

Chapter 6—*Health and Safety*



Field work and firefighting are inherently dangerous. We must do all that we can to prevent illness and injuries, to treat them properly, and to ensure the worker's successful return to work.

Prevention

Prevention begins long before the field season, with preparation, training, and attention to daily habits.

Fitness

Fit workers are less likely to be injured, and they lose less time when they are injured. Debilitating back and repetitive trauma problems are less common in workers with adequate muscular fitness.

Training

Workers need to learn and practice proper lifting techniques to avoid back problems. Training in the efficient and effective use of tools is also important. Workers should be cross-trained to reduce the likelihood of repetitive trauma disorders. Simply changing jobs or tools now and then will reduce the isolated strains and trauma associated with certain tasks.

Work Hardening

Feet, hands, backs, joints, and muscles need to adjust to prolonged arduous field work. Workers should come to the job ready to work, and early training should provide additional job-specific work hardening. Blisters, sprains, strains, and muscle soreness are indications that more work hardening is needed.

Safety

Safety awareness and training are

crew leaders and managers. Workers respond to safety messages that are communicated by action and deed.

Protective Equipment

Workers need to understand and appreciate the values and limitations of protective equipment, and become proficient in its use and care.

Ergonomics

Ergonomics implies selecting the right tool for the job as well as the right person for the tool. Our studies show that certain tools, such as the combi tool, are more effective and less fatiguing than the Pulaski, and that some workers are more capable with certain tools. Field work and firefighting in remote sites limit the use of power-assisted tools, so there is a greater need for worker fitness and skill with handtools.

Blisters

Blisters are a major cause of discomfort and lost work time. Friction separates skin layers and fluid accumulates. Avoid blisters by:

For feet

- Fitting new boots (some old-timers soak a new pair of boots and wear them until they dry out)
- Wear boots often before the season starts
- Use petroleum jelly to lubricate potential hot spots
- Wear two pairs of socks or double-layer socks
- Use mole skin or a skin protector to cover hot spots.

For hands

- Harden your hands with light work
- Wear gloves that fit
- Use mole skin or a skin protector to cover hot spots.

Energy and Hydration

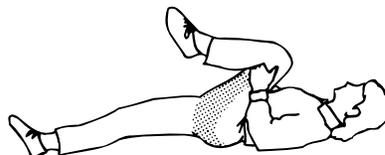
Workers are responsible for maintaining their energy and fluid intake. Supervisors can make food and drink available, but individuals are responsible for maintaining their effectiveness and safety by adequate intake of energy and fluids. Failure to do so makes one a hazard to self and coworkers. Supervisors should schedule fluid replacement every 30 minutes during hot conditions.

Work and Rest

Fatigue is a cause of accidents; adequate rest is the prime factor in controlling fatigue. Breaks, both short and long, are one defense against fatigue. Sleep is another. To perform well at tough jobs like wildland firefighting, workers need to average 1 hour of sleep for every 2 hours of work. This rest-to-work ratio means that a 14-hour work shift is about as long crews can work and still get the sleep and rest they need. The shift should allow time for eating, showering, and getting ready for work. Sleeping conditions should be quiet, warm, and dry. Night crews need protection from noise, light, dust, and other conditions that interfere with restful sleep during the day.

Warmup

Workers, like athletes, need to warm up before strenuous effort. A gradual increase in muscle and body temperatures improves metabolic and neuromuscular efficiency. Warmed muscles and stretched tissues are less susceptible to injury, and stretching helps relieve soreness. So use stretching and a gradual transition to work to ease into the workday.



Injuries

No job is worth an injury, yet job-related injuries are common. Slips, trips, and falls are common in field work. Firefighters experience ankle, knee, and back injuries. How can we prevent or limit these injuries? This section deals with the treatment and rehabilitation of injuries, and the worker's safe and productive return to work.

Treatment

Treatment will depend on the nature and severity of the injury. Of course, serious injuries require medical attention and treatment. For soft tissue injuries that are not severe, the appropriate treatment will minimize the extent of the injury and ensure a quick and complete recovery. Most soft tissue injuries are treated with RICES (Rest, Ice, Compression, Elevation, Stabilization, Stretching). We will use a sprained ankle to illustrate the treatment (sprained ankles are unlikely for workers who wear good boots).

