

Recommendations



Following the presentation and discussion of information, conference participants met in working groups to formulate recommendations. The working group recommendations were shared with the conference participants. Following discussion, the working groups finalized their recommendations.

Illness, Injury, and Fatality Prevention

Recommendations were formulated in the areas of Care, Training, and Information.

Care

Provide a higher level of care in fire camp:

- to reduce costs (direct and indirect), transportation, and lost wages,
- to provide better care, quicker diagnosis, reduce exposure.
 - ◆ *Develop criteria: using industry standards to determine when to request a care giver (i.e., 400 to 500 people), or on contract to request as needed.*

Care Giver (Registered Nurse, Physician's Assistant, Nurse Practitioner) to fit local jurisdiction or state practice. Develop protocols to

provide treatments (i.e., upper respiratory infection, poison oak, hydration, etc.). Consider ability to prescribe medications, administer injections, suture.

Injury, illness analysis process:

- accidents/illness as related to types of employees (AD's, volunteers, temporaries, etc.)
- determine if changes are necessary as a result of the analysis.

Training

- 29 CFR 1960 or equivalent for managers and supervisors (Supervisor Responsibilities),
- Integrated behavior-based safety model (shift from compliance-oriented process),
 - ◆ *Use theories of safety psychology*
 - ◆ *Use practical tools and systems to implement a structured observation and measurement process*
 - ◆ *Include management and employees in the process*
 - ◆ *Use zero accidents and injuries as a goal.*
- Crew supervisor training
 - ◆ *Leadership training*
 - ◆ *Communication training*
 - ◆ *Behavior-based theories and tools*
 - ◆ *Making of a crew (MTDC)*
- Vehicle operator training course and implementation (available at fire camp for volunteers and AD's)

Information

The National Wildfire Coordinating Group (NWCG) Safety and Health Working Team (SHWT) should summarize up-to-date fire fatality information, suggest a new means of distributing that information, and verify that the information is being received. The target group is ground level with an emphasis on nonfederal agencies (e.g., volunteers and rural fire departments).

Using the distribution process indicated above, the SHWT should develop an information packet of publications and materials annually and distribute the packet throughout the wildland fire community, with an emphasis on nonfederal agencies. Packet contents could include information on NWCG standards; personal protective equipment; incident command system organization/qualification; health and fitness; fire training courses; illnesses, injuries, and fatalities. The SHWT should review the packet annually and be responsible for distribution of the packet as indicated above.

To minimize accidents and capture information on potential hazards and near misses, a reporting system such as the SafeNet Program (currently scheduled to be beta tested in the Forest Service's Pacific Northwest Region (6)) should be developed.

Recommendations

Job Requirements/Issues

The group examined job requirements and related issues that affect firefighter safety and health. The following issues were brought forward by the group.

Assignments

The workgroup recognizes numerous issues related to assignment requirements including assignment length, rest and relaxation (R&R), assignment flexibility, shift length, work/rest ratios, availability/participation.

These issues can be divided into two groups:

1. Those that relate directly to the physical well-being of individuals such as issues that affect fatigue; and
2. Those issues that are related to personal/cultural/organizational factors.

Group 1 issues include assignment length, rest and relaxation, shift length, and work/rest ratios. These issues are probably best handled through research.

The following specific issues should be addressed:

- a measure of fatigue/alertness
- cumulative effects of fatigue
- longer recuperation periods at home between assignments
- effects of assignment type (line, camp, aviation, etc.)
- frequency and severity of injury, and when most injuries occur
- literature search for statistics and related studies that have already been completed
- shift length
- travel time included in assignment length

- effects of preassignment activities (e.g., prescribed burns)
- quality of rest period
- what constitutes rest—what is appropriate for proper rejuvenation?
- emergency vs. nonemergency/routine job assignments and proper work rest cycles.

Group 2 issues include assignment flexibility and availability/participation. Long assignment requirements and other issues create barriers to many who would otherwise participate in fire suppression activities. Family and work demands affect safety directly by creating stress and indirectly by preventing people, often those with considerable experience, from accepting fire assignments.

