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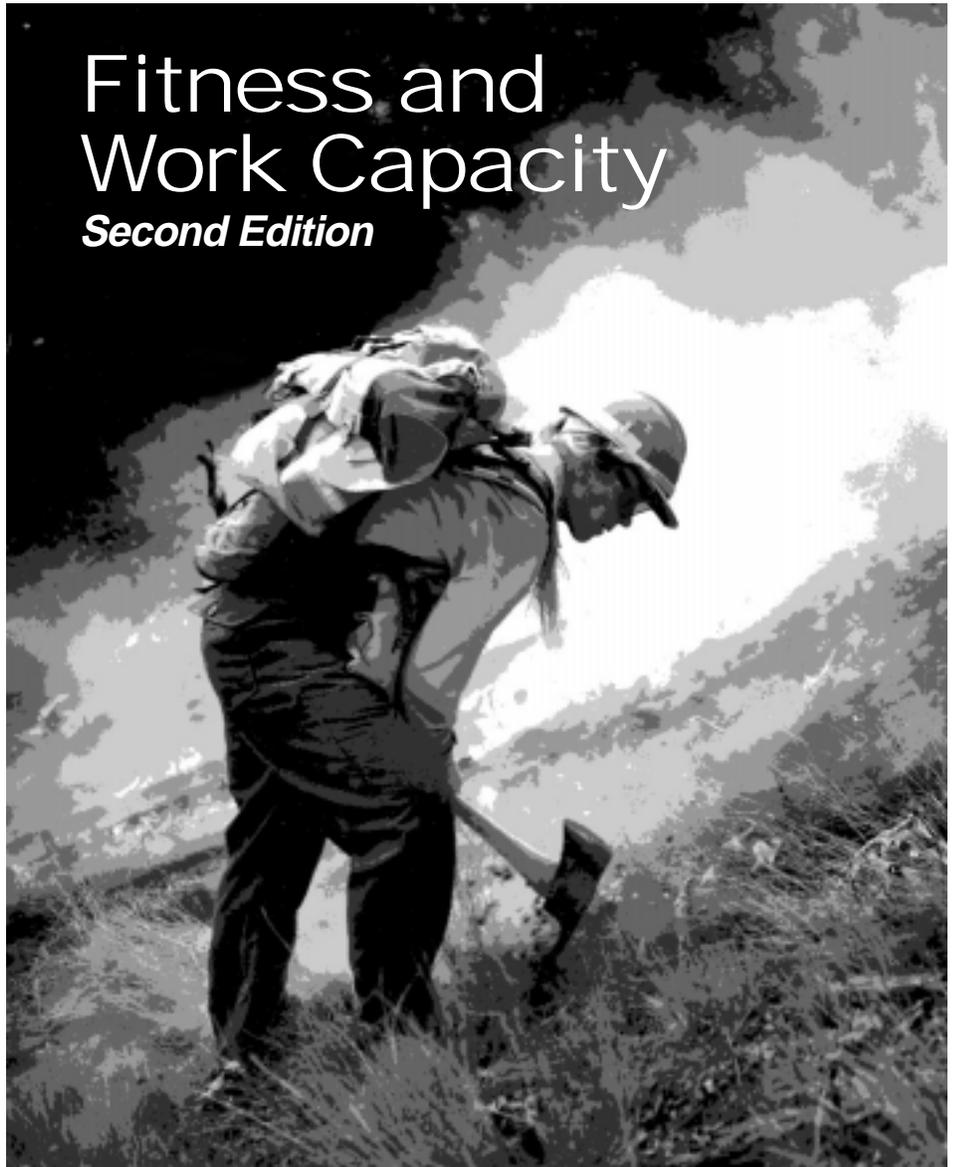
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Fitness and Work Capacity

Second Edition



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Technology & Development Program
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Preface

The first edition of this booklet, published in 1977, was designed to help field workers and wildland firefighters achieve health, fitness, and work capacity. This long-overdue second edition updates information on fitness and work capacity, and provides additional material on nutrition, hydration, the environment, work hardening, and injury prevention. It consolidates important information under one cover, introduces a new generation of job-related work capacity tests, and provides workers with guidelines to help them achieve and maintain fitness and the capacity to perform prolonged arduous work. Fit employees will not become a hazard to themselves or coworkers. They have a reserve to meet unforeseen emergencies.