Rest

Rest is used when necessary to relieve swelling and to allow treatment (ice, elevation). Otherwise some mobility is desirable, so long as discomfort and swelling are controlled.

Ice

Ice (a cold pack, a frigid mountain stream, snow in a plastic bag) is the treatment of choice for acute soft tissue injury. Cold slows metabolism, reduces bleeding and swelling, reduces pain, and limits the extent of injury. Apply ice for 20 to 30 minutes several times a day for best results. Continue for several days or until the swelling and pain are gone.

Compression

An elastic wrap soaked in cold water provides compression and cooling

shortly after the injury. A dry wrap continues compression between cold treatments.

Elevation

Elevation limits the edema and swelling that occur after an injury. A badly swollen sprained ankle should be elevated above the heart as much as possible during the 24 hours following the injury.

Stabilization

Workers can use tape or ankle supports to stabilize the ankle.

Stretching

While stretching may be viewed as part of rehabilitation, gentle stretching may begin shortly after the injury. Flexion and extension exercises can be done while applying ice, compression, and elevation.

This simple treatment plan, if followed properly, has a dramatic effect on recovery time. Use ice as often as possible in the first few days following the injury. Use compression to avoid swelling. Elevate the leg as necessary to control swelling. When pain and swelling are controlled, stabilizing the ankle allows a return to limited activity and rehabilitation.

Rehabilitation

Serious injuries should be rehabilitated under the guidance of an Athletic Trainer or Physical Therapist. Rehabilitation involves a progressive program designed to regain muscle strength and endurance, range of motion, and full functional use. The ability to perform under field conditions should test the employee's readiness to return to work. Physician approval will be required following recovery from serious injuries.

Well-designed rehabilitation programs return workers to full activity in the shortest possible time. With physician

approval, workers may return to work with the aid of protective taping or bracing. Leg, back, wrist, and other braces are becoming common in the workplace, but there is little proof that they prevent new or recurring injuries. Braces are no substitute for training or rehabilitation. Workers should not return to work until they can do so safely, without becoming a hazard to themselves or to coworkers.

Return to Work

Before the return to duty following work-related injuries, we insist on medical clearance, but seldom specify specific performance criteria. As a minimum, workers should be able to perform the job-related test utilized in hiring. For example, a firefighter should be able to pass the test used to establish job-related work capacity.



This will demonstrate recovery from the injury as well as the fitness for duty. If no test is available for the job classification, demonstration of key elements of the job will provide some assurance of job readiness. Because of the risk of subsequent injury, smokejumpers require a more demanding test. Dr. Michael Schutte, an orthopedic surgeon and specialist in sports medicine, has used a jumping test to evaluate a jumper's readiness for return to work.

Workers want to rejoin their crew and return to work as quickly as possible. Medical clearance and an appropriate field evaluation will ensure readiness for work without undue risk of subsequent injury.

Illness

Illnesses and related medical conditions, such as allergies and asthma, also affect work capacity and the quality of life. Prevention strategies reduce the incidence of illness, and appropriate treatment reduces down time and hastens return to duty.

Prevention

Prevention of upper respiratory and other conditions includes avoiding exposure and maintaining immune function.

Exposure

Upper respiratory infections occur more frequently in group living conditions, such as fire camps. When possible, living conditions should allow privacy and partial isolation. Workers should not share water bottles, except in emergencies. And workers should avoid close contact with affected friends or family members (workers with the potential for exposure to HIV, Hepatitis B, or Hantavirus must follow appropriate precautions).

Immune Function

The healthy immune system protects the body from viral and bacterial assaults. Maintain your immune system by controlling factors that influence its function.

Stress

Excessive, prolonged exposure to events and conditions perceived as stressful causes the release of hormones that depress immune function. Avoid exposure and learn strategies for stress management (relaxation, meditation). Remember, stress is in the eye of the beholder. Follow two rules of stress management:

- *Don't sweat the small stuff, and*
- *It's all small stuff!*

Nutrition

A healthy diet helps to maintain immune function (Chapter 4).