This workgroup recommends that the following issues be examined:

- a) Barriers that prevent people from taking part in fire activities. How can we chip away at these barriers to induce more people to take part? (Examples: stress on marriages, stress from leaving children for long periods, line officers who are reluctant to allow employees to leave home units).
- b) Alternative approaches for assignment length.
- c) Cost and logistics of flexibility (pro and con, e.g., travel costs may rise, but managers may see more experienced workers, experienced workers require less training, there is less fatigue if more people are taking part, employees may be happier, etc.)

Crew Typing

Problem: Need to raise Type II crew standards. Is this done by changing Type II requirements, or adding more crew types so Type II performance is more consistent?

Recommendations: Task IOS (Incident Operations Standards) Team to improve Type II Standards. Examine experience

levels, qualifications and equipment requirements.

Driving Regulations

Problem: The way in which driving regulations are interpreted and applied during emergency situations is inconsistent between agencies.

Recommendation: This group recommends that a national standard be established for all agencies. The FFAST (Federal Fire and Aviation Safety Team) group is believed to be addressing this issue.

Fitness Requirements

Problem: Maintaining fitness among full-time fire employees, returning seasonal employees, and nonfire employees who take part in fire suppression activities (militia).

Recommendation: Agencies should require mandatory participation in fitness programs **at a minimum** for seasonal and full-time fire employees. Questions arose regarding the ability to require participation by nonfire employees and the ability to pay for health club memberships for temporary employees.

Contract Resources

Problem: Quality of contract resources is inconsistent.

Recommendation: Emphasize need to follow set policy in contract administration.

Medical Standards

Problem: Current fitness standards do not address existing medical problems that may lead to injury.

Recommendations



Recommendation: Support medical standards relative to incident management positions and encourage ongoing efforts regarding medical screening.

Training and Certification of Work Capacity Test Administrators

Problem: Question arose regarding the need to certify Work Capacity Test Administrators.

Recommendations: Wait for recommendations from Work Capacity Test investigations.

Minimum Qualifications

Problem: The work group recognizes that some full-time fire managers lack adequate fire qualifications.

Recommendations: The group supports the Interagency Fire Program Qualifications Task Group and suggests that States also identify their own Program Management Qualifications.

The Working Environment

All incident personnel shall be informed of the hazards related to their working environment and shall be appropriately trained and provided with the equipment to safely deal with those hazards.

Heat

- Consider using both a.m. and p.m. shifts. If p.m. shifts are used, locate crew camps away from main base camp, generators, etc. (use spike camps, mini-base camps, etc.) If night shifts are used, the terrain should be sized up for snags and other hazards so crews can be made aware of their locations before the start of their shift.
- Ensure that breaks are being taken by the crews. Educate crews on the importance of breaks. Make sure individuals are not penalized for taking a break to recover from heat-related problems.
- Ensure that crews are educated about acclimatization, heat-related illnesses, and that they are acclimatized to the environment as

much as possible before they are asked to perform the most strenuous tasks at a fire.

- When crews are assigned a task, make sure their level of acclimatization is taken into consideration.
- The Safety Officer for the fire should prep the crews once they arrive at the fire about the environmental conditions (heat) and remind them about heat-related illnesses and acclimatization.
- Develop a checklist related to heat stress for the dispatcher to provide for crews before they arrive at a fire.
- Investigate the use of Rehab tents by the Medical Group Unit to help crews recover from working in the heat.
- Use motels and air-conditioned tents for crews at fires. This is especially important if night crews are used. The ability to use this will vary upon the geographical location of the fire and the costs involved. At the present time, Florida puts crews in motels when they are fighting fires in the State.
- Ensure that crews are hydrated properly to work in the heat.
- Investigate the use of personal cooling systems (such as cooling vests) by crews, their effectiveness, ease of use, etc.
- Continue to research the development of Nomex garments that do not increase the worker's heat load.
- Investigate the effect of working a night shift or work/rest cycles on the crews.

Smoke

- Mitigate the effects of smoke by avoidance—both by placement of camps and tactics used to fight fires.
- Educate crews about the hazards of smoke.

