7

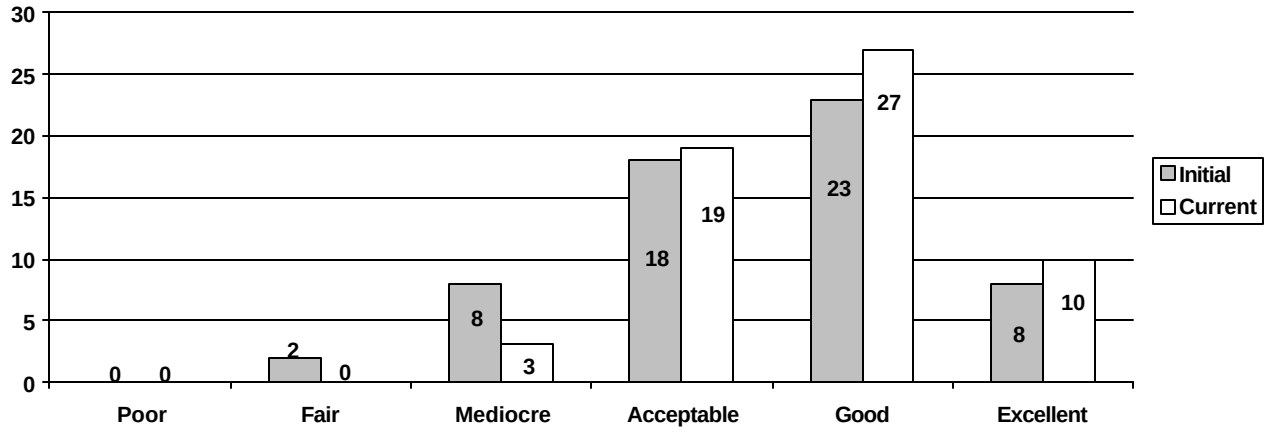

Figure 2.0 represents comparisons of respondents baseline fitness levels and their current fitness levels. The information contained in figure 2.0 illustrates decreases in the three categories below acceptable levels, while fitness levels increased in the levels of acceptable and above.

Question 8 asked for respondent's age group. Seven of the respondents were in the twenty to twenty nine age group, twenty five were in the thirty to thirty nine age group, twenty five were in the forty to forty nine age group, and two were in the fifty to fifty nine age group.

Question nine was an opened ended question, with respondents giving their personal opinions on what changes if any they would like to see in the fitness program. The recommendations varied. One issue mentioned frequently was the aerobic capacity evaluation. This evaluation is conducted utilizing a

step test. Sixty four percent (38 of 59) indicated that they would like to see another method for determining aerobic capacity.

The following figures illustrate fitness levels by age group, with the acceptable category meeting the RCFD minimum fitness standards. The figures encompass questions six, seven, and eight of the survey instrument.

Figure 2.1
RCFD Age Group 20 - 29

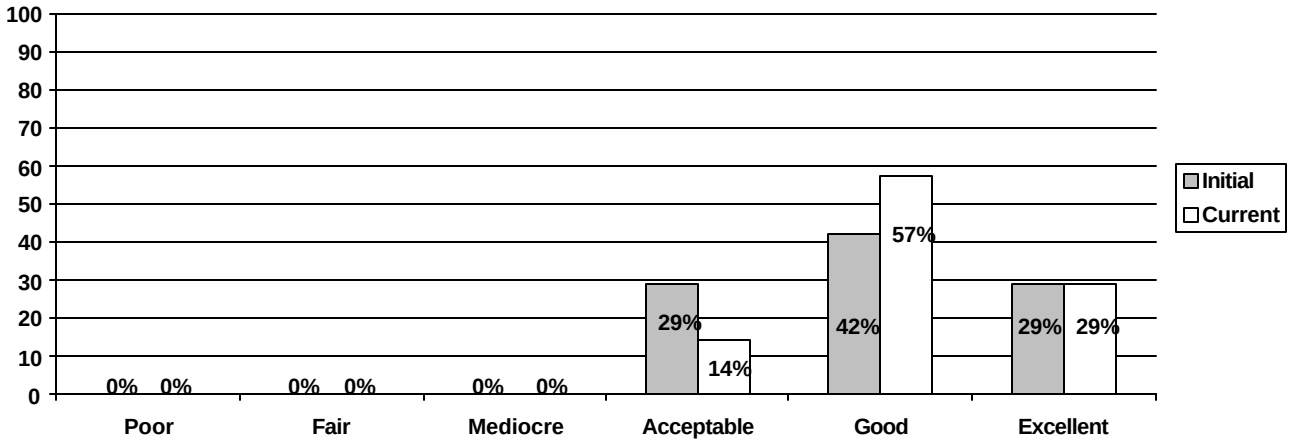

Figure 2.1 illustrates that all personnel in this age group were at or above acceptable fitness levels when initial baseline fitness levels were taken. A fifteen percent improvement has been realized. A fifteen percent decrease in acceptable levels coupled with a fifteen percent improvement in the good category has been shown.

