Physical Fitness Testing for Wildland Fire Agencies

Strategic Management of Change

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ABSTRACT

The occupation of a firefighter is one which requires a high level of physical fitness. Physical fitness standards have been around for awhile in various businesses and specifically in the fire service. With the advent of the American with Disabilities Act and federal and state civil rights laws, tests to evaluate potential and current employees' ability to meet a standard have been questioned.

Since 1975, federal and many state wildland fire agencies have used a Step Test to certify employees as meeting a minimum standard. Many agencies have scheduled the Step Test to be replaced by a newly developed family of three tests called the Pack Test. The problem that existed was for the Oregon Department of Forestry was to determine if the Pack Test met the needs of the Department.

The purpose of this research was to review the state of physical fitness testing in the fire service and to evaluate the new physical fitness standard being introduced by the federal wildland agencies and to provide recommendations to the Department.

To answer the following questions, a Descriptive Research Methodology was selected. Specifically, the Department wanted to know the answers to the following questions:

1. Is there a correlation between a fitness standard, higher productivity and lack of accidents?

2. Is the Pack Test a valid test to meet the requirements of civil rights laws and the Americans with Disabilities Act, and does it follow sound scientific principles to stand up as a reasonable standard if challenged?

3. What are other wildland firefighting agencies in the West doing with respect to a physical fitness standard and fitness program.

To answer these questions, the following procedures were utilized. Current literature was reviewed to determine if there was a correlation between fitness levels and performance, accident and disease prevention, and absenteeism. The history of the Pack Test was studied and the field trials evaluated to determine if it met current legal requirements. It was also appraised to determine if it qualified as a suitable test for the mission for which the Department is responsible. Finally, a survey was conducted of state and federal agencies with wildland fire responsibility in the Western United States to ascertain whether the Department's cooperators had a physical fitness standard and a fitness program.

The research found that there is a clear link between high fitness levels and high performance, lower absenteeism, lower on-duty injury rates and minimizing certain diseases. It also concluded that the Pack Test was a suitable measure of a minimum level of fitness and does not discriminate against age, weight, height, gender, or ethnicity. It can be justified as a test that correlates to the job tasks of fighting wildland fires and was done under sufficient scientific principals.

The survey of wildland fire agencies in the West found that 11 of the 12 agencies intend to move to the Pack Test for all their firefighters. The twelfth agency has a unique test for permanent employees. Discipline for failing the fitness standard was not consistent among agencies. All the agencies had a physical fitness training program, and one was soon to become mandatory. Eleven of the 12 agencies allowed purchase of fitness training equipment with agency funds.

Based on these conclusions, the Department was recommended to move to the Pack Test as a mandatory requirement for all employees in firefighting positions based on the Wildland Firefighting Qualification System. Additionally, it should be explored for pick-up personnel. Districts should be required to develop a physical fitness program and work should be done on an agency level to change the culture of the Department to encourage such programs.

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INTRODUCTION

The Oregon Department of Forestry is responsible for wildland fire protection on approximately 16 million acres of Oregon's forest land. The Department desires to have safe, productive workers so as to achieve maximum effectiveness in achieving this mission. "It is the policy of the State Forester to promote individual physical fitness to help ensure that Department personnel assigned to fire suppression duty are physically capable of performing their assigned tasks safely, effectively and without undue fatigue" (Directive 1-0-1-301 Physical Fitness Plan for Wildfire Duties, 1985, p.1).

Physical fitness is a critical component to this aspect of safe and productive workers. In addition, the job of firefighting is necessarily a "physical" occupation. Compton wrote in 1994 (p. 19), "Until the 1980's, certain issues regarding the wear and tear on firefighters were considered to be simply a part of the job." 'Wear and tear on firefighters' is no longer considered limitless. Personnel costs make up more than two-thirds of the Southwest Oregon District budget. Although these costs consider worker's compensation premiums, it does not consider the cost of injuries and the associated lost time. Neither does it consider the cost of workers who are performing less than their full capabilities or not even at a minimum standard. Finally, it does not consider the cost of the lost investment when a trained firefighter is no longer able to their job at full capacity. Firefighters are our most valuable resource, and as such, we must manage to keep them as efficient, safe and durable as possible.

Since 1975, various wildland fire protection agencies have used a physical fitness test to determine a minimum level of fitness for fireline duties. The test was developed at the federal level and is called the Step Test. During the last 20-plus years, it has been adopted by many state and local agencies.

Currently, the Department has a voluntary program to evaluate personnel's level of physical fitness--the Step Test. The directive authorizing this program also allows districts to develop a voluntary or mandatory programs of physical fitness training. The Department does not have any pre-employment screening or testing to determine if a candidate can meet the physical demands of the job of wildland firefighting. Neither is a fitness level part of employees' job descriptions.

Recently, federal agencies have developed a new test called the Pack Test to more fully evaluate an individual's capacity for fireline tasks. The problem that became evident to our Department was, 'Does the Pack Test meet our needs?'. Specifically, does it meet our agency's mission and have a reasonable payback.

The purpose of this research was to review the state of physical fitness testing in the fire service and evaluate the new physical fitness standard being introduced by the federal wildland agencies. To answer the following questions a Descriptive Research Methodology was selected.

Research Questions

Specifically, the Department wanted to know the answers to the following questions:

1. Is there a correlation between a fitness standard, higher productivity and lack of accidents?

2. Is the Pack Test a valid test to meet the requirements of civil rights laws and the Americans with Disabilities Act, and does it follow sound scientific principles to stand up as a reasonable standard if challenged?

3. What are other wildland firefighting agencies in the West doing with respect to a physical fitness standard and fitness program.

The answer to question one would document for the Department what appears obvious by

intuition but requires relevant justification. Without a clear correlation, the Department felt it could be open to criticism.

The answer to question two would provide validation to the Pack Test for the Department employees and union. In addition, it would verify that the Pack Test meets the intent of various laws such as the Americans with Disability Act and Oregon's Civil Rights Laws. It would show whether or not the Pack Test was developed under scientific protocols.

Finally, the answer to question three would help the Department see where it fits in relationship to other agencies and determine if other agencies have unique programs to further investigate.

BACKGROUND AND SIGNIFICANCE

The Oregon Department of Forestry has been responsible for suppressing wildland fires on 16 million acres of Oregon's forest land. It has a permanent and seasonal workforce in a variety of duties to meet this mission, many of which are assigned directly to field duties responsible to suppress wildland fires.

Wildland firefighters are hired primarily to be trained and ready to fight wildland fires, yet they may only spend 3-10 percent of their time actually involved in firefighting (sample from unpublished data available from Southwest Oregon District personnel files). The other time is spent in training, patrol, prevention activities, and maintenance of vehicles, and stations. These other activities do not demand the same physical requirements of firefighters. In fact, they generally do not contribute to the physical preparedness of individuals for the energy demands of wildland firefighting. Yet, the workforce is expected to be 'combat ready' once fire danger escalates to declared Fire Season. The American Academy of Physical Education provided a definition of fitness that fits very well with the Department's needs, "The ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy, to engage in leisure-time pursuits and to meet the above-average physical stresses encountered in emergency situations" (Ulrich, 1994, on-line).

