Risk Communiqué

Glatfelter Brokerage Services SM
56 Clifton Country Road
Suite 205
Clifton Park, NY 12065
800.833.8822
GBSNewYork.com

Firefighter Training and Chemical Exposure Hazards

Through the collaborative efforts of the National Institute for Occupational Safety and Health, the U.S. Department of Health and Human Services and the Centers for Disease Control and Prevention, a recent study was organized to learn more about respiratory health effects from exposures to smoke simulants used during training exercises.

What Was Done:

- Sampled the air for components of two types of smoke simulant during training exercises.
- Observed training exercises and interviewed five trainers to obtain an understanding of their work practices and work-related safety and health concerns.
- Reviewed the fire department's firefighter training logs of work-related injuries and illnesses for the years 2005–2012.
- Reviewed medical records concerning a trainer's exposure to an oil-based smoke simulant resulting in acute respiratory injury and hospitalization.

What Was Found:

- Levels of mineral oil mist in air were above exposure limits. These measurements were taken during training exercises involving only oil-based smoke simulant.
- Levels of diethylene glycol in air were above the exposure limit. Levels of formaldehyde in air were about half the exposure limit. These measurements were taken during a training exercise that involved only glycol-based smoke simulant.
- Levels of mineral oil mist, diethylene glycol, formaldehyde and acrolein in air were above exposure limits. These measurements were made during training exercises that involved smoke simulants, heat and fire.
- Levels of these compounds in air could exceed exposure limits outside the training room when a trainer opens the door to look inside.
- The mineral oil mist and diethylene glycol aerosols were small enough to penetrate deeply into the lungs.
- Brief exposures to the compounds measured could irritate the eyes and lungs or cause more serious lung damage.
- Levels of mineral oil on trainers' turnout gear and surfaces in the training room after training exercises were mostly non-detectable.
- The most commonly reported symptom was cough.
- Medical record reviews confirmed a respiratory illness due to prolonged exposure to mineral oil mist.

This is a sample guideline furnished to you by Glatfelter Brokerage Services, Group Manager. Your organization should review and make the necessary modifications to meet the needs of your organization. The intent of this guideline is to assist you in reducing risk exposure to the public, personnel, and property.

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What Employers Can Do:

- Rotate training officer duties throughout a full day of training exercises.
- Ensure that trainers do not re-enter the training tower without wearing appropriate respirators until the tower is visibly clear of smoke simulant.
- Require trainers to wear self-contained breathing apparatus inside the training tower even if they are outside the training room during training exercises that involve heat or fire.
- Require trainers to wear self-contained breathing apparatus or full-facepiece air purifying respirators with cartridges or canisters that are effective against oil-based aerosol and formaldehyde during training exercises that involve only smoke simulants. Trainers should wear these respirators inside the training tower even if they are outside the training room. Respirators should also be worn during maintenance and adjustment activities if smoke simulant release is expected.
- Maintain all respirators and make sure they fit and function properly.
- Create a schedule for changing out respirator cartridges and canisters.
- Fit test the trainers for each of the respirators that they are to wear.
- Encourage trainers to report any health concerns or symptoms associated with work tasks to a supervisor.

What Employees Can Do:

- Report health concerns or symptoms that could be work-related to a supervisor.
- Follow all procedures including work rotations, personal protective clothing and respirator use.
- Make sure you are fit-tested for each respirator you wear.

References

1. NIOSH [2013]. Health hazard evaluation report: evaluation of chemical exposures during fire fighter training exercises involving smoke simulant. By Fent KW, Musolin K, Methner M. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH HETA Report No. 2012-0028-3190.

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