Figure 2.2
RCFD Fitness Levels
Age Group 30 - 39

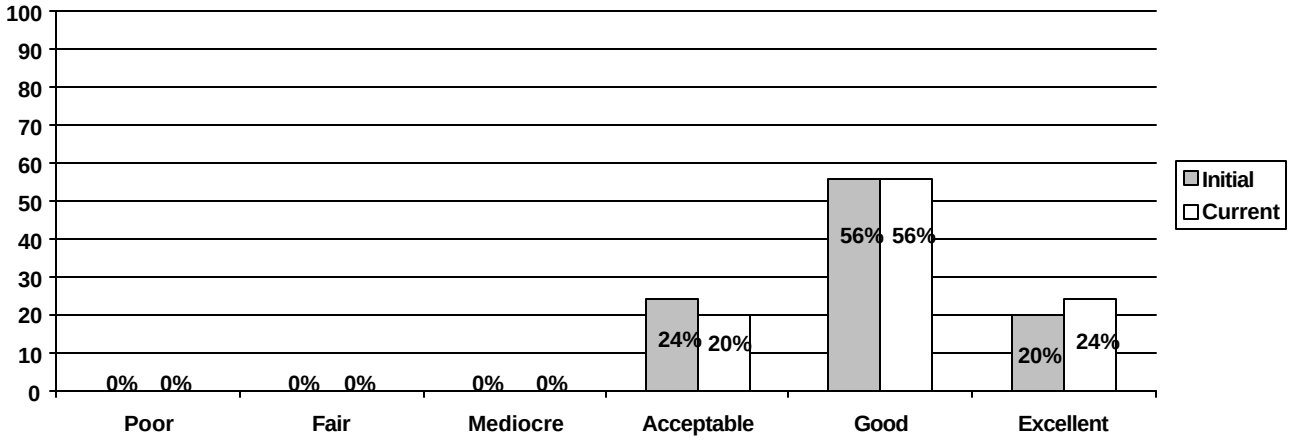

Figure 2.2 shows that all personnel in this age group were at or above acceptable fitness levels when baseline fitness levels were taken. Personnel in this age group had a four percent drop in the acceptable category, were constant in the good category, and increased by four percent in the excellent category.

Figure 2.3
RCFD Fitness Levels
Age Group 40 - 49

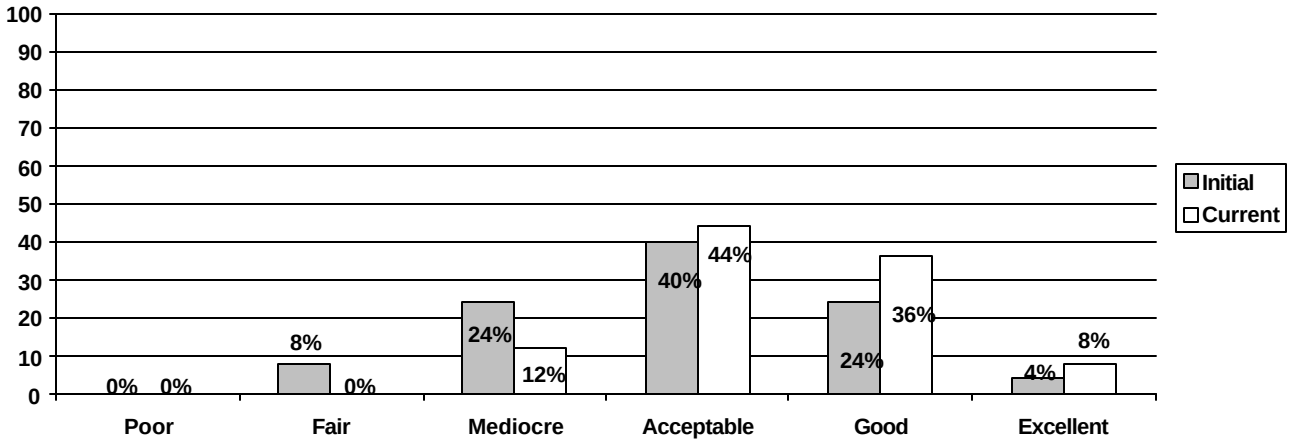

Figure 2.3 indicates that this age group had the most personnel below acceptable minimum fitness levels with thirty two percent. This age group was also able to show the most significant improvement with twenty percent increasing to, or above acceptable fitness levels. Further breakdown of the information revealed a twelve percent increase in the good category, and fifty percent increase in the excellent category.