The National Wildfire Coordinating Group has assigned one of four levels of physical fitness (arduous, moderate, light and none) to each wildland ICS position (see Appendix C). Although a guide, many agencies have adopted it as a standard. The Department acknowledges the publication as guidance for training and experience, but with no official testing mechanism it is unable to use the fitness standard.

Additionally, production rates based on the physical fitness standard are used by all agencies in a variety of studies to determine budgetary needs and fire suppression levels. It is difficult for the Department to know for certain that employees can meet these production rates since there is no minimum standard.

Ulrich stated that, "Physical fitness is usually measured in relation to functional expectations" (1994, on-line). Since 1975, all federal and many state and local wildland fire agencies have used the Step Test as an evaluative tool to measure a minimum level of fitness for potential personnel and incumbent employees to meet the functional expectations of wildland firefighting. The score on the test determined if they would qualify for positions on fires within the Incident Command System organization.

Mention is frequently made of the fact that people in better physical shape are more productive, have less accidents and have a lower absenteeism rate. Although this seems credible, the Department wanted verification in order to justify any future decisions.

Firefighting is an extremely hazardous occupation and requires great physical demands during fireground activities. Putnam (1995) reported wildland fire agencies, "Are averaging 30 entrapments each year now" (p. 1). One could deduce that there is some reason firefighters are not making it to their safety zones. Logically it could be concluded that at least some of these are related to fatigue.

In addition, NFPA's statistics (Washburn, LeBlanc and Fahy, 1997) reveal that one-half of fireground deaths for all agencies are heart attack related. This may be more significant to the Department since it does not currently have Firefighter Retirement. Therefore the Department always has personnel in the upper age brackets working in critical line positions. This will be particularly evident in the next 5-10 years while the Department experiences a greater than average turnover

(Thomas, 1997) "Forty-one percent of Forest Unit Supervisor 1's and Forest Unit Supervisor 2's will be eligible to retire" (assumption of retirement age of 58).

This paper provides both analysis and planning segments described in the change model presented in the Strategic Management of Change course in the Executive Fire Officer Program. It involved identifying organizational conditions and comparing these to the existing mission, standards, values and norms. It also includes an evaluation of external forces such as the American's with Disability Act and Oregon Civil Rights Laws, interagency standards and guidelines as well as determining exactly what our cooperators are doing. In addition, certain aspects of the planned change are offered within the Recommendations section.

LITERATURE REVIEW

Past research was evaluated for pertinence to the subject of this paper. In addition, research was used to answer research questions one and two. It was divided into several categories to group similar topics.

Influences

This segment of the research was to determine what influences or controlling authorities fitness standards are under. These authorities come from the law, interagency guidelines and Department Directives and have an impact on the need and use of physical fitness standards by creating potential sideboards under which the standard or program can operate. Many of these act as external forces to any changes in our current procedures.

The Department's Directive 1-0-1-301 Physical Fitness Plan for Wildfire Duties (1985) sets forth the current scope of the Department's Physical Fitness Program. The Department's program provides for voluntary testing on an annual basis by use of the Step Test or the companion 1½-mile run test. The testing is at the employee's discretion. In addition, the Directive allows Districts to develop conditioning programs that can be either voluntary or mandatory. Fitness equipment and shower facilities are encouraged.

The Wildland Fire Qualification Subsystem Guide (1993) is the current standard for qualifying personnel for wildland fire assignments It includes a physical fitness standard in the various fire positions. The guide assigns one of four levels of fitness (arduous, moderate, light and none), and leaves it up to each agency to determine the method of fitness for each level. The Guide is part of the National Interagency Incident Management System (NIIMS) and published by the National Wildfire

Coordinating Group. The Oregon Department of Forestry ascribes to the NIIMS incident management system.

The Oregon Civil Rights Laws handbook (1996) briefly describes several federal laws that potentially effect a physical fitness standard or program. Title VII of the Civil Rights Act of 1964 prohibits discrimination on basis of race, color, sex, religion, and national origin. The Age Discrimination in Employment Act (ADEA) prohibits discrimination on the basis of age for people 40 and over. The Americans with Disabilities Act of 1990 prohibits discriminating against qualified individuals with a disability in hiring, firing, compensation, advancement, training and other terms, conditions and privileges of employment (p. 9-10). However, it goes on to explain,

> Denying employment opportunity because of a person's sex, national origin, religion or age is not always unlawful discrimination. Making such a distinction is legal when it is reasonably necessary to the normal operation of the employer's business. This "legal discrimination" is called a bona fide occupational qualification (BFOQ) under federal law. The BFOQ defense cannot be justified by mere convenience, custom or preferences of customers. This defense is available only if the qualification is necessary to the employer's essential business purpose...
>
> Unlawful discrimination can also occur when people are treated equally. This occurs when a policy or practice has the effect of denying opportunities to people of a particular class at a significantly higher rate than others (p. 17-18).

"State law ORS 659.030 prohibits discrimination in employment on the basis of sex" Oregon Civil Rights Laws (1996, p. 19), but the law also states, "However, discrimination is not an unlawful employment practice if such discrimination results from a bona fide occupational requirement reasonably

necessary to the normal operation of the employer's business." (Oregon Revised Statutes, chapter 659, 1995).

Dr. Davis and LeCuyer described the requirements of the American with Disabilities Act (A.D.A.) and the need for hiring and performance testing to replicate the essential functions of the job. Smith (1993, p. 209) quoting directly from the A.D.A., found it to speak clearly on physical fitness testing when she wrote,

> Nothing in the A.D.A. prohibits physical agility tests. In fact, Title I of the A.D.A. states clearly that 'an employer may establish physical or mental qualifications that are necessary to perform specific jobs (for example, ...fire fighter jobs;...)'(Tab 300 p. 178), and 'an employer may give a physical agility test to determine physical qualifications necessary for certain jobs...'(Tab 300, p. 179). The only restriction is that, if such standards or qualifications screen out an otherwise qualified individual with a disability, the employer must be prepared to show that the qualifications and tests are job-related and consistent with business necessity (Tab 300, p. 179).

Drs. Davis and Dotson (1991) agreed when they said, "Case law supports management's right to expect physically fit individuals in critical occupations" (p. 36). Later, when speaking of fitness programs based on scientific principals, they found, "Court opinions support the defensibility of such an approach" (p. 37). Their conclusion was that fitness testing then became an acceptable alternative to unacceptable age discrimination.

> Case law supports the right of management to use physical fitness as an occupational requirement of retention. The courts have found that fire departments have a business necessity to ensure firefighters are capable of meeting minimum physical fitness

standards. (p. 38).

It is important to note that the courts have allowed, "the right of management to improve its workforce by requiring new hires to have increased abilities over current workers." (O'Conner and Warner, 1996, p. 15). Otherwise, the worst worker would become the minimum standard.

Oregon Civil Rights Laws (1996) specifically discusses testing saying,

> Other types of job requirements that may have an adverse impact include testing requirements, such as requiring all employee or applicants to pass a test.
>
> Such requirements may be legal, however, if the employer can demonstrate that the requirement is job related, is effective in predicting employ performance, and that there is no acceptable alternative that would have a less adverse impact (p. 18).

And again, later on page 22,

> If an employer wants to use height, weight and physical agility requirements, and if these requirements screen out one gender at a higher rate than the other, then the employer must be prepared to show that these requirements relate to the job and predict successful job performance.

