Control Measures in the Fire Service to Protect Against Exposures to Carcinogens

Introduction

Firefighters are regularly exposed to hazards in the workplace, some of which are carcinogens (cancer-causing chemicals or agents) such as benzene, diesel exhaust, and polycyclic aromatic hydrocarbons. Exposures to carcinogens may occur during emergency response, training, and routine activities in the fire station. To reduce the risk of exposures, employers must perform a risk assessment and implement control measures specific to their workplace.

This tip sheet provides information on workplace control measures for fire service organizations to protect workers against exposures to carcinogens. It provides employers with examples of control measures based on the hierarchy of controls, as well as guidance to workers on how they can protect themselves. The guidance provided in this document is primarily for structural firefighters. For information on control measures specific to wildland firefighting, please refer to Wildland Firefighting Cancer Awareness.

Risk Assessment and Hierarchy of Controls

Fire service organizations are responsible for ensuring the health and safety of their workers and are responsible for assessing the health and safety risks of a job. This includes assessing the risks associated with exposures to carcinogens such as polycyclic aromatic hydrocarbons, diesel exhaust, and other hazardous combustion products. Using a risk assessment, employers must evaluate the probability firefighters will be exposed to these carcinogens and the severity of the resulting harm, including occupational cancer.