Recommendations

- Ensure that present smoke conditions are communicated to the crew from the base camp. The crew also needs to ensure that they communicate their present smoke conditions to the base camp.
- Review exposure data/health data (both acute and chronic, on and off the job) related to exposure to smoke.
- Investigate if high smoke exposure times are predictable.
- Collect smoke exposure data using dosimeters. Review exposure data that are collected.
- Conduct pulmonary tests on crews before and after exposure to smoke to determine effects on crews.
- Research the need for crews to wear respiratory protection—investigate smoke versus dust.
- Research the type of fuels crews are exposed to and determine if smoke is hazardous to the crews.
- Research the need for protection from super-heated gases.
- Establish a method for crews to get comments regarding personal protective equipment to the Missoula Technology and Development Center (MTDC).
- Consider a postcard that the crews can pick up when they going through the food line.
- Continue research to ensure that women are provided with Nomex pants and shirts that are sized properly for them.
- Continue discussion with textile manufacturers on the development of new Nomex fabrics; development of fabrics that have better breathability is especially important.
- Review the design of the fire pack and ensure that it can be adjusted so it fits a wider percentage of the population. Allow individuals to have fire packs custom made if they have approval.
- Investigate the performance/comfort issues related to boots.
- Research using reflective tape or markings on the Nomex garments for visibility.
- Research the visibility of the different colors of helmets that are worn and see if helmet color affects the safety of crews.
- Research if the cost of boots can be financed by the Forest Service so that individuals can afford a better boot when they start fighting fire.

Tools

- Ensure that crews are trained properly to use, carry, and repair hand and power tools.
- Ensure that manufacturer specifications are followed when repairing tools.
- Share information on safety issues under “Tech Tips” published by MTDC on alternative PPE products and approaches (such as use of a chain saw harness).
- Review the tools currently being used to determine if their size is appropriate for the current work force.
- Research the difference between fiberglass and wooden handles on tools.

Uniforms

- Ensure that the appropriate PPE is not only provided to the crews but is worn by them.
- Establish a mechanism (e-mail) to share research and development between individuals completing research on uniforms for firefighters.
- Study the type of boot that is appropriate for crews to wear; ensure that appropriate boots are being purchased.

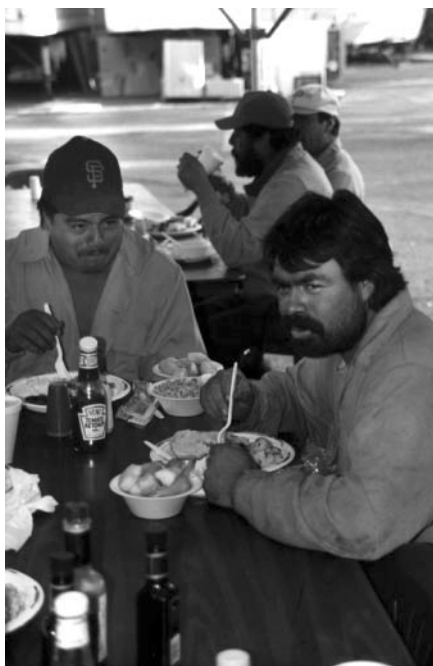


Recommendations

Energy, Nutrition, and Health

Definition of the Issues

1. Compromised nutrition was found in the majority of tested subjects (in terms of total macronutrient intake patterns).
2. The working environment contains all of the factors known to challenge or compromise immune function.
3. Further education of the caterer organizations and firefighters is needed.
4. Special training and/or information needs to reach wildland firefighters in camp on the types of food they need to eat and how much food they require.
5. The concept of eating and drinking to meet the physiological demands (rather than eating and drinking according to personal preference) needs to be taught.
6. It is unclear what factors in the fire diet and work environment predispose wildland firefighters to weight loss, but they may include: a conscious choice to lose weight, unavailability of the right foods, and eating fatigue that develops from the caloric demand.



existing meals (macro/micronutrients), actual consumption, and define areas in need of improvement. Issues related to vegetarians and gender should be considered.