While the focus of this booklet is on field workers and firefighters, it can be used by others interested in improving health, fitness, and the quality of life. The 1996 Surgeon General's Report warns that:

Physical inactivity can be hazardous to your health!

The report recommends that everyone should engage in 30 minutes or more of moderately vigorous physical activity, most days of the week. Regardless of your job description, activity will improve your health and extend the prime of your life.

Part One

Fitness and Work Capacity

*Fitness can
neither be bought
nor bestowed,
Like honor it must
be earned."*

-Anonymous-

Fitness means many things to many people. It was once defined as "the ability to carry out daily tasks with vigor and alertness, and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies." Now fitness is defined in two major categories, aerobic and muscular. Both are essential components of work capacity, and both contribute to health and safety. We will review the components of fitness and their contributions to health, then provide exercise prescriptions designed to help you reach your health, fitness, and work capacity goals.

Chapter 1—*Fitness, Health, and Work Capacity*



Until recently the primary source of power for accomplishing work came from the contractions of human and animal muscles. While wind and water were used to augment muscular power, it wasn't until the 18th century that mechanization began to reduce the need for muscular work. Machines, computers, and robots have been developed to supplement or replace human effort. Today when men and women go to "work," few engage in arduous muscular effort. At the same time labor-saving devices have reduced the need for muscular work at home, and the automobile has made getting from place to place physically effortless.

Not surprisingly, we are now witnessing the consequences of mechanization and diminished activity. The United States, with one-third of its population overweight, has become the fattest nation on earth. Degenerative diseases or diseases of lifestyle, such as heart disease, hypertension, diabetes, and cancer have become the major causes of death. Overuse or repetitive trauma injuries are on the rise as the population becomes less active. As a consequence, many workers are unable to deliver a full day's effort in a physically demanding job.

Work Capacity

Work capacity is the employee's ability to accomplish production goals without undue fatigue, and without becoming a hazard to oneself or coworkers. It is a complex composite of aerobic and muscular fitness, natural abilities, intelligence, skill, experience, acclimatization, nutrition, and—of course—motivation. For prolonged arduous work, fitness is the most important determinant of work capacity.

Many jobs, such as field work and wildland firefighting, still require strength and endurance. Workers who are accustomed to spending their days at a desk must engage in strenuous field work during the field season.

Job Task Analysis

A comprehensive job task analysis was conducted to identify the tasks required of wildland firefighters, and to determine the importance, difficulty, duration, and frequency of each task. Last conducted in the 1970's, the analysis was updated to reflect possible changes in the demands of wildland firefighting. The top-ranked tasks included:

- *Using handtools to construct fireline*
- *Performing under adverse conditions*
- *Hiking with light loads*
- *Lifting and carrying light loads (such as firehose).*

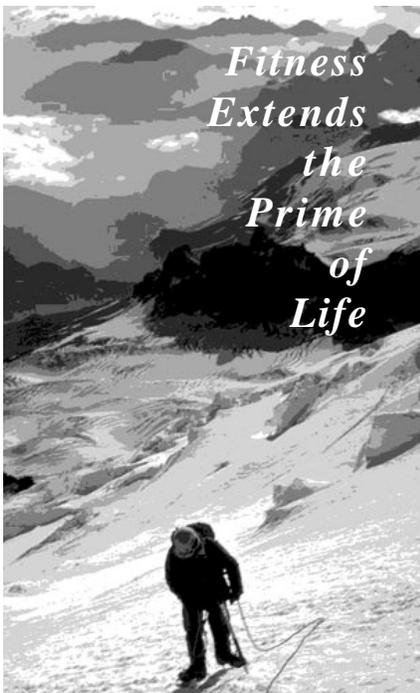
Tasks that ranked lower, largely because they occurred less frequently, included:

- *Packing heavy loads*
- *Emergency responses*
- *Chain sawing.*

The job task analysis confirmed the importance of fitness for wildland firefighters. The task "Performing under adverse conditions," identified in interviews of experienced fire managers, was defined as "including long work shifts; rough steep terrain; heat, cold, altitude, smoke; insufficient food, fluid replacement, sleep." "Emergency responses," another category added in the 1995 analysis, was defined as "fast pull-out to safety zone, rescue or evacuation assistance to others." Firefighting continues to be demanding, often dangerous work, performed under adverse conditions.