Title VII, SEC. 2000e-2 of the Civil Rights Act of 1964 states,

> ...nor shall it be an unlawful employment practice for an employer to give and to act upon the results of any professionally developed ability test provided that such test, its administration or action upon the results is not designed, intended or used to discriminate because of race, color, religion, sex or national origin (p. 3).

Determining adverse impact was explained by Haertel (1984),

> A selection rate for any race, sex or ethnic group which is less than four-fifths (or eighty

> percent) of the rate for the group with the highest rate will generally be regarded by the federal enforcement agencies as evidence of adverse impact, while greater than four-fifths rate will generally not be regarded by federal enforcement agencies as evidence of adverse impact (p. 55)

Haertel noted that this was not a legal definition but only a guide.

Cohen, (1996) Assistant General Counsel for the U.S. Department of Agriculture, found the proposed Pack Test to be "legally sufficient" when he reviewed it for the United States Department of Agriculture, Forest Service. He found several recent court decisions that gave broad latitude in physical examination methods as long as the testing procedures reflected actual job conditions.

The National Fire Protection Association (NFPA) began a process to include a Medical and Physical chapter (National Fire Protection Codes, Volume 8, 1996) within its National Fire Codes which Dr. Davis (1994) described. The proposed chapter, 1583, went entirely through the process and was adopted only to be withdrawn after complaints before issuing the document (Marinucci, 1996 and (NFPA Council upholds complaints...,1996). Therefore, the standard "does not exist" according to Steve Foley of the NFPA (personal communication 8/22/97). Although there is considerable interest in re-visiting the topic, it is not currently in progress.

It seems clear that physical fitness testing is allowed by the law, but must be done in such a manner as to show a clear relationship to the job being performed. There are standards in the fire service and within wildland agencies. This information sets forth the need to closely evaluate the Pack Test to determine if it correlated to the job the Department is responsible for.

The Need for Physical Fitness Training and Minimum Standards

This category was used to emphasize to the Department the importance of physical fitness

training and having a minimum standard that could minimize fitness capacity related injuries and deaths.

Washburn, LeBlanc and Fahy detailed statistics from 1996 firefighter fatalities. They found heart attacks caused more than 50 percent of the fireground deaths. Although this study included structural firefighting as well as wildland duties, the trends are important.

> Heart attacks are typically the leading nature of injury in on-duty firefighter deaths and usually account for approximately half of the total fatalities. Last year [1996] was no exception. Forty-five firefighters died of heart attacks while on duty.…Forty-four of the 45 heart attacks in 1996 were attributed to stress or overexertion.

O'Conner and Warner (1996) determined that physical exams were not successful in screening applicants who could not do the job. Rather, they wrote,

> Very few applicants "fail" a physical, even those with injuries can easily slip through and end up costing the company significantly in terms of medical and lost time benefits. When it comes to physical capacity to do work, you can't tell by looking. To check physical capacity, you must have the applicant perform some type of physical work. (p. 8, 10).

They then go on to describe a process to determine the physical demands for the job and the testing process to screen candidates. Since this can be quite complicated, they recommend consultants who specialize in scientific processes.

Dr. Ted Putnam's (1995, p. 1) workshop findings concentrated more on human factor such as decision making, but reported, "Since 1990, wildland fire agencies have lost 23 people who might have survived had they simply dropped their tools and equipment for greater speed escaping fires." Putnam later referenced an earlier report of his (p. 41), "They would have been able to move 15-20% faster

without their packs and tools." Although one of the purposes of Putnam's group was to encourage a cultural change for people to drop their equipment, among other things, a physical fitness program certainly enhances the ability to survive without an entrapment. The paper also found that fatigue leads to failures in decision making.

The Wildland Firefighter Safety Awareness Study (1997, p. 2) found in its survey of 1000 federal wildland firefighters that the highest priority needs were, "Improving the experience level, training, and physical fitness of the individual firefighters." The same article stated later (p. 8), "There is a firefighting community acceptance of the need for good physical fitness, yet there is acceptance of many who are not fit."

Dr. Putnam (1995, p. 8) found a similar feeling among his workshop participants.

> Type I crews should have common physical fitness requirements. Current standards are too low, and the poorer fitness levels of a few are compromising the safety of the rest of the crew. This problem is especially disturbing when supervisors are less fit than their crews.

Davis (1996) editorialized that frequently the fire service is giving lip service only to physical fitness training. McCrory and Goodson (1996) made a strong argument that firefighters are athletes requiring both skill-related and health-related fitness.

This category acknowledges the fact that fitness is at least a perceived problem among fire personnel and shows that fatigue can lead to poor fireline decisions.

Correlation of Physical Fitness to Accidents and Production

This segment of literature answers research question one and was an important need requested by the Department. Although it seems obvious that physically fit persons perform better with less

injuries, the Department wanted to see documented studies.

Several authors emphasized the importance of fitness in relation to reducing accidents and productivity. Dr. Brian Sharkey (1997, p. 2) said, "Studies show that fit workers are safer and more productive than their sedentary counterparts. Unfit individuals can become a safety hazard to themselves and their coworkers." He later noted on the same page,

> But fitness is more than increased performance or improved safety. The active life and fitness lead to better physical and psychological health, lower risk of degenerative disease, enhanced vitality and longevity, and an improved quality of life. It pays dividends on and off the job, with improved performance and morale, reduced absenteeism, and lower worker's compensation and health care costs.

On page 15, he concluded,

> Our studies have shown that muscular fitness is highly related to performance of the tasks involved in wildland firefighting. Firefighters with more strength and muscular endurance are better able to carry the loads and use the tools more than those with lower levels. Muscular fitness protects against lower back injuries and other overuse injuries common in field work. And muscular fitness helps workers avoid the accidents and hazards found in dangerous environments, such as the fireline.

Drs. Davis and Dotson (1991) presented a compelling study that was completed in the Wichita Fire Department. Prior to a physical fitness program, the sick leave rate was essentially the same as city employees in other departments. After the institution of a mandatory physical fitness program, sick leave utilization fell dramatically to about half the rate of other employees, at a savings of more than $246,000 after fitness-related costs were deducted!

The two authors also reported on a study by Los Angeles City and County Fire Departments. There, the Injury-On-Duty rate decreased to less than half historical norms, while the number of alarms has risen substantially since the fitness program began.

There is, however, a down side to a physical fitness program. Washburn, LeBlanc and Fahy detailed statistics from 1996 firefighter fatalities. They included physical fitness training within the 'Training Activities' category and found (p.47), "[One firefighter] died as a result of heat stroke during a training run, and [another] collapsed during fitness training and later died as the result of a disease associated with sickle cell anemia."

Sharkey (1997) pronounced the theoretical conclusion that "Fit workers can sustain a higher work rate" (p.16). He justified this by stating on the same page,

> For stronger individuals a given work load constitutes a lower percentage of their maximum strength, allowing improved performance. The ideal combination involves above-average strength and aerobic fitness. For example, a worker with a VO_2 Max of 55 and sufficient strength that a loaded shovel constitutes 20% of maximal strength, will be able to sustain a work rate greater than 10 contractions per minute. A worker with a VO_2 Max score of 45, for whom the load constitutes 50% of maximum strength, will be able to sustain less than half that rate. Field studies of wildland firefighters verify these predictions.