A secondary purpose would be to perform a qualitative study to identify common misconceptions in the wildland firefighter community on what foods should be consumed to maintain health and maximize performance.

- Review the reported dietary intakes of firefighters in total energy expenditure (TEE) studies to determine:
 - ♦ *macro/micronutrient intake patterns (% of total, g/kg for carbohydrate and protein)*
 - ♦ *amount (total g) of carbohydrate consumed post shift (to maximize glycogen resynthesis)*
 - ♦ *liquid carbohydrate consumption patterns during the day.*
- Document level of oxidative stress that may have existed in the subjects from TEE/Energy Balance studies (wildland firefighters and

normally active controls). This would require further analysis of existing samples for the following:

- ♦ *urinary levels of ketones (protein catabolism, elevated rates of gluconeogenesis)*
- ♦ *3 methylhistidine (protein catabolism)*
- ♦ *malondialdehyde (marker of oxidative stress)*
- Assessment of upper respiratory distress in the fire camps (percent visits to the medical tents, evaluate working conditions such as shift length, temperature, caterer meals provided) in a quantitative/qualitative study to determine “trends” in upper respiratory infections/complaints.
- Development of a nutritional issues/energy expenditure guidelines brochure and/or video.

It would be beneficial to work with a sports nutrition expert to develop an example menu (using typical caterer menus) that would provide a set number of kilocalories per day. The brochure could be used to stress the importance of liquid carbohydrate intake during the shift and carbohydrate ingestion after the shift. It could also include typical work-related tasks and projected rates of energy expenditure to give wildland firefighters a sense of what they should eat to maintain energy and proper nutrition.

- A controlled study of smokejumpers during preseason training.

Use the controlled preseason period for a study of energy balance, dietary intake, immune function measures, and oxidative stress.

- Performance-related studies:
 - ♦ The maintenance of blood glucose and immune function during field operations using energy bars (solid) and carbohydrate beverages (liquid).

Recommendations—Research and Development:

Topics for recommended research and development include:

- Tray survey to identify self-selected dietary selection and intake on the fireline.

The purpose of this study would be to describe the dietary availability and the actual consumption patterns of the wildland firefighter (what is available vs. what is consumed). The goal would be to describe the

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- ◆ Effects of solid/liquid carbohydrate feedings on self-selected work rates.
 - ◆ Effects of solid/liquid carbohydrate feedings on cognitive function in the wildland firefighter.
 - ◆ Monitor profile of mood states survey for changes during acute and seasonal wildfire suppression activity.
- Field trials:
 - ◆ *Field acceptance of solid/liquid carbohydrate sources.*
 - ◆ *Field acceptance of modified meals.*
 - ◆ *Changes in eating behavior related to educational materials.*



Individual Factors

Fire and the environment are not biased; individuals should be eligible to be a wildland firefighter if they meet the requirements of the job and perform as required.

candidates are adequately prepared and the test is administered according to the instructions.

Communication is Essential to Ensure Proper Dissemination of Information–

- Assure that information is disseminated by multimedia efforts
- Information needs to be consistent across agencies.

Recommendations

Fitness and wellness should be practiced all year long, not just during the fire season.

- Develop and assign Fitness Coordinators on each unit
- Provide preseason fitness training information
- Develop a multimedia fitness training package
- Encourage physical training time for all red-carded personnel
- Provide medical screening for all fire personnel before the season
- Encourage continuous support of agency Wellness programs.

Improve Outreach and Recruitment of Wildland Fire Personnel

- Hire the best qualified individuals for fire positions
- Develop an interagency multimedia outreach and recruitment program
 - ◆ *Recognize and respect cultural traditions and beliefs in the fire organization*
 - ◆ *Include diversity outreach for attendance at national fire meetings.*

Implement the Work Capacity Tests in all Agencies–Immediately–The Pack Test is appropriate if test

Firefighters are our most valuable asset, we have to treat them right and take care of them. Safety has to be the way we do business. All decisions must be made with safety in mind—at all levels of the organization.