Without proper preparation, the stresses of arduous field work can lead to injury, illness, even death. Concern for employee safety and health has prompted the development of employee health or wellness programs, and special programs to ensure that only the fit are assigned arduous field tasks. 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. This booklet is designed to help managers, crew leaders, and field workers achieve the fitness and work capacity needed to do the job safely.

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.



Activity, Fitness, and Health

The benefits of physical activity and fitness extend well beyond those related to your job. Activities that lead to improved fitness and work capacity are also associated with:

- Reduced risk of heart disease, hypertension, and stroke
- Reduced incidence and severity of diabetes
- Reduced risk of certain cancers
- Reduced incidence of overweight and obesity
- Strengthened bones, ligaments, tendons, and muscles
- Reduced risk of osteoporosis
- Reduced risk of injury and illness
- Increased energy, mobility, and even longevity.

Activity and fitness also confer substantial psychological benefits, including:

- Reduced anxiety and depression
- Reduced tension and stress
- Enhanced self-concept and body image
- Improved appearance and performance
- Enhanced joy of living, vitality, and quality of life.

Activity and fitness also contribute to longer life and to shortening the period of debilitating illness that frequently precedes death. Active living extends the prime of life, and **adds life to your years as well as years to your life.** Aerobic and muscular fitness extend the period of vigor so retired workers can lead vital, independent lives (Figure 1.1).

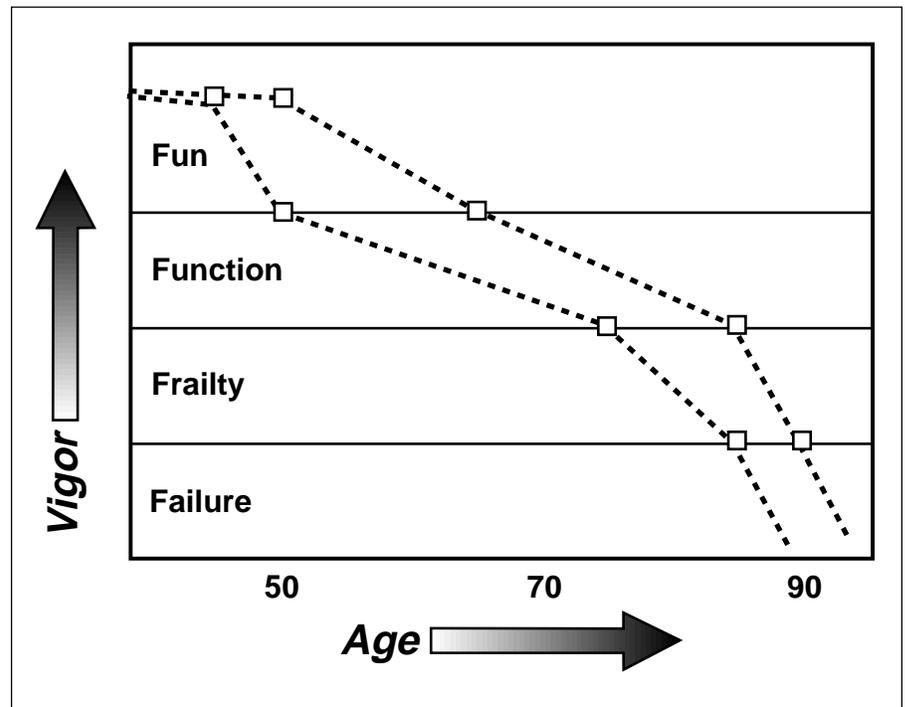


Figure 1.1—Vigor and the active life. Active living extends the periods of fun and function and shortens the time of frailty and failure.

The mechanisms behind these benefits are beyond the scope of this booklet. 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. The respiratory and cardiovascular systems are enhanced with activity and training, and tissues such as muscle and bone are strengthened. Best results come when activity and fitness are combined with good nutrition, weight control, stress management, adequate rest, safe habits (using seat belts, wearing bicycle helmets), avoidance of smoking

and other drugs, and moderate use of alcohol.