In describing endurance, he reported on one such study,

> Muscle endurance is extremely trainable. In one study a subject who could do 50 repetitions with a 25-pound weight before training, was able to do over 2,000 repetitions after 8 weeks of training. That is why I emphasize the importance of

> endurance for work capacity. Anyone can swing a tool 20 to 30 times, but 20 swings per minute for 8 hours adds up to over 8,000 swings. That takes endurance.

He also found here, "Fit workers cope with and better recover from adverse firefighting conditions like long shifts and reduced rest, and they miss fewer days of work because of illness or injury."

Former Surgeon General, Dr. C. Everett Koop established in 1994 a non-profit health organization "Shape Up America!" The organization stated, in a recent news release (What's so great about physical activity?, un-dated),

> There is so much exercise does: increases your self-esteem, improves mood, boosts energy, strengthens heart, strengthens muscles, burns calories, improves cholesterol levels, relieves stress, lowers risk of heart disease, hypertension, and diabetes, prevents bone loss, decreases risk of some cancers…There is no such thing as a good excuse for not exercising!

In a July, 1996 news release, (Dr. Koop Issues Action Plan..., on-line) they cite, "mounting evidence that physical activity reduces the risk of premature death from obesity and other diseases." Dr. Koop was quoted in 1994 (Dr. C. Everett Koop Launches a New Crusade to Combat Obesity in America, 1994, on-line) that, "After smoking,...obesity-related conditions are the second leading cause of death in the U.S."

McConnel (1996) reported on a recent report from the current surgeon general's office, "Physical Activity and Health." On page 104-105 of his article, he quoted the report which said,

> The report makes clear that this widespread inactivity 'contributes to premature death and unnecessary illness' for millions of Americans each

> year....Dozens of studies suggest that exercise increases the level of "good" HDL cholesterol in the blood, which acts like a scavenger of "bad LDL cholesterol--the main component of arterial plaque--by transporting it to the liver for elimination in bile....Regular exercise also lowers high blood pressure by relaxing the vascular system. Even better, exercise increases the capacity of the heart's coronary arteries.
>
> Steven N. Blair, the senior scientific editor of the surgeon general's report and president of the American College of Sports Medicine, twice evaluated almost 10,000 American men ages 20 to 82 for cardiovascular fitness at an interval of five years. "Those who improved their fitness through exercise had a 64-percent reduction in death from cardiovascular disease compared with those who remained unfit," he says.
>
> Several major studies worldwide have shown that regular physical activity significantly reduces the risk of colon cancer.

Dr. Haskell (1995) of Standard University concentrated on heart disease when he reviewed over 50 published studies from the last half-century. He reported on the association between habitual physical activity and coronary heart disease (CHD). Although diverse protocols did not allow a single summary statement, he stated, "The general impression obtained … is that more active people develop less CHD than their inactive counterparts, and when they do…it occurs at a later aged and tends to be less severe" [on-line]. Additionally, he found, "That being physically active does not increase an individual's overall risk of CHD." Of particular interest was the conclusion of 1986 and 1993 studies he reported on. "Sedentary

alumni who were ex-varsity athletes had high risk while sedentary students who became active in later life seem to acquire low risk." This suggests that people can lower their risk, later in life, just by becoming active, even with little or no past athletic experience. Of important significance was his conclusion of a 1989 study where, "Higher levels of physical fitness appeared to delay all-cause mortality" [on-line]. He also found that deaths during physical activity from sudden cardiac death although get a lot of media attention are "quite rare" and were the result of, "Serious cardiovascular risk factors that were known in advance or could have been identified easily."

Even Maclean (1992) in his evaluation of the wildland firefighters killed in the Mann Gulch Fire of 1949 discussed how two survivors of Mann Gulch, Rumsey and Sallee, were both in excellent physical condition (p. 97).

What seems obvious by intuition is validated by clinical studies and empirical evidence, namely, that there are many health benefits from regular exercise which contribute to better health and longer life. This forms the answer for research question number one and drives the key recommendations of the study.

Step Test

Research question two required an evaluation of the new Pack Test. This category reviewed all the documentation published on the Pack Test's development as well as some information on its forerunner, the Step Test. A more detailed history is provided in the Discussion section.

Sharkey (1977) described the Step Test in his first edition of Fitness and Work Capacity. "Since 1975 Federal Agencies have utilized a 5-minute Step Test to screen candidates for wildland firefighting jobs." (Sharkey, 1997, p. 48). It was originally developed in 1954 by Swedish

physiologists as an easy alternative to expensive and time-consuming laboratory treadmill tests. It measures fitness numerically based on post-exercise pulse rate, body weight, and age. Jim Russell, Fire Management Officer for the Bureau of Land Management in Medford, Oregon provided more history when he stated, "The Step Test was originally designed to be a preliminary test to screen out individuals that may be susceptible to cardiovascular problems during a more rigorous physical fitness test." (personal communication, April 25, 1997).

When the Step Test was enlisted to act as a physical fitness test, it underwent numerous criticisms. Dr. Kevin Sykes (1995) evaluated the accuracy of the Step Test and offered improvements and alternatives. He found,

> In general, step tests have standard errors of estimate (SEE) of around 12 to 15 per cent. This means that the predictive score may overestimate or underestimate the directly measured VO_2Max in two-thirds of the population by as much as 12 to 15 per cent. The error therefore, in one-third of the population is even larger....These factors make the step test a rather dubious assessment tool if *accurate* aerobic capacity scores are required (p. 27) [emphasis his].

According to Paul Broyles at the National Park Service from the National Interagency Fire Center at Boise (email 5/6/96),

> The rationale for the full replacement, rather than a supplementary fitness screenout to the step test et al, [sic] is the fact that no one (Sharkey least of all) can any longer defend the step test in court, since it is not specifically task-related to the job of fire suppression. The Amer. with Disabilities Act of '91 and the EEOC have specific criteria for screening (ie task related only, provable in court), as you know. Sharkey

> feels that the only reason we have not been "sued" or otherwise taken to court by the EEOC is because they know that we/FS/MTDC are working on developing a defensible task-oriented test [sic].

Criticism has also come from among firefighters. Although not based on scientific study, firefighters are not confident in the Step Test. The Wildland Firefighter Safety Awareness Study (1997) found the validity of the Step Test as the fourth highest 'Specific Issue' among 238 potential issues when it surveyed 1000 firefighters in the five federal firefighting agencies. Although not correlated to other responses in the report, the theme seemed to be that rather than finding the Step Test too difficult to pass, the critics thought it was allowing people to go to the fireline who should not be allowed to.

The research on the Pack Test will be analyzed in the "Results" and "Discussion" section of this paper. This research in this section forms the basis for the answer to research question two.

Various articles gave examples of physical fitness programs

California Department of Forestry's Physical Fitness Guidelines and Health and Safety Procedures Handbook - 1830 Physical Fitness served as a handbook for a fitness program. The booklet gave detailed instructions for aerobic conditioning, strength conditioning, flexibility conditioning and weight control.

Owsley stressed the importance of a flexibility component to any fitness program. McCrory tried to answer questions about the optimal number of sets and repetitions in weight training. He emphasized the importance of continual exercise over sporadic and high intensity over lower intensity. Davis and Dotson outlined a 10-step process for implementing and maintaining a fire department's workout routine.