Figure 2.4
RCFD Fitness Levels
Age Group 50 - 59

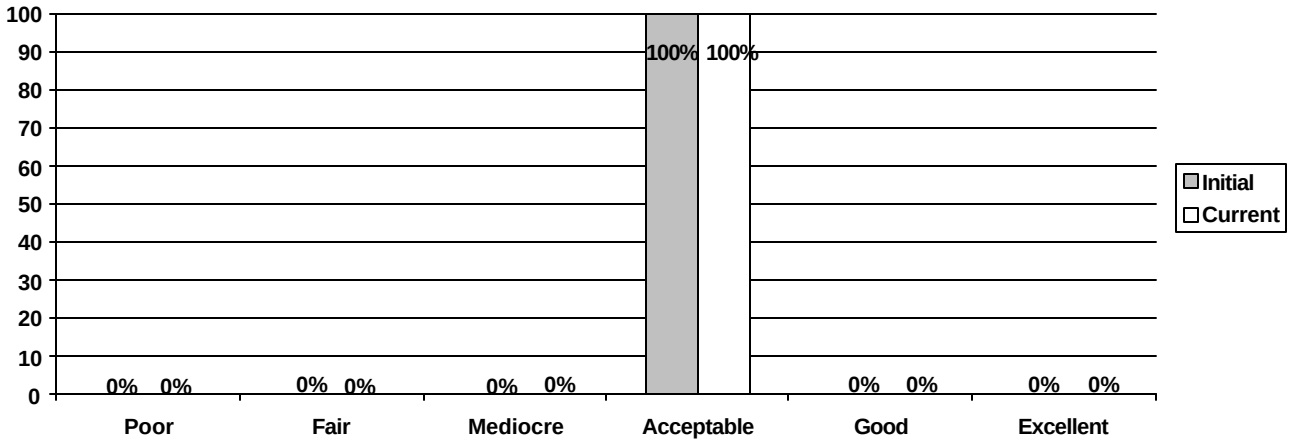

Figure 2.4 illustrates that personnel in this age group have maintained acceptable fitness levels since the fitness programs inception.

Interview Results

The four persons interviewed for this project were: Chief Roland Benton, Captain Jeffery Whisenant, Paul Davis Ph.D., and John Lecuyer health and fitness coordinator, Aurora, Colorado. John Lecuyer was interviewed to provide background information on NFPA 1583. Results from the interview were used in the literature review and discussion sections of this project.

Should a physical ability test be used as an evaluation tool in a physical fitness program was the first question asked. Chief Benton thought that the test was an appropriate measure of personnel's ability to do the job. Dr. Davis indicated that the work sample testing "brings home the mail", and was

the best barometer of firefighter fitness. Captain Whisenant went on to say that those personnel maintaining minimum acceptable fitness standards should be exempt from physical ability testing. Captain Whisenant added: the test is an appropriate tool to determine fitness for duty for those personnel coming back from light duty and work-related injuries.

The second question asked, was whether or not physical fitness programs should be mandatory or voluntary. Chief Benton felt that a mandatory program was the only way to ensure that personnel maintain their fitness levels. Chief Benton also felt that implementation of fitness standards sends a clear message to personnel that administrators are serious about the issue of fitness.

Captain Whisenant agreed that fitness programs should be mandatory. Captain Whisenant felt that a mandatory program was the only way to achieve success.

Dr. Davis agreed that mandatory programs are the only way to verify if members are truly capable of physically performing their jobs. Dr. Davis feels that mandatory programs benefit those in most need of exercise, because they are required to participate.

The final question asked, was if aging should be considered in the evaluation process? Chief Benton felt that age should not be a factor. Chief Benton stated that the job doesn't change; it is the same for everyone.

Captain Whisenant echoed Chief Benton, and felt that if the requirements for the job don't change, there was no reason to make accommodations for aging.

Dr. Davis simply stated: that the "job is the job"; the "hose is the hose"; the job is the same for everyone. Accommodations should not be made for aging.

Answers to Research Questions

Question 1:

What are the components of the RCFD physical fitness program?

Answer:

The department's physical fitness program is a mandatory program with a minimum fitness standard identified for all personnel. The components are: a health and fitness coordinator, with four assistant coordinators, who provide training and exercise prescription, as well as testing of all personnel. Health risk screening and appraisal, medical physicals conducted annually, technical assistance provided by ARA/Human Factors HealthFit®, incentive program, testing, and a formal written policy, (appendix D) which explains the components of the program.

There are six categories of fitness levels in the program; the levels are: poor, fair, mediocre, acceptable, good, and excellent. Each is given a specific point total; 14 or less for poor, 15 to 39 for fair, 40 to 59 for mediocre. The following categories represent those categories at or above RCFD minimum fitness levels; Acceptable, 60 to 69, good, 70 to 84, and 85 points and above is considered excellent.

Question 2:

Have there been significant improvements in RCFD personnel fitness levels since the physical fitness program was implemented?

Answer:

Yes. The following figures identify the improvements made in the components of fitness.

Figure 3.0
RCFD Initial Baseline
Fitness Levels, February 1995

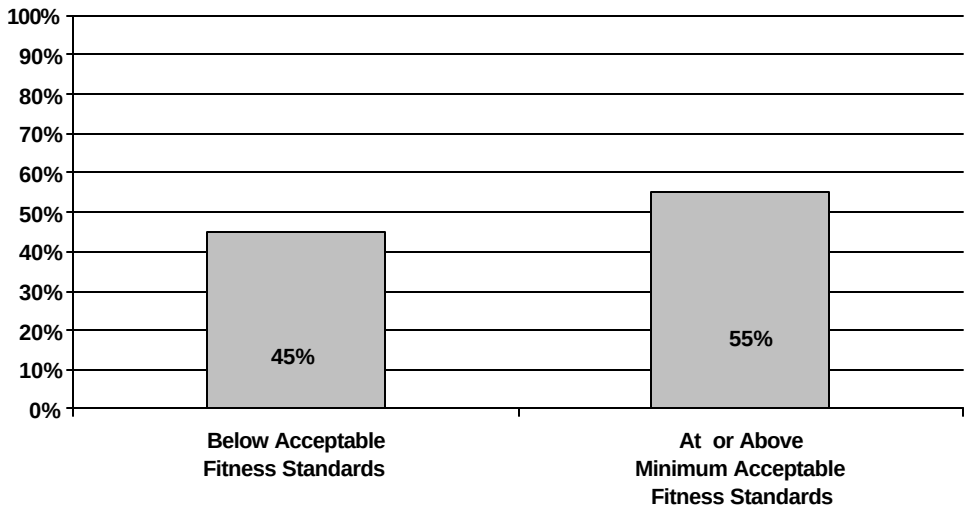

Figure 3.0 graphically illustrates the poor physical condition of the department as a whole. Baseline fitness levels were taken in February 1995, and indicated only fifty five percent at or above acceptable fitness levels.

