

COURSE: Prescribed Fire Planning and Implementation

TOPIC: Smoke Management (Unit 5A)

HANDOUT 4:

RISK MANAGEMENT

Respirator Program

When considering the use of respiratory protective devices (even disposables) to mitigate the health hazards of smoke, managers must implement the 11-step program mandated by OSHA (CFR 29, 1910.134b). To provide employees adequate protection and to comply with the OSHA respiratory protection standard, a minimally acceptable standard must include the following:

- 1. Establish Written Operating Procedures:** There must be written standard operating procedures governing the selection and use of respirators for each task or operation where they are employed. The employer must develop a formal written document that addresses each of the following points.
- 2. Respirator Selection:** Respirators must be selected on the basis of the hazards to which the employee is exposed. Guidance concerning respirator selection is provided in ANSI Z88.2-1992, the newly revised standard on respiratory protection. (Note: Further guidance is available in issues of this report or in the appendix of NFPA 1977).
- 3. Train Users:** Employees must be instructed and trained in the proper use and limitations of the respirators to which they are assigned. Respirators must be tested for fit, and they should not be used if facial hair, eye glasses or other factors interfere with the seal of the face piece.
- 4. Respirator Assignment:** Where practical, respirators should be assigned to individual employees for their exclusive use. When it isn't practical to assign respirators individually, the next step becomes even more important.
- 5. Cleaning:** Respirators must be regularly cleaned and disinfected. Those issued for the exclusive use of an employee should be cleaned after each day's use or more often, if necessary. Devices used by more than one employee must be thoroughly cleaned and disinfected after each use.
- 6. Storage:** Respirators must be stored in a convenient, clean, and sanitary location.
- 7. Inspection and Maintenance:** Respirators that are used routinely must be

inspected during cleaning; worn or deteriorating parts must be replaced. Respirators for emergency use, such as self-contained breathing apparatus, must be thoroughly inspected at least monthly.

8. Monitor Work Area: Appropriate surveillance of work area conditions and the degree of employee exposure or stress must be maintained.

9. Inspection and Evaluation: There must be regular inspections and evaluations to assess the continued effectiveness of the respiratory protection program.

10. Medical Evaluation: Employees should not be assigned to work tasks that require the use of respirators unless they have been determined to be physically able to perform the work and use the equipment. The local physician must determine what health and physical conditions are pertinent. The respirator user's physical condition should be reviewed periodically (e.g., annually).

11. Approved Respirators: Respirators approved by the National Institute for Occupational Safety and Health (NIOSH) or accepted by OSHA must be used when they are available. The respirator must provide adequate respiratory protection against the particular hazard for which it has been designed in accordance with standards established by competent authorities (e.g., NIOSH, ANSI). (Adapted from *Respiratory Protection*, Akron: American Industrial Hygiene Association, 1991).

In addition to exposure to the hazards in smoke, many other conditions call for the use of respiratory protection. The agency having jurisdiction must have a written program in place to cover all uses of respiratory protection. Respirator selection for firefighters will be guided by findings from ongoing exposure and health effects studies. Fitness testing and extensive training will be required to ensure that employees are aware of the proper use and limitations of respirators. For example, many air purifying respirators that protect the wearer from particulate and some gases/vapors do not provide protection from carbon monoxide. Due to the problems encountered in cleaning and maintaining respiratory protective devices in the field, managers may want to consider maintenance-free or disposable respirators.

The 11-step program calls for surveillance of work area conditions and employee exposures, so it will be necessary to develop a monitoring program. Medical evaluation of the worker's ability to perform work and use the equipment must be performed and reviewed periodically. This requirement could involve pulmonary testing and/or job-related work capacity testing. Regular inspections will be required to assess the effectiveness of the program.

While NIOSH calls for the use of self-contained breathing apparatus (SCBA) for use in fire fighting, few expect wildland firefighters to carry and use SCBA, especially in remote

locations. NIOSH does not currently approve an air purifying respirator for use during occupational exposure to fire that provides protection from the known health hazards in forest fire smoke (carbon monoxide, respirable particulate, and organic vapors/acid gases). For toxic contaminants that are not immediately dangerous to life and health (not IDLH), NIOSH recommends either particulate filters, gas/vapor sorbents, or combination cartridges with particulate filters and gas/vapor sorbents. These devices do not provide protection from carbon monoxide.

Respirator Alternatives

Studies show that wildland firefighters are not exposed to smoke that is immediately dangerous to life and health (IDLH). The bandanna is the only form of protection currently used. Efforts to provide additional relief and protection from the health hazards of smoke with low-cost disposable or other devices are burdened by extensive regulations. And currently approved respirators do not provide protection from all the known health hazards in forest fire smoke. Since firefighters only need respiratory protection when conditions warrant, one approach may be to consider respirators designed and approved for emergency escape.

There are three general uses for respirators in emergency situations:

1. *Escape from an unexpected hazard,*
2. *Rescue of personnel trapped or overcome in a hazardous environment, and*
3. *Work to control a situation that has caused a sudden hazard.*

Although SCGA are preferred for conditions 2 and 3, other devices may be considered when the atmosphere is not IDLH. While it may not seem necessary to escape from a non-IDLH atmosphere, this approach may open the door to a wider range of devices, including disposable mouthpiece respirators that can be worn around the neck or stored in a small pouch. Whatever type of respirator is used, the 11-step OSHA program is still required.

Firefighter Mortality

How much is known about causes of death among firefighters? This review summarizes the causes of death among structural firefighters. The causes of death are compared to those of other workers or the general population. Excess mortality is said to occur when there are more deaths among firefighters than would be expected in the comparison population. Once an excess has been established, the next step is to consider whether the excess could be related to the exposures encountered on the job.

Research provides conflicting evidence regarding the risk of death from cardiovascular disease among structural firefighters. Several studies show a slight excess in cardiovascular mortality, and one shows a slight excess in heart disease. Numerous

other studies have not found an increase in overall cardiovascular mortality. Despite the conflicting evidence, heart disease continues to be compensated as a work-related disease in several states.

While several studies have demonstrated excess mortality from brain cancer, a recent review indicates no apparent excesses of lung and colon cancers. A few studies report excesses for malignant melanoma, bladder cancer and non-Hodgkin's lymphoma. It is currently unknown whether the exposures encountered in firefighting contribute to causing these and other cancers.

Both acute and chronic changes in pulmonary function have been documented in firefighters. However, chronic obstructive pulmonary disease (chronic bronchitis, emphysema, asthma) as a cause of death is usually not increased among firefighters. One study showed that risk increases steadily with the number of years employment.

Several studies indicated an increased risk for cirrhosis of the liver and gallbladder disease, although known occupational risk factors were not apparent. It may be that lifestyle factors (alcohol, high cholesterol diet) contribute to these findings. This review suggests that firefighting is a hazardous occupation with the potential to increase the risk of death attributed to specific diseases. In addition to recommendations to identify and avoid hazardous substances, the author recommends lifestyle choices, including not smoking, minimizing prolonged exposure to sunlight, and reducing fat in the diet.