These findings of others certainly encourage the Department to enhance our level of firefighter

fitness. The need to know what our cooperators were doing became evident. This would further guide the Department to determine its own direction.

PROCEDURES

Definitions:

Incident Command System (ICS): Used by wildland firefighting agencies to provide the basic organizational structure, job titles, and duties for the variety of positions in wildland firefighting. It is one of several components to NIIMS (see below).

Maximal Oxygen intake (VO_2 Max): An aerobic fitness measurement indicating the body's ability to take in, transport and utilize oxygen. It can be measured with a laboratory treadmill test using a computerized metabolic measurement system as well as estimated with more simplistic field tests. Its dimensions are milliliters of oxygen per kilogram of body weight per minute and denoted as mL/kg•min.

NIIMS: National Interagency Incident Management System: A multi-agency system developed in 1980 to be adaptable to any type of emergency.

Pack Test: A newly-developed family of three fitness tests used to determine aerobic fitness. The tests consist of carrying a pack of specific weight over level terrain for a given distance and time. The distance and weight are determined by the level of fitness capacity required by the ICS position. (See Appendix C and Appendix D). The Pack Test is correlated to the ability to perform arduous work.

Pick-up Employees Temporary firefighters hired by the Department during emergency situations who typically have less formal training and experience.

Step Test: A fitness test used to predict aerobic capacity in milliliters of oxygen per kilogram of body

weight per minute. It consists of stepping on and off a box at a rate of 22.5 steps per minute for five minutes and then using pulse count (15-30 second post exercise) with body weight and age to compute aerobic capacity.

Research Methodology

The answers to the research questions would help the Department shape a new physical fitness standard and program. To answer the questions a Descriptive Research Methodology was selected, yet different procedures were used to answer the various questions. Current studies would be used to determine the prevailing success of physical fitness programs in the fire service which improve performance and decrease accidents. The validity of the Pack Test would be evaluated also based on the current state of the research. The Department would need to know how it was developed and under what parameters it would be authentic. Finally, a survey would be taken of western fire agencies to ascertain their use of a current physical fitness standard.

Personal Interviews with agency representatives

During the summer of 1997, phone interviews were conducted with agencies having wildland fire responsibilities in the Western United States. All agencies had both permanent and seasonal wildland firefighting personnel.

A personal interview was selected rather than a survey in order to develop a discussion rather than a fill-in-the-blank questionnaire. It was felt this technique would allow for issues that came up to be explored in greater detail. In addition, one-on-one contact was selected as a method to make certain each individual gave his or her specific feedback. It also guaranteed 100% response of the agencies selected.

The agencies chosen included both federal and state agencies. For state agencies, contact was

made at a state level rather than a local district field office. The intent was to get the policy for the agency rather than the interpretation of the field offices. States contacted were: Alaska, California, Idaho, Montana, Nevada, and Washington. The contact person in some cases was a statewide training coordinator, and in other cases it was the fire program manger. In one case, the contact was the agency's physical fitness coordinator.

In dealing with the federal agencies, contact was made with a region or area office with a staff member having responsibility over the western states. In the case of the United States Department of Agriculture (USDA), Forest Service, two regions were sampled to cover both the Pacific Northwest and California regions due to their large size and occasional differences in procedures. Besides the USDA Forest Service, the United States Department of Interior (USDI), agencies evaluated were Bureau of Land Management, Bureau of Indian Affairs, Fish and Wildlife Service, and National Park Service. A complete listing of the agencies and contacts is included in Appendix B.

The small number of the population allowed for direct contact with each agency and insured a 100 percent return. A form was developed to make sure each agency was asked the same questions and to provide a place to document the answers. A copy of the form is included in Appendix A. The questions were tested with the first few interviewees and found to be appropriate. All interviews were conducted over the phone. After introducing the reasons for the survey, all interviewees were asked if he/she had time to spend on the interview. Most interviews lasted approximately thirty minutes.

Some of the information received was hard data, i.e. type of program, while other information dealt with the representative's impressions or feelings as to effectiveness, problems, field administration, etc. These interviews were used to answer research question 3, "What are other wildland firefighting agencies in the West doing with respect to a physical fitness standard and a fitness program?"

Project limitations

Although physical fitness is important to many businesses, such as police agencies and the military, the focus of this paper was primarily the fire service. The literature review concentrated on firefighter occupations although several sources provided information on the general health benefits of exercise. The surveys were confined entirely to wildland agencies and only those in the Western United States in the areas surrounding Oregon.

RESULTS

Answer to research question 1: Is there a correlation between a fitness standard and higher productivity and lack of accidents?

Although it seems obvious, studies, do in fact, prove the worth of exercise in avoiding accidents and improving performance. In addition, fitness can be responsible for disease prevention. Dr. Haskell (1994) found in his review of 50 studies that physical fitness clearly minimizes death related to heart disease and NFPA's study found that heart attacks were a significant cause of fireground fatalities.

The surgeon general's report summarized by McConnel (1996) pointed out the many benefits of exercise in disease prevention as did Dr. Sharkey (1977 and 1997). Former Surgeon General, C. Everett Koop believed it so strongly he conceived a non-profit organization, 'Shape Up America!' specifically to trumpet the health benefits from physical fitness.

The studies in Wichita and Los Angeles reported by Drs. Davis and Dotson (1991) present compelling evidence that physical fitness programs can save thousands of dollars in absenteeism and reduce the Injury-On-Duty rate.

Dr. Sharkey's (1997, p. 16) field studies validated his prediction that "Fit workers can sustain a higher work rate." The improvement based on eight weeks of training from an initial ability of only 50 repetitions to over 2000 repetitions plainly shows the performance increases attainable. "In short, fitness is the most important factor in work capacity." (Sharkey, 1997, p. 47).

The evaluation of these conclusions were done by persons and organizations with the highest credentials and leaders in the field of health and science. Their conclusions are not disputed among their peers. Greater detail is provided in the literature review section.

Answer to research question 2: Is the Pack Test a valid test to meet the requirements of civil rights laws and the Americans with Disabilities Act, and does it follow sound scientific principles to stand up as a reasonable standard if challenged?

Dr. Sharkey and others fully evaluated the Pack Test with respect to meeting the objectives of determining "if a person has the minimum levels of aerobic and muscular fitness to perform the tasks associated with their assigned fire suppression positions safely and effectively" (Lavin, 1997, p.3), "and comply with applicable laws and regulations." (Sharkey, 1997, p. 48).

They conducted field trials during the 1995 fire season on 333 firefighters from 3 regions of the USDA, Forest Service, three federal agencies, and one state. The sample consisted of a representation of size, age, gender and ethnic distribution of firefighters.

AGE:

Of thirty subjects over 40 years old, 25 passed, producing a pass rate of 83.3% compared to an overall pass rate of all subjects of 81.9%. The average time of the over 40 group was actually better than the average for those under 40.

HEIGHT:

"Analysis of scores above 45 minutes revealed no significant relationship ($r = -0.022$. $r^2 = 0.0005$)." (Sharkey, un-dated, p. 2).

WEIGHT:

"There was no relationship between weight and performance on the pack test for all subjects by gender, or for those who scored over 45 min." (Sharkey, un-dated, p. 2).