Figure 3.1
RCFD Fitness Levels
April 1998

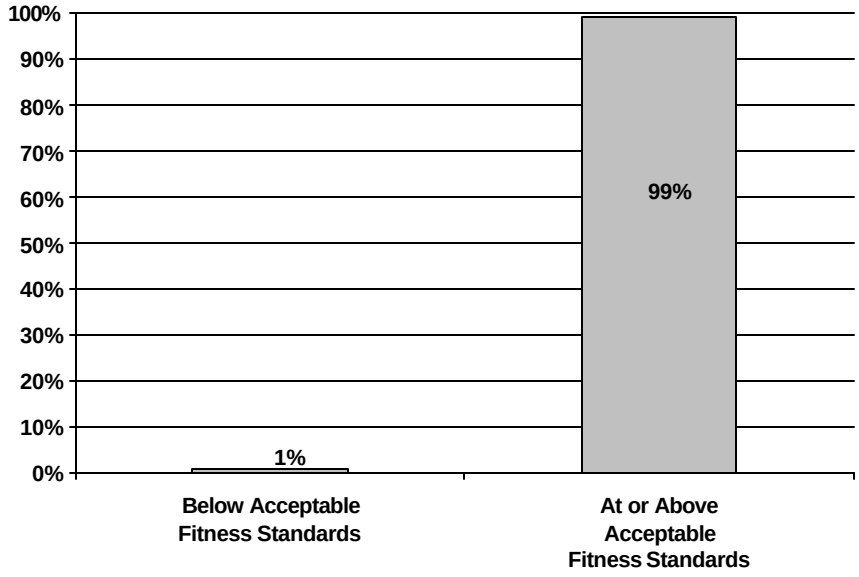

Figure 3.1 indicates the significant improvement in fitness levels since the inception of the physical fitness program. Ninety nine percent of the department is at or above acceptable fitness standards for the April, 1998 Fitness evaluations.

To further illustrate the improvement made by RCFD personnel, a comparison of the initial baseline and current components of fitness are graphically presented.

Figure 3.2
RCFD Aerobic Capacity Comparison

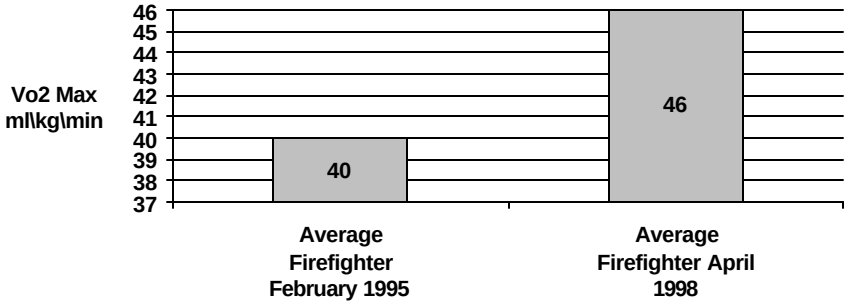

Figure 3.2 indicates improvement in RCFD personnel's aerobic capacity. Initial aerobic capacity of 40 VO_2 Max. was at the recommended minimum for firefighting. The April 1998 level of 46 VO_2 Max. is now above the recommended 45 VO_2 Max. needed to overcome fatigue during firefighting operations.

Figure 3.3
Muscular Strength Comparison

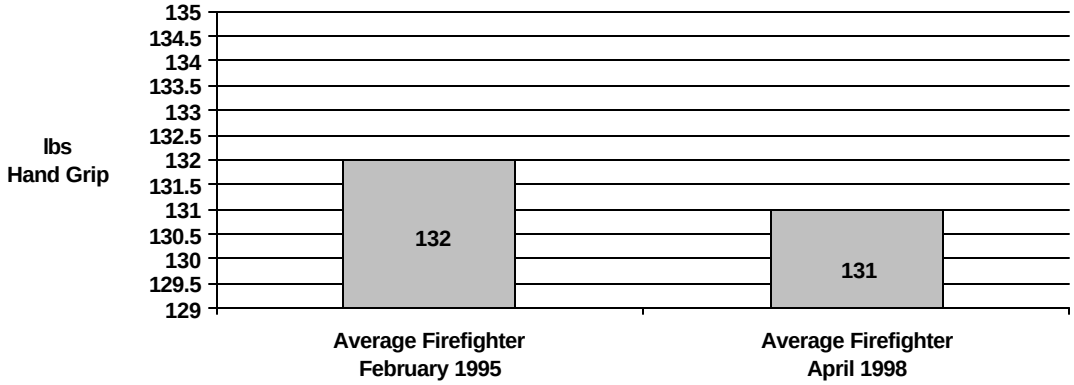

Figure 3.3 indicates a slight decrease in muscular strength when compared to initial baseline scores. However, it should be noted that both levels exceed the ON-TARGET maximums for muscular strength, which is 119 pounds.