Fatigue

Exhaustion increases the incidence of upper respiratory infections. Maintain fitness, ensure energy intake, take frequent breaks, and get adequate sleep to avoid excessive fatigue.

Environment

Smoke from cigarettes, forest fires, wood stoves, and other forms of occupational and environmental pollution can lower natural defense mechanisms.

Treatment

The common cold is an upper respiratory infection caused by one of many viruses. While colds are hard to avoid, you can help by washing hands, keeping hands away from the face, and avoiding overfatigue and close contact with those who have symptoms. The cold usually lasts about 1 week. Prolonged upper respiratory problems may indicate

secondary bacterial infection or allergic rhinitis. It is probably not necessary to limit work for those with upper respiratory infections, unless the condition is accompanied by fever, muscle pains, or symptoms of systemic infection.

More serious respiratory problems such as bronchitis and pneumonia require medical treatment and rest, as do viral hepatitis and infectious mononucleosis. Systemic infections impair strength, endurance, coordination, and concentration. Hard work could slow recovery and predispose the worker to injury.

Return to Work

Following a short illness resulting in absence from work, the employee may return to duty under these conditions:

- *Physician approval (if needed)*
- *Absence of fever for 24 hours without use of antifever drugs (such as aspirin).*

After a prolonged illness a worker should follow a gradual transition to full work activity, or be reassigned to less arduous duties until work capacity is regained.

NeckCheck

Use the "neck check" to decide if you should train or work with an infection. If your symptoms are above the neck, stuffy nose, sneezing, scratchy throat, proceed with caution. If you feel all right, you can continue at full speed. Postpone training or hard work, if possible, if symptoms are below the neck, including fever, aching muscles, nausea, diarrhea.

Summary

The best way to avoid illness is to practice prevention and to maintain a healthy immune system. This means washing hands before meals, drinking from your own water bottle, eating immune friendly foods, getting adequate rest, and managing stress. Of course it helps to come to work fit, rested, and ready for the demands of the job.

Medical Considerations

Reproductive Risks

Wildland firefighters and field workers face many hazards in the conduct of their duties. Among these hazards are potential reproductive risks, such as exposure to toxic chemicals, heat, and other factors that can threaten someone's ability to conceive or bear a healthy child. These potential risks affect both men and women.

Smoke

While exposure to cigarette smoke has been linked to low birth weights, spontaneous abortion, still birth, preterm birth, and cleft palate, there is little information concerning the risks of exposure to toxic chemicals at levels measured in the breathing zone of wildland firefighters. Carbon monoxide has the potential to affect the developing fetus, but cigarette smokers are **regularly** exposed to levels of CO that are several times above those occasionally experienced by firefighters.

Heat

There is concern about exposure to extreme heat, which has been linked to male infertility and possibly to birth defects in the offspring of exposed mothers. Although maternal illness with prolonged high fever has been

associated with birth defects, sauna studies and case studies of pregnant runners have not revealed birth difficulties or defects. In fact, the opposite has been true for those who remain active during pregnancy. And while wildland firefighting has the potential for heat stress, studies have not indicated severe heat problems, especially when firefighters are fit, acclimatized, and hydrated. The low humidity and air movement of the burning season enhance evaporative and convective cooling, and lower the risk of heat stress.

Pregnant women who are physically capable of performing the duties of the position may, at their discretion, remain in active duty (U.S. Supreme Court, *UAW v. Johnson Controls*, 1991). While it is not the obligation of the employer to protect the fetus, the employer may be able to assign the worker to less hazardous duties upon receipt of a request. Workers who are pregnant, breast feeding, or attempting to conceive should consult their physician if they are concerned about the reproductive risks of fire suppression or other duties. Pregnant firefighters who, on the advice of a physician, cannot continue working in any capacity, should request leave in accordance with existing pregnancy or other leave policies of the agency having jurisdiction.