GENDER:

"Females passed at the rate of 85.2% of the male pass rate, which does not constitute adverse impact as defined by the EEOC (<80%)." (Sharkey, un-dated, p. 2).

ETHNICITY:

Sharkey concluded, "Ethnicity did not appear to be a factor in test performance." (un-dated, p.2)

RELATIONSHIP TO OTHER FITNESS MEASURES:

Initial testing began in 1994 when Sharkey, Rothwell and DeLorenzo-Green tested firefighters in leg tests, arm tests, muscular fitness tests, and a field test to determine the relationship to the Pack Test and identify factors correlated with the Pack Test. "Results indicate that performance on the Pack Test involves components of aerobic and muscular fitness, and that a time of 45 minutes for the 3 mile test approximates the current fitness requirement [Step Test] of 45 mL/kg•minute." (p. 1).

RELATIONSHIP BETWEEN THE FIELD TRIALS AND THE PACK TEST:

In 1995, De-Lorenzo-Green and Sharkey compared the Pack Test to the energy costs of fireline construction and found the Pack Test to be "similar to the documented cost of firefighting duties." (De-Lorenzo-Green and Sharkey, p. 1).

RELATIONSHIP TO FIELD PERFORMANCE:

Sharkey, Rothwell and Jukkala (1996) tested the Pack Test in relationship to field performance and measures of strength and aerobic fitness. The results confirm the relationship to field performances and a regression analysis validated that a score of 45 minutes for the 3-mile Pack Test approximated the aerobic standard of 45.

RELATIONSHIP TO STEP TEST

A score of 45 mL/kg•minute is the same score required by the Step Test, but the Pack Test correlates much better to the job of firefighting. Therefore, the fitness standard has not been raised; the new test is just a better evaluative tool that excludes age, weight, and heart rate in the numerical rating formula.

SCIENTIFIC CREDIBILITY

Dr. Sharkey's research began with a survey determining what physical tasks firefighters were required to do (see Appendix E). The tasks were measured in a laboratory to determine the VO_2 Max required for each test. Sharkey then chose two representative tests (the Pack Test and the Fireline Test) to evaluate and selected a random sample of 333 firefighters from various areas in the nation to evaluate the tests. The results were presented at the Occupational Physiology and Medicine section of the American College of Sports Medicine.

> Both [tests] were judged to be valid, reliable, objective, and job-related measures of work capacity. However, because of its reliance on upper body strength, the FT [Fireline Test] was found to have adverse impact on females (i.e., females passed at less than 80% of the male's pass rate, EEOC). Moreover, the FT cost more (equipment, time) to administer (Sharkey, un-dated, p. 2).

Dr. Sharkey's work spans more than 30 years with the USDA Forest Service at the Missoula Technology and Development Center and the University of Montana Human Performance Laboratory.

Answer to research question 3: What are other wildland firefighting agencies in the West doing with respect to a physical fitness standard and a fitness program?

Of all the agencies surveyed (12) only one (California) is not planning to use the Pack Test for next fire season (1998). California (CDF) has its own fitness testing for permanent employees, but does not test seasonal firefighters. Of the 11 agencies moving to the Pack Test next year, many had experimented with it already this year. All those experimenting with it strongly supported it over the Step Test.

When hiring firefighters, a physical fitness test is not used by agencies to screen candidates in the selection process. However, 11 of the twelve agencies are currently using a Step Test or alternative (California) and require successful performance as a condition of employment and part of the job description. Washington is similar to the Department in that the test is currently voluntary with no penalty of failing. However, they expect to accept the national standard when it is adopted.

Failure in passing a test, whichever test was used, brought a variety of responses. All the federal agencies required passing to get a red card, but one agency allowed participation at a home unit in fire suppression or prescribed burns without meeting the physical fitness requirements for red card certification. State agencies varied with several not requiring fitness testing for annual certification. Two state agencies did require successful completion for annual certification. Another was voluntary; a fourth would allow them to work on their home unit, and the last two did not have required annual testing.

Discipline for failure to pass the test is a difficult problem for all the agencies. Only three federal agencies felt that they could terminate a person for not meeting the annual Step Test. The other three federal agencies felt that realistically, the person would be ineligible to go on fires and would be a candidate for re-assignment. Since many of the field units for these agencies are small and re-

assignment opportunities were minimal, these agencies were concerned with the discipline aspect of failing the test. However, they felt the Pack Test would solve this problem. To-date, no agency indicated that they had gone to court over failing the Step Test, but voiced concern if a person were terminated against his/her wishes. No state agency had solved this conundrum either. The biggest incentive/disincentive for fighters seemed to be the exclusion of non-passing employees from fire assignments. After all, fighting fire is what a firefighter wants to do.

All agencies had some type of physical fitness training. Eleven of the 12 were voluntary and the twelfth (California) is currently in the transition process of becoming mandatory. Of the voluntary agencies, all but one allowed an hour per day of duty time for fitness training. The remaining one encouraged training on an employee's own time. Several commented that their program varied in the field and policy allowed local units flexibility to manage at the line officer's discretion.

Eleven agencies allowed field units to purchase or develop fitness equipment. This too, was left to the local unit's line officer. All stated that shower availability encouraged the voluntary programs, but several acknowledged that showers were not always available in smaller field units. A more thorough survey of shower availability or types of fitness equipment was not part of this study.

DISCUSSION

PACK TEST HISTORY

It is useful to go back and describe a little more of the Pack Test's development to begin a discussion on its value in the Department.

The most credible way to test an employee in any task, is to have them perform it. For physical fitness tests in wildland fire agencies, this could include digging fireline, pulling hose, climbing hills, carrying hose packs and pumps, chopping, shoveling and using a chain saw. This would make for an expensive and complicated testing procedure requiring weighting of individual tasks.

As an alternative, these individual tasks were tested by Sharkey to determine their energy costs in terms of calories per minute used and the volume of oxygen per kilogram of body weight per minute (called aerobic power or VO_2 Max). A table for these energy costs is presented in Appendix E and average about 22.5 mL/kg•minute per task. Yet, "Even highly trained and motivated workers are unable to sustain more than 50% of their capacity during extended work shifts.... A worker's aerobic fitness needs to be at least two times the energy demands of the job (2 x 22.5 = 45 mL/kg•min.)." (Sharkey, 1997, p. 6).

This aerobic fitness can be measured by a laboratory treadmill test with the subject attached to electro-cardiograph electrodes and a breathing valve while the treadmill grade increases. The test continues until the subject cannot continue or the subject's use of oxygen levels off. The VO_2 Max score is the highest level achieved. This too would be an extremely expensive test to administer to every prospective firefighter.

Therefore Dr. Sharkey sought an alternative that was, "Job-related, safe, inexpensive, brief, easy to administer, valid, reliable and objective. Moreover, the test had to comply with applicable laws

and regulations." (1997, p. 48). Dr. Sharkey met this objective and provided a valid test that correlates well with the tasks required by firefighters yet is still easy to administer. Furthermore, the Pack Test should be more acceptable to employees than the Step Test since it correlates well and does not include the questionable components of age, weight and pulse rate.