Figure 3.4
Muscular endurance Comparison

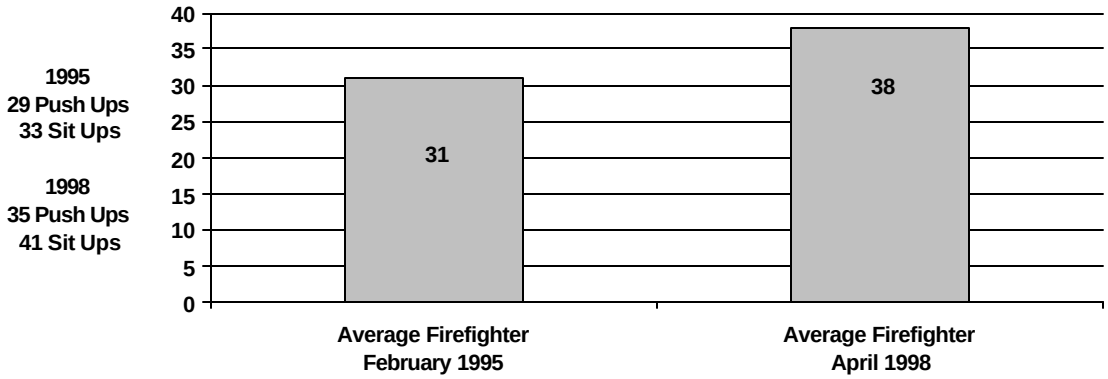

Figure 3.4 indicated significant improvement in muscular endurance. Combining sit-ups and push-ups, then dividing by two, gives an average score in the category. The initial score fell into the average category, while the April 1998 score is in the good category.

Figure 3.5
Flexibility Comparison

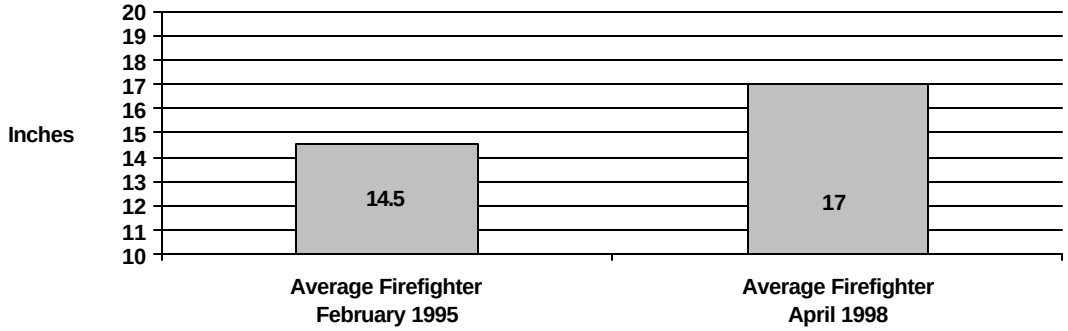

Figure 3.5 indicates that initial flexibility scores were in the good category. Flexibility scores for the April 1998 assessment have improved to the excellent category.

Figure 3.6
Body Composition Comparison

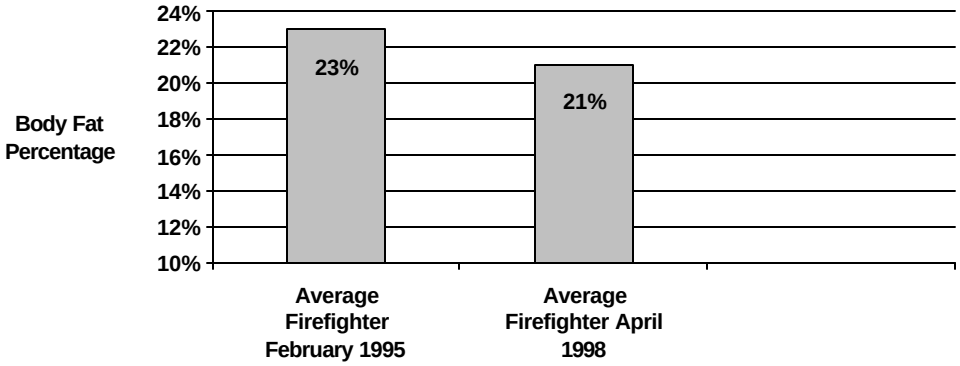

Figure 3.6 shows only a modest improvement in body composition. A two percent improvement has put RCFD personnel in the average category.

Question 3:

Should a physical ability test be used as an evaluation tool in a physical fitness program?

Answer:

Yes. The research indicated the differences between fitness evaluations and performance evaluations. The physical ability test is non-discriminatory, and job-related. The test is also the best indicator of ones ability to perform the essential functions of the job. Federal law indicates that physical ability tests are appropriate for employment decisions.

Question 4:

Should physical fitness programs be mandatory or voluntary?