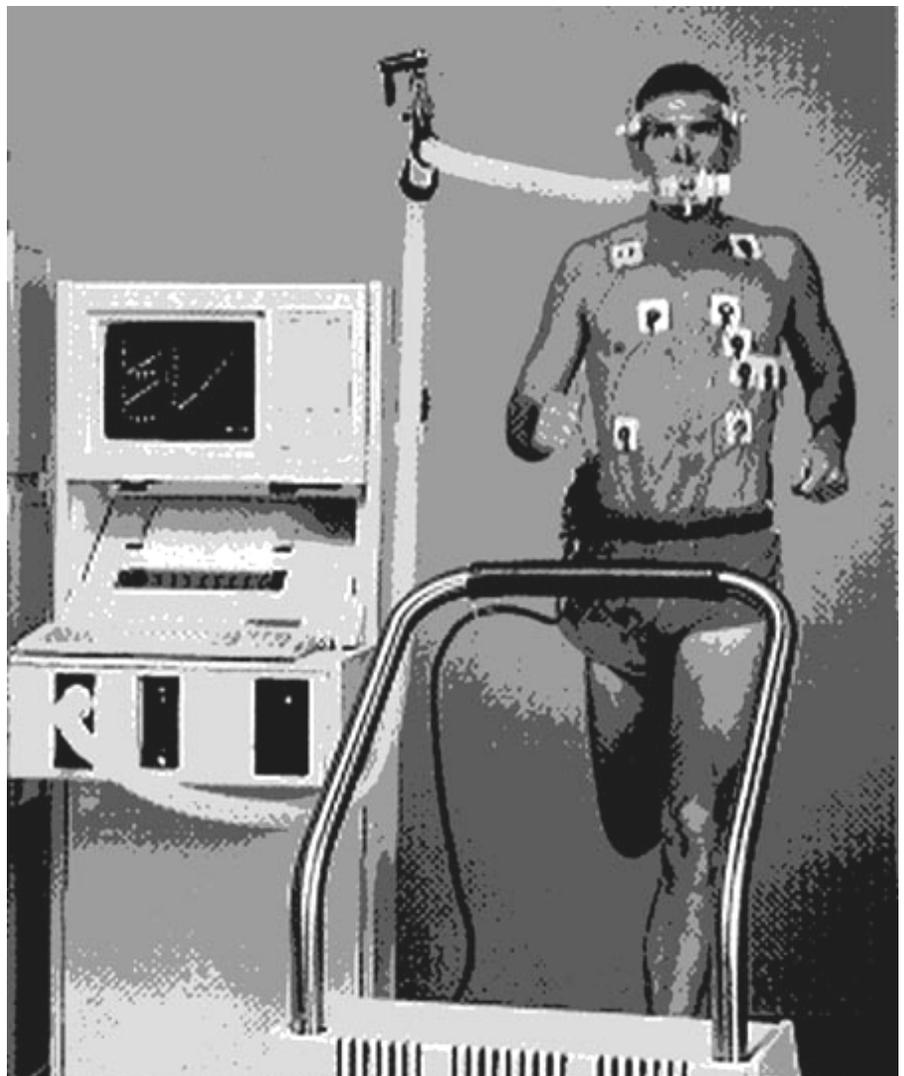
Medical Examination

The American College of Sports Medicine recommends a medical examination for persons over 40 years of age, for those with heart disease risk factors, and for those who have been sedentary before a major increase in activity. For many others, a simple health screening questionnaire provides assurance of the readiness to engage in training, work, or a job-related work capacity test. PAR-Q is a health screening questionnaire

designed to identify that small number of individuals who should seek medical advice before involvement in moderate activity. A 'no' answer to seven simple health questions indicates suitability for involvement in an exercise test or moderately vigorous aerobic and muscular fitness training. PAR-Q was developed and validated by the Canadian Society for Exercise Physiology. Use of the questionnaire substantially reduces the risk of taking exercise tests or training for apparently healthy adults. Candidates for fitness training, firefighting, or field work should complete the PAR-Q **before** taking a work capacity test or beginning strenuous training (page 42).

Over 40?