Wellness and Safety

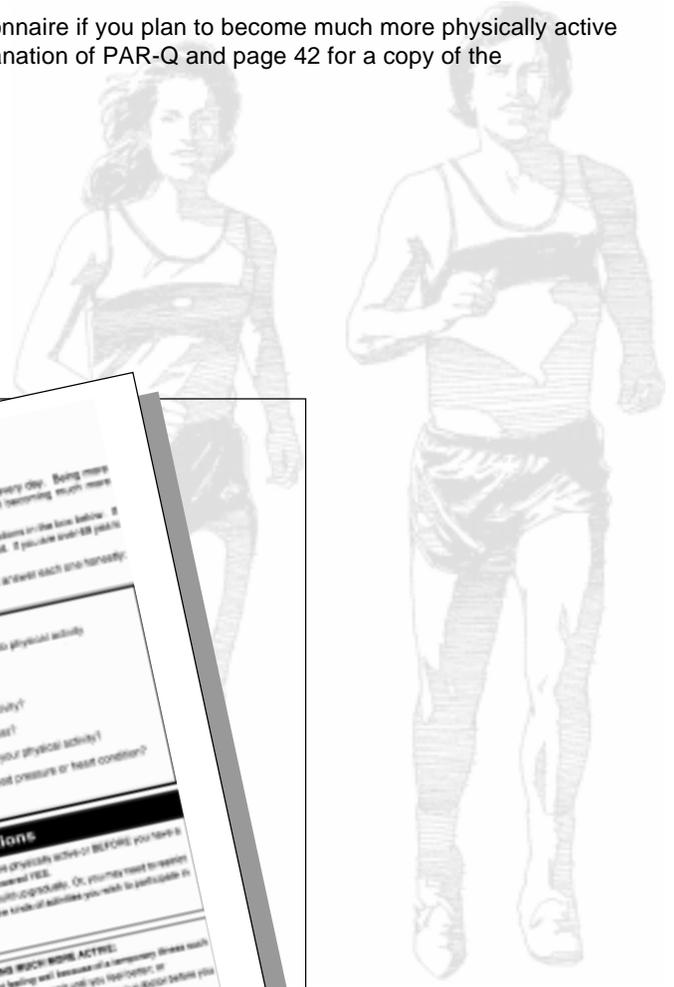
Employee health and safety programs combine to reduce health care and worker's compensation costs. A good wellness program is really a good safety program. Like safety, wellness emphasizes prevention, individual responsibility, and cost-effectiveness.

Over 80% of all accidents in the workplace are caused by unsafe acts rather than unsafe conditions. It makes little sense to stress the importance of protective equipment or ergonomics

while ignoring the mental and physical condition of employees. In general, individuals associated with high health care costs and unhealthy lifestyles (who are overweight, are inactive, are substance abusers, or who smoke) are most prone to on-the-job injuries. A high percentage of on-the-job accidents are attributable to the human factor, human errors compounded by unhealthy habits. A good wellness program helps individuals change destructive and unhealthy habits. Wellness programs increase morale and productivity while they reduce worker's compensation costs, absenteeism, and employee turnover. Wellness, safety, and work performance go hand in hand.



PAR-Q Physical Activity Readiness Questionnaire. Use the questionnaire if you plan to become much more physically active or before you undertake an exercise test. See page 41 for an explanation of PAR-Q and page 42 for a copy of the questionnaire.



PAR - Q & YOU
 (A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you're between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you're over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly. Check YES or NO.

YES	NO	Question
<input type="checkbox"/>	<input type="checkbox"/>	1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
<input type="checkbox"/>	<input type="checkbox"/>	2. Do you feel pain in your chest when you do physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	3. In the past month, have you had chest pain when you were not doing physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	4. Do you have a headache because of dizziness or do you ever lose consciousness?
<input type="checkbox"/>	<input type="checkbox"/>	5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
<input type="checkbox"/>	<input type="checkbox"/>	7. Do you know of any other reason why you should not do physical activity?

YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — starting as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO to all PAR-Q questions, you're fit to become more active. You can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in fitness appraisal — this is an excellent way to determine your health status so that you can plan the best way for you to get active.

DELAY BECOMING MUCH MORE ACTIVE:

- If you are not feeling well because of a temporary illness such as the flu or a fever — wait until you feel better, or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

You are encouraged to copy the PAR-Q in it only if you use the entire form.

NOTE: If the PAR-Q is being used in a person home or in the workplace in a physical activity program or a fitness appraisal, this section may be used for legal or administrative purposes.

I have READ, understood and completed this questionnaire. Any questions I had were answered to my full satisfaction.

NAME _____ DATE _____
 SIGNATURE _____ NO. _____
 SIGNATURE OF PARENT _____
 or SIGNATURE for persons under the age of 18 years _____

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