Answer:

Mandatory. Research indicates that mandatory programs are best for the fire service. The benefit of a mandatory program is: that it is all inclusive, everyone, specifically those in most need of exercise are required to participate and maintain minimum acceptable fitness standards.

Question 5:

Should aging be considered in the evaluation of personnel fitness and performance levels?

Answer:

No. Research points out that the job is the same for everyone. The equipment and the fireground tasks are the same for a 25 year old as they are for a 50 year old. Research also indicates that regular exercise can actually slow down the aging process and increase your work capacity.

Discussion

Firefighting is a dangerous and physically demanding occupation. Research indicates that a firefighters physical fitness capacity is a clear indicator of their ability to do the job. Firefighters arrive on scene wearing approximately fifty pounds of personal protective equipment. As rapidly as safe to do, expend enormous amounts of energy deploying the necessary equipment needed to rescue citizens and extinguish the fire.

The literature review identified the benefits of participation in a mandatory physical fitness program. The results of the study clearly showed significant increases in RCFD fitness levels after implementing a mandatory physical fitness program. At the programs inception, the baseline fitness levels were very poor for an organization paid to protect its citizens. Only fifty five percent of personnel were at acceptable minimum fitness levels. Personnel were given a thirty month phase-in period to meet the minimum acceptable standards set-forth by the Chief. Current levels are at ninety nine percent at or above accepted minimum fitness standards. Clearly, the program has been a success.

It is interesting to note that when the RCFD fitness program was implemented, many personnel thought the program was being "shoved down their throats". The survey of RCFD personnel indicated that seventy eight percent (46 of 59) now feel the program should be mandatory. Ninety two percent (53 of 59) felt they had benefited from participation in the fitness program. National survey results indicated that fifty six percent (25 of 45) have a mandatory program in place. It should be noted that voluntary programs do not attract those in most need of fitness.

Evaluation of personnel continues to be a controversial subject in the fire service. The RCFD evaluates it's personnel fitness levels every twenty weeks. As an incentive, personnel who maintain accepted fitness levels, are not required to take the physical ability test. The physical ability test is administered to all candidates and any incumbent not meeting minimum fitness standards. The ability test is also used for fitness for duty decisions for those personnel coming from light duty and work related injuries.

The research supports the use of physical ability testing for both candidates and incumbent firefighters. The national survey results indicated that physical ability testing is widespread in the fire

service. Eighty seven percent (39 of 45) of those departments responding to the national survey indicated the use of a physical ability test. However, only forty percent (18 of 45) were utilizing the test in evaluation of their personnel's physical performance. It is assumed that the majority of physical ability testing is conducted on candidates.

The research confirmed that content-validated physical performance tests identify to fire service administrators and firefighters, that they have the physical ability to perform the essential functions of the job. The review indicates that a job-related physical performance test mirroring the essential functions of firefighting, is the most legally defensible in employment decisions.

Allowing differing standards on the basis of age, race, and sex is now illegal under federal employment law. The literature review was clear in identifying that accommodation for aging was not necessary. The affects of aging as identified by the research can be significantly reduced through a program of vigorous exercise. The review indicated that older workers could slow down the aging process and increase their work capacity by participating in a structured fitness program.

The RCFD does not make accommodations for aging. However, national survey results indicated that thirty three percent (15 of 45) did make accommodations. Surprisingly, when comparing mandatory programs to voluntary programs, forty four percent (11 of 25) of those with mandatory programs indicated that age was a factor in the evaluation process; compared to only twenty percent (4 of 20) for those with voluntary programs.

Results of the national survey indicate that departments are addressing the fitness issue. Seventy percent (45 of 64) indicated that a program is in place. The survey also indicates the differences between departments in how personnel are evaluated, whether or not physical ability tests are used,

mandatory or voluntary participation in a program, and at what time intervals individuals are evaluated. Clearly a definitive standard is needed.

In discussing national standards on firefighter physical fitness, the research did indicate that there was a draft document available for review. However, the documents existence is not widely known. The author was only able to discover that there was a document after interviewing the health and fitness coordinator for the Aurora Fire Department, Lieutenant John Lecuyer.

Lieutenant Lecuyer went on to discuss the document by stating that he: "thought it was a watered down version of the original NFPA 1583 document"(John Lecuyer, telephone interview, June 3, 1998).

The author was able to find only one article that discussed the issue of the new NFPA 1583 committee and the draft document currently available. The article covered statements made by the new committee chair person. One of the comments made by the chair person is troubling.

While discussing physical fitness testing and whether or not the committee might embrace testing the committee must… "be convinced that physical fitness plays an important role in the health, well being and effectiveness of its members" (Ostrow, 1997, p. 15).

The above statement is troubling, given the amount of scientific research available on the subject of physical fitness. One can draw the conclusion that the new committee is not taking the issue as seriously as the original committee had.

The research validates the physical fitness program implemented by the RCFD administration. Significant improvement in personnel fitness levels, a well as improved attitudes toward the program have occurred.

Recommendations

The problem that initiated this paper was the lack of a definitive standard on firefighter physical fitness programs. The purpose of the paper was to evaluate the RCFD physical fitness program and identify fire service trends in physical fitness programs. Based on the results of this project the following recommendations are offered.

The RCFD should rethink it's position on utilization of the physical ability test as an incentive for maintaining acceptable fitness levels. Research clearly indicated that physical ability testing should be utilized in a comprehensive fitness program, and that all members should participate in a physical ability test at least annually.