If you are over 40 years of age, have one or more heart disease risk factors (smoking, high blood pressure, elevated cholesterol), and have been inactive, your physician may recommend an ECG-monitored exercise test. A progressive treadmill test (stress test) determines functional capacity and cardiovascular health. To estimate aerobic fitness the test must proceed to an endpoint determined by fatigue, discomfort, or other indicators (ECG, blood pressure). The prediction of aerobic fitness (VO_2 max) is not valid if the individual holds the railing to support their body weight during the test.



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 are 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 are 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	
<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 lose your balance 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 <u>any other reason</u> why you should not do physical activity?

YES to one or more questions

If
you
answered

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 — as long 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 and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions

If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that 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 a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold 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.

Informed Use of the PAR-Q: The Canadian Society for Exercise Physiology, Health Canada, and their agents assume no liability for persons who undertake physical activity, and if in doubt after completing this questionnaire, consult your doctor prior to physical activity.

You are encouraged to copy the PAR-Q but only if you use the entire form

NOTE: If the PAR-Q is being given to a person before he or she participates 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 _____

SIGNATURE _____

DATE _____

SIGNATURE OF PARENT _____
or GUARDIAN (for participants under the age of majority)

WITNESS _____

Warning Signs

Here are some points to consider if symptoms or warning signs appear during exercise testing, training, or work.

Group 1

These can be remedied without medical consultation. Report them if they occur frequently.

Side stitch. This muscle spasm (intercostal or diaphragm) may be relieved by sitting, leaning forward, and pushing abdominal organs against the diaphragm. The side stitch usually disappears as training progresses and fitness improves.

Breathlessness that lasts more than a few minutes after exercise stops. Train at lower edge of the heart rate training zone or use the talk test (you should be able to carry on a conversation during aerobic exercise).

Nausea or vomiting during or after exercise. After eating, wait several hours before exercise. Do moderate exercise and extend the cool-down.

Prolonged fatigue the day after exercise, or insomnia. Reduce intensity and gradually increase the level of exercise.

Group 2

Try the suggested remedy; if it doesn't help, consult your physician.

Arthritic flareup during or soon after exercise. Rest, use ice, and aspirin or ibuprofen. Resume exercise gradually. Use cross training to reduce repetitive trauma.

Rapid heart rate during or 5 to 10 minutes after vigorous exercise. Keep rate at lower end of training zone and increase slowly. Avoid exercising in the heat.

Wheezing and phlegm during or soon after exercise. Use a gradual warmup, reduce exercise intensity, avoid cold, dry air or use a mask to warm cold air; try swimming.

Group 3

If any of these occur, stop exercise. Consult your physician before resuming exercise.

Pain or pressure in the middle of the chest or in the arm or throat, precipitated by exercise or occurring after exercise.

Abnormal heart action during or soon after exercise. Irregular pulse, fluttering, palpitations in chest, sudden burst of rapid heart beats, sudden drop in heart rate.

Dizziness, light-headedness, sudden loss of coordination, confusion, cold sweat, glassy stare, pallor, blueness, or fainting. Stop exercise; sit with head between legs or lie down with feet elevated.

Things to Avoid

In addition to the precautions already noted, there are some other things to avoid in training.

Sudden vigorous exercise without warmup can cause ECG abnormalities. A warmup and cool-down reduce the likelihood of cardiac complications.

Downhill running. Called a “crime against the body” by an experienced crew leader, running down steep grades increases impact forces and the risk of chronic knee problems. While uphill hiking or running is good for training, you should minimize the amount of downhill running. Hike or jog slowly on the downhills.

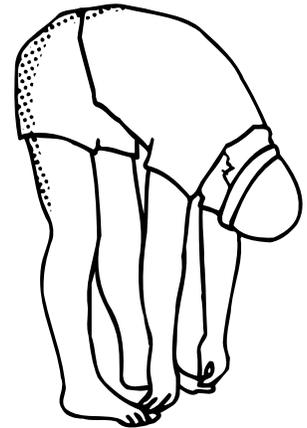
Straight leg situps don't help stomach muscles and they can

aggravate the back. Do bent knee crunches or curl-ups with the arms folded across the chest.