FITNESS TRAINING

Sharkey found that after eight weeks of training, passing the test is likely. That suggests that nearly anyone without a serious disability could get themselves into shape to meet the standard. If one could not pass the test after eight weeks, it is likely that they would be a liability on the line rather than a benefit. As an anonymous author stated, "Fitness can neither be bought nor bestowed, like honor it must be earned." Sharkey stated that this is attainable, "You can increase VO_2 Max 20 to 25% in 2-3 months or by more than 30% with significant weight loss." (1997, p. 51). But, "Most training adaptations are reversible; they are lost more rapidly than they are gained." (p. 53). "Simply stated, the human body responds to the dictum: Use it or Lose it. The body doesn't wear out with use; it deteriorates with lack of use" (p. 3). Importantly, many authors dispel the myth that this exercise must be painful (McConnel, McCrory, Sharkey, and C. Everett Koop's 'Shape Up America!'). Rather, it should be done feeling relatively comfortable.

SURVEY

Nearly all of the agencies were taking a similar approach to physical fitness testing by using the Step Test and transitioning to the Pack Test. There were differences in administration and policies, but the agencies were working on a similar program. The one exception was California (CDF). In some cases, California was innovative in their approach and in others, they were doing little. For example, they had a detailed consultant's study comparing four tests which correlated to 12 sample work tasks.

Passing these fitness-related tests were required before a permanent firefighting position was offered. However, once completed, there was no annual testing and there was no testing of seasonal workers at all. CDF is also enacting mandatory physical fitness training for employees from the Ranger Unit Chief down. So California has the ideal program for testing new permanents upon entry into their agency and then continued training, but they do not re-test regularly and do not test seasonals at all.

If the missing elements were added, a program similar to CDF's would provide an excellent solution to Oregon's need for a fitness curriculum. However, there is a considerable up-front cost in developing a study to meet legal requirements, and there would a lot of energy required to negotiate an agreement with the union. Also, annual testing of every seasonal, during a very short time window would be difficult and is likely the reason CDF has not undertaken it.

The Department has always prided itself on being on the forefront of new ideas and the cutting edge of technology. It is envied among our peers in other agencies as being proactive. This is true in such things as our relationship with the legislature, our constituents, the industry and our cooperators. We have led the nation with the Forest Practices Act, land use planning, interface certification, fire prevention cooperatives, and arson investigation. However, in the case of physical fitness standards, testing and training, we appear to be out of date. Technology is proving the value of exercise in preventing a variety of diseases and injuries all germane either to the general public and general occupations as a whole or specifically to firefighting (heart attacks). It also has been shown to improve performance and reduce absenteeism. Particularly without firefighter retirement, our workforce age is higher than most fire service organizations. This would suggest that we are at a higher risk for increased accidents, heart attacks, and conceivably lower production. The time is ripe for taking new action to move into this arena in a much stronger fashion.

As always, change will generate some strong emotions. The Department's change will require several years to change attitudes and even more to change our culture. Putnam (1995, p. 6) stated, "It is easier to modify behavior than attitudes. Changing attitudes occurs after a 3- to 5-year effort. Attitudes need to be exemplified in behaviors." The sooner the Department mandates behavioral changes, the sooner our attitudes will follow. Smith found that after several years of a fitness and testing program in Pike Township, it had "Become a major part of the culture of the ... Department. Several of the newer employees have stated that they were attracted to this department in particular because of its strong emphasis on physical fitness..." Davis (1996, p. 1) said, "We know that for a practice to become habit, a person has to stick with an activity for a minimum of four months."

CDF is considering an incentive package similar to their California Highway Patrol that would provide incentive pay for a certain fitness standard. An incentive of this type would make the cultural changes more readily received.

RECOMMENDATIONS

The Department should do all it can to encourage physical fitness among its employees. It should begin an effort to re-shape the culture of the Department similar to changing attitudes and behavior with respect to affirmative action, diversity, sexual harassment, etc. The rationale for this is the tremendous benefit to the Department for having healthy employees, increasing performance and minimizing accidents, certain diseases, and absenteeism.

The Department should adopt a physical fitness standard for its firefighters. The standard most easily adopted is the Pack Test already developed by Sharkey and others. The majority of our cooperators and neighboring states will be adopting it, so it makes for a clear understanding between

agencies. An alternative would be to develop a test of our own that meets similar objectives. Since this would be costly and not very timely, it is discouraged in favor of the Pack Test.

The Pack Test should be adopted irrespective of seasonal or permanent status. It should be applied equally to all employees. New hires should be tested immediately after being offered a job in a firefighting position and should be required to pass the Pack Test as a condition of employment. It should become part of job descriptions of permanent and seasonal firefighting positions. The classifications that it should be applied to are Student Worker, Labor I, Labor II, Forest Officer and Inmate Crew Coordinator all at the arduous level. The moderate level should be applied to Protection Supervisors and Protection Unit Foresters. In addition, it should be also applied according to the ICS position for personnel in non-fire positions yet holding an ICS qualification.

Further, it should be considered for inmates and pick-up personnel. Although this sounds like a daunting problem, it could be managed to a reasonable level. For instance, the Pack Test could be required in the contract for contract engines and crews. Fallers, dozer operators, kitchen help, and runners do not have a position in the ICS standard (P310-1) so there is currently no fitness requirement for these positions. Since fallers and dozer operators are typically hired at the industrial level, that could be construed to meeting a working standard already. Kitchen help and runners should not be required to meet a standard.

The Department should seek to make physical fitness part of a broader incentive package for Incident Management Team and pool members. The Department is considering incentives in order to retain team members. If an incentive system were established, meeting a physical fitness standard would seem to be a reasonable requirement. It could also be a requirement for Firefighter Retirement if that program is successfully developed in the near future.

Districts should be required to develop a physical fitness training program. Flexibility could be allowed for each District but a standard format could be followed. It should be recognized that the best physical training for any activity is the activity itself. "Studies have proven the obvious; running does little to improve swimming performance and swimming does little to increase running performance...Training must simulate the activity." (Sharkey, 1997, p. 12). Therefore, practicing building fire trail is the best training for digging fireline on fires. A fitness training regiment should consider actual work practice in addition to weight training and aerobic conditioning.

Field supervisors will need to change their mindset from completing project work and training to one that physical fitness training becomes a priority. Since the benefits are so great, this can be justified.

The Department will have to determine if there is a need to do a medical screening prior to annual testing. Drs. Davis and Dotson (1991) suggested that it can be done similar to triage and only test those most likely to have concerns. This could be done with a simple health screening questionnaire. Sharkey (1997) quoted world-renowned physician and exercise scientist, Dr. P.O. Astrand,

> ...Anyone who is in doubt about the condition of his health should consult his physician. But as a general rule, moderate activity is less harmful to the health than inactivity. You could also put it this way: A medical examination is more urgent for those who plan to remain inactive than for those who intend to get into good physical shape! (p. 8-9).

Davis and Dotson (1991) stated that 1-2% will have undiscovered heart disease, but most authors agree that it is easily found. The Pack Test is certainly not any harder than actually performing the work required.

Finally, the Directive will have to be re-written to reflect a change in policy and the mechanisms established to meet the policy requirements.