The formation of a fitness committee is also recommended. Currently program decisions are made by the fitness coordinator. Survey results indicated that personnel would like to see some changes made in the fitness evaluations; specifically with regards to the use of the step test in determining aerobic capacity. Forming a committee would build on an already good attitude towards the program.

Fire service administrators should review NFPA 1500 which requires the implementation of a mandatory physical fitness program. The NFPA should also make it widely known that a document on firefighter physical fitness is available for review. Some middle ground should be found between the initial 1583 document and the current draft.

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Appendix A

National Survey

PHYSICAL FITNESS PROGRAM SURVEY

Instructions: Listed Below are Questions concerning your Fire Department's Physical Fitness Program. Please place a "X" in the appropriate box that best reflects your honest answer. Thank you for your participation.

1. Does your department have a physical fitness program?

YES ☐ **NO** ☐

NOTE: If you answered "**NO**", please stop here and place the survey in the self-addressed stamped envelope. This information is an important part of the research. **PLEASE RETURN TO SENDER.**

2. Is your physical fitness program voluntary or mandatory?

VOLUNTARY ☐ **MANDATORY** ☐

3. At what time intervals are your personnel's fitness levels evaluated?

QUARTERLY ☐ **SEMI-ANNUAL** ☐ **ANNUAL** ☐ **OTHER** ☐

4. Does your department utilize a physical ability test?

YES ☐ **NO** ☐

5. Is the physical ability test part of your department's physical fitness evaluation?

YES ☐ **NO** ☐

6. Is age a factor in the evaluation process?

YES ☐ **NO** ☐

7. Is your Department career paid? Please answer **YES** ☐ or **NO** ☐ If "No" indicate type, (Volunteer, Combination, Paid on-call, etc.) _____

Appendix B

Survey Cover Letter

460 N. Battle Mountain Dr.
Las Vegas NV. 89110
702-459-0316

23 March 1998

Dear Training/Safety officer:

My name is Douglas Lautner. I am an Assistant Chief from Las Vegas NV. As part of the National Fire Academy's Executive Fire Officer program, I am conducting research for a project on Firefighter physical fitness programs. Enclosed is a survey on your departments physical fitness program. Would you please answer the survey questions and return to me by 25 April 1998. I have enclosed a self-addressed stamped envelope for your convenience.

I would like to express my appreciation to you for your assistance in this project. If you would like the results of this project or a copy of the paper when it is completed, or if you have any questions, please let me know. I can be reached at the above listed telephone number or by email at: <lautner@skylink.net>.

Thank You

Douglas P. Lautner

DPL

Enclosures: 2

Appendix C

RCFD Personnel Survey

PHYSICAL FITNESS PROGRAM SURVEY

Instructions: listed below are questions concerning this fire department's physical fitness program. Please place a "X" in the appropriate box that best reflects your honest answer. Question # 9 requires a written response. This survey is voluntary and your name is not required.
If you do not wish to participate please return the survey to me. Thank you for your participation.

1. Do you feel that the current evaluation process is accurate in determining your fitness level? **YES** ☐ **NO** ☐

2. Should the time limit for the physical ability test be increased as you get older? **YES** ☐ **NO** ☐

3. As an incentive, are you in favor of eliminating the physical agility test for personnel who meet and maintain minimum acceptable fitness standards? **YES** ☐ **NO** ☐

4. Do you feel that you have benefited from participation in the physical fitness program? **YES** ☐ **NO** ☐

5. Do you think the physical fitness program should be voluntary or mandatory?

VOLUNTARY ☐ **MANDATORY** ☐

6. What was your initial Baseline Fitness Level?

POOR ☐ **FAIR** ☐ **MEDIOCRE** ☐ **ACCEPTABLE** ☐ **GOOD** ☐ **EXCELLENT** ☐

7. What is your current Fitness Level?

POOR ☐ **FAIR** ☐ **MEDIOCRE** ☐ **ACCEPTABLE** ☐ **GOOD** ☐ **EXCELLENT** ☐

8. What is your current age group?

20-29 ☐ **30-39** ☐ **40-49** ☐ **50-59** ☐ **60 and Over** ☐

9. What, if any, changes would you make to the current Physical Fitness Program?

Appendix D

RCFD Physical Fitness Program Policy

Physical Fitness Conditioning and Training Policy
for
Fire Protection & Emergency Services

Philosophy: We have the responsibility of deploying a firefighting and emergency response force well versed in many specialized skills. Consistent with this mission, members must maintain a physical capacity to perform arduous tasks of effective fire combat and related duties and each firefighter must be physically and mentally prepared for the associated levels of risk to its members.

Because of the hazardous and physical nature of firefighting/emergency response, the department will not knowingly deploy individuals who are physically unfit to do the job. A primary purpose of the physical fitness program is to promote an appropriate level of physical fitness among our members and to establish an acceptable system which measures basic physical conditioning to ensure every firefighter maintains the physical ability to perform the job as safely and efficiently as possible.

Purpose: The Purpose of this policy is to establish a mandatory physical fitness conditioning and training program that meets or exceeds Air Force Instruction 32-2001, Air Force Manual 32-2002, NFPA 1500, and outline procedures for fitness assessments and proficiency criteria.