Full squats with weights can aggravate knee problems. Use leg press machines or squats with a spotter, but don't go much beyond a 90 degree knee bend.

Neck circles and the backover (lying on back, legs go over head to touch floor) may be stressful for those at risk for neck injury.

Standing toe touch. This stretch can aggravate the lower back when the touch is done with straight legs. Use a seated stretch with the knees slightly bent.



Exercise Problems

Minor exercise problems should be viewed as symptoms. Here are some common problems and some possible solutions.

Blisters can be prevented with properly fitted shoes, good socks (two pairs or a double layer pair), and lubrication. They can be treated with moleskin or a skin replacement product.

Soreness can be minimized with warmup and stretching, gradual progression, and avoidance of ballistic (fast) or eccentric (lowering heavy weight) movements. Delayed onset muscle soreness occurs a day or more after vigorous effort (especially eccentric contractions, as in downhill running). Stretching and anti-inflammatory agents such as ibuprofen relieve the discomfort, but only time eliminates the problem.

Muscle Cramps are powerful involuntary contractions that may be caused by dehydration, electrolyte imbalance (sodium, potassium, calcium), or both. Avoid cramps with adequate warmup and fluid and electrolyte replacement. Relieve cramps by stretching the cramped muscle.

Bone bruises on the feet can be avoided with careful foot placement, running on soft surfaces, and good footwear. Treatment includes ice, padding, and cross training to allow recovery.

Shin splints or pain on the front of the shin have many possible causes. Prevention includes gradual changes in training intensity or distance, running on softer surfaces, good footwear, stretching, and strengthening exercises. Rest, ice, taping, and a heel pad are sometimes effective treatments. A persistent point of pain could indicate a stress fracture. Persistent diffuse pain could signal an

anterior compartment syndrome. See an athletic trainer or sports medicine specialist.

Knee pain could be due to a number of factors, including improper footstrike, worn shoes, or alignment problems. Use rest, ice, and anti-inflammatory agents (aspirin, ibuprofen) to reduce discomfort. Resume activity with new footwear. If problems persist, see a podiatrist. If the problem is an old injury with associated arthritis, try rest, ice, and anti-inflammatory agents to reduce the pain. Resume activity with exercises to strengthen thigh muscles (weight lifting, bicycling). If the problem persists, see a sports medicine specialist for bracing or other options.

Lower back pain can be due to poor posture, inactivity, lack of flexibility, and weak abdominal and back muscles. Prevention involves attention to each of the possible causes and proper lifting technique. Treatment

involves rest, but only until acute pain subsides, followed by a gradual return to activity. See page 74 for back exercises.

Crew Bosses

When crews report for duty at the start of the season, plan time for job-specific work hardening. Schedule training and project activities that prepare workers for the job and the environmental conditions. Gradually increase work rate and duration. Take frequent breaks and use the time to provide instructions on tool use. Change tools often to avoid fatigue and to cross train workers. Watch for signs of overuse injuries, heat stress, or other early season problems. Use this time to develop good habits, including safety awareness, hydration, and nutrition, and to build crew morale, cohesion, and teamwork. Work hardening is a physical and psychological process that builds the toughness needed to be an effective member of a productive crew.



Work Hardening

Work hardening is a gradual progression of work-specific activities designed to bring you to the job ready to deliver a good day's work. While fitness training provides the foundation, it is no substitute for **job-specific** work hardening. Aerobic and muscular fitness training increase the strength of tendons, ligaments and connective tissue. Work hardening

ensures that the muscles and connective tissues used on the job are tough and ready to go. Feet are work-hardened when you hike and work in the boots you'll use in the field. Hike up and down hills and on sidehills, at the pace you'll use on the job. Do some extended hikes with a loaded pack to prepare the back and shoulders for carrying loads. Test legs and boots on steep uphill climbs.

If you will be building fireline, you will need to do some work with a tool like the Pulaski. There is no substitute to prepare trunk and upper body muscles for prolonged work in the position demanded by hand tools. This work will also toughen your hands so you won't get blisters the first day on the job. Come to the job hardened and ready to go, but be prepared to treat blisters and other problems that diminish performance.