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APPENDICES

Appendix A: List of Contacts

Appendix B: Survey Form used for Agency Representatives

Appendix C: Summary of physical fitness requirements for each ICS position

Appendix D: Pack Test Standards

Appendix E: Energy Costs of Common Wildland Firefighting Tasks

Appendix F: Survey Summary of Specific Agency Responses

Appendix A

List of Contacts

Selected Wildfire Agencies in the Western United States

State Agencies

Alaska Division of Forestry	Joe Stam	(907) 356-5529
California Dept. of Forestry and Fire Protection	Mike Catlin	(916) 654-9239
Idaho Department of Lands	Mike Dannenberg	(208) 769-1522
Montana Dept. of Resources and Conservation	Steve Holden	(406) 542-4223
Nevada Division of Forestry	Mike Klugh	(702) 849-2500
Washington Department of Natural Resources	Dave Luse	(360) 902-1300

Federal Agencies

USDA Forest Service (Region 5)	Lyle Shook	(415) 705-2722
USDA Forest Service (Region 6)	Mike Spencer	(503) 326-6788
USDI Bureau of Indian Affairs	Bill Donaghu	(503) 231-6806
USDI Bureau of Land Management	Mike Spencer	(503) 326-6788
USDI Fish and Wildlife Service	Andy Anderson	(503) 231-6171
USDI Park Service	Paul Broyles	(208) 387-5266

Appendix B

Western States Fire Agencies
Physical Fitness Standard Survey

Agency _____ Contact _____

1. Do you have a Physical Fitness Standard (pre-hire testing)?

   What is it (Step Test, Pack Test, other)?

2. Do you test current employees to meet the Physical Fitness Standard?

   Is it Voluntary or Mandatory?

   Is the employee subject to disciplinary action based on the test results?

3. Do you have a Physical Fitness Program?

   Explain it?

   (voluntary vs. mandatory; management required; certain required elements vs. do what you want, minimums to achieve vs. "get in shape"; time allowed on job; shower facilities available; etc.)

Appendix C

Summary of Physical Fitness Requirements for ICS position from P 310-1

Positions Requiring ARDUOUS

Incident Commander Type 3
Incident Commander Type 4
Division Supervisor
Task Force Leader
Strike Team Leader
Crew Representative
Single Resource Boss
Firefighter 1
Firefighter 2
Helicopter Manager
Helicopter Crew Member
Field Observer

Position Requiring MODERATE

Safety Officer Type 2
Operations Branch Director
Operations Chief Type 2
Situation Unit Leader
Fire Behavior Analyst

Positions Requiring LIGHT

Operations Section Chief Type 1
Staging Area Manager
Helicopter Manger – 1-3 helicopters
Helicopter Manger – 4 or more helicopters

Positions having NO Fitness requirement

Area Commander
IC Type 1
IC Type 2
Safety Officer Type 1
Safety Officer Type 2
IIO Type 1
IIO Type 2
IIO Type 3
Agency Rep.
Interagency Resource Rep.
Liaison Officer
Air Ops. Branch Director
Air Tactical Group Sup.
Air Support Group Sup.
Helicopter Coordinator
Air Tanker/Fixed Coor.
Area Com. Planning Chief
Planning Section Chief I
Planning Section Chief 2
Documentation U.L.
Demobilization U.L.
Resource Unit Leader
Infrared Interpreter
Training Specialist
Display Processor
Status/ Check-in Recorder
Area Com. Logistics Chief
Logistics Chief Type 1
Logistics Chief Type 2
Support Branch Director
Service Branch Director
Food Unit Leader
Communications U.L.
Facilities Unit Leader
Supply Unit Leader
Ground Support U.L.
Medical Unit Leader
Security Manager
Incident Com. U.L.
Base Camp Manager
Ordering Manager
Receiving/Distr. Man.
Equipment Manager
Finance Sec. Chief Type 1
Finance Sec. Chief Type 2
Procurement Unit Leader
Cost Unit Leader
Time Unit Leader
Compensation/Claims Ldr.
Equipment Time Recorder
Commissary Manager
Personnel Time Recorder
Comp.-for Injury Man.
Claims Manager

Appendix D

Pack Test Standards

This standard, frequently called the Pack Test, is actually a package of 3 tests depending on the ICS positions physical fitness requirements.

	Test Name	Distance	Weight	Time
Arduous	Pack Test	3 Miles	45 Pounds	45 Min. (4 mph)
Moderate	Field Test	2 Miles	25 Pounds	30 Min. (4 mph)
Light	Walk Test	1 Miles	0 Pounds	16 Min. (3¾ mph)
None	NONE	N/A	N/A	N/A

Altitude Adjustments

(add the following numbers in seconds to the required times)

4-5000 ft. 10 Secs. to the Walk Test, 20 Secs. to the Field Test, 30 Secs. to the Pack Test

5-6000 ft. 15 Secs. to the Walk Test, 30 Secs. to the Field Test, 45 Secs. to the Pack Test

There is an altitude adjustment for testing over 4,000 feet elevation which is not included here since it is unlikely it would apply to the Department.

Appendix E

ENERGY COST OF COMMON WILDLAND FIREFIGHTING TASKS

The following energy costs are estimates for a person weighing 150 pounds.
Add or subtract 10 percent for each 15 pounds above or below 150 pounds.

WILDLAND FIREFIGHTING TASKS	**ENERGY** (Calories per minute)	**COST** (mL/kg minute)
Using a handtool: Digging or chopping with a pulaski, combi Tool, McLeod, or brush hook.	7.5	22.5
Lifting and carrying light loads: Clearing loose brush or trees, deploying or repositioning hose, throwing dirt with a shovel, firing operations, or structure protection.	6.8	20.0
Chain sawing: Felling, bucking, limbing.	6.2	18.0
Packing heavy loads: Pumps, hose packs, 5-gallon water bags	Flat 7.5 Hill 10.0	22.5 29.4
Hiking with light loads: Field packs and tools	6.5	19.0
Performing under adverse conditions: Long work shifts; Rough, steep terrain: heat, cold, altitude, smoke; insufficient Food, fluid replacement, sleep.	6.5 – 10 +	19 – 30.0
Emergency responses: Fast pull-out to safety zone, rescue or evacuation assistance to others.	10.0 +	22.5
Chopping wood	7.5	21.4
Tree felling: (ax)	8.5	25.0
Stacking wood	5.8	17.0
Shoveling	6.8	20.0

SOURCE: Dr. Brian Sharkey, Fitness and Work Capacity
USDA Forest Service Technology & Development Program
Missoula, Montana. April 1997.

Appendix F

Survey Summary of Specific Agency Responses

	Standard Y/N	Pack Test Step Test Other (see key below)	Voluntary Mandatory	Discipline Y/N	Physical Fitness Program Y/N
State Agencies					
Alaska	Y	3	M	Y	Y
California	Y	0	M	Y	Y
Idaho	Y	3	M	N	Y
Montana	Y	3	M	N	Y
Nevada	Y	2	M	Y	Y
Washington	N	3	V	N	N
Federal Agencies:					
BIA	Y	3	M	Y	Y
BLM	Y	3	M	Y	Y
USFS&WS	Y	3	M	Y	Y
NPS	Y	3	M	Y	Y
FS Reg. 5	Y	3	M	Y	Y
FS Reg. 6	Y	3	M	Y	Y
TOTALS	11/12		11/12		11/12

Key for column 2:
1= Step Test
2= Pack Test
3= Transiting from Step Test to Pack Test
4= Agency Test

[1] Some discipline was suggested, but some agencies were uncertain if it would be possible to terminate an employee.

[2]