Performance Standard: In order to be considered a combat firefighter, personnel must maintain an appropriate state of physical conditioning. Physical fitness levels must be achieved that will permit the performance of required tasks of emergency response efficiently and without undue risk to themselves or others. To maintain this standard the department has adopted the ARA Human Factors "HealthFit" fitness program, and set our minimum standard at the "Acceptable" level. This is a minimum score of 60 points out of 100.

Application: This policy applies to all Range Complex Fire Department members.

Responsibility: The physical fitness conditioning and training program will be managed by a primary certified fitness coordinator. Assistant certified fitness coordinators on each shift will conduct program implementation and are responsible for ensuring that each firefighter on their respective shifts meet the physical performance requirements of this plan. Each member is responsible for achieving and maintaining their own physical condition consistent with this program up to and including the management of personal time to allow for quality fitness training. At no time will physical training inhibit the capability to respond to emergencies or other mission requirements.

Participation in general physical fitness training is **Mandatory** for all firefighters. All personnel are expected to participate in physical conditioning a minimum of two out of every three work day periods. These physical conditioning periods should consist of at least 60-90 minutes of appropriate physical exercise[1]. Fitness coordinators will design individual programs for members and will assist personnel as necessary. Members not meeting the minimum standards will be closely monitored with their exercise program for a sixty day period. At the end of the sixty day period they will be re-evaluated in accordance with established guidelines. If the member still has not met the minimum standards then further evaluation will be needed, up to, and including the initiation of the disciplinary process.

If at any time during the testing process it is suspected that there is a physical limitation that is responsible for a member's lowered fitness level, the individual will be immediately sent to the department physician. If it is determined that the member is not complying with the program, that person will be subject to progressive disciplinary action IAW established department policy.

Limited Duty Rehabilitation: Consistent with the scope of the policy, personnel on a limited duty status will still be required to maintain their physical fitness level (depending on the type of injury) through a physician approved exercise program.

Procedures: A General Fitness assessment will be conducted every 20 weeks after the baseline evaluation. The general fitness assessment documenting the performance of each individual will be maintained by the primary fitness coordinator.

Medical Clearance: annual medical examinations in accordance with NFPA 1500 and 1582 are provided to all firefighters. Individuals in full duty status are considered to be healthy and capable of performing fitness assessments, and exercise programs. This program was screened by the department physician who "strongly recommended" this fitness assessment and training program.

To ensure individuals maintain a health status that does not adversely affect job performance, a health risk appraisal will be conducted, using the PAR-Q and RISKO questionnaires as part of the fitness evaluations. Any "yes response on the PAR-Q, a blood pressure greater than 140/90 (ARA criteria), or a score above 31 on the RISKO that was not previously noted, would preclude undergoing a physical assessment or engaging in an exercise program until further medical clearance is obtained.

Incentives: Where possible, the department will highlight the obvious benefits of exercise to an individual's health, i.e., helping to lower cholesterol, reducing the risk factors that lead to Coronary Heart Disease, helping to lower excess weight, and improving strength, stamina, and

[1] Appropriate physical exercise is considered to be a combination of aerobic and strength training

energy. Additionally, we have an award program honoring those members who meet the higher standards of the Excellent/Gold and Good/Silver categories. These individuals are awarded with a T-shirt printed with the appropriate Silver or Gold award logo and a certificate of achievement. The department also awards certificates for "Best in Department" and "Most Improved. Any **Combat Firefighter** who meets or exceeds acceptable physical fitness standards will not be required to take the physical ability test.

General Fitness Evaluation: Every successful fitness program begins with some type of health screening and fitness assessment. This physical fitness conditioning and training policy will provide five major benefits to exercise participants:

1. Minimize risks to individuals with physical limitations.
2. Provide a reference point for comparison with future progress.
3. Develop an exercise program specific to the needs of each subject.
4. Provide realistic expectations for improvement.
5. Provide incentive and motivation for adherence and improvement.

All personnel will undergo a baseline evaluation with a reassessment every 20 weeks. Each assessment will consist of evaluations of the five basic components of fitness:

1. *Aerobic Capacity*: a five minute step test conducted on a 15 ¾ test bench at a ninety beat -per-minute cadence. The exercise heart rate is taken at the end of the test, and from this, an aerobic capacity value is given based on the body's ability to take up and use oxygen (VO_2 Max.).

2. *Muscular Strength*: uses a hand grip dynamometer to test hand grip strength in pounds. Basic grip strength is a general indicator of overall body strength.

3. *Muscular Endurance*: combines the number of sit-ups (maximum number in two minutes) and push-ups added together, then divided to form a numerical value. This value shows the ability to use dynamic strength repeatedly of a given period of time.

4. *Flexibility*: a sit and reach test device is used to measure lower back and leg flexibility.

5. *Body Composition*: circumference measurements of the abdomen an neck (male), and abdomen, neck, and hips (female) to give a value that is calculated to show the percentage of body fat.

After the baseline and each subsequent assessment, a conference will be held with the individual to review test results. The results of the fitness assessments will be the basis of individualizing physical training programs. All assessments will be conducted using the protocols contained in the Fitness Coordinator's Manual. **All assessment data will be treated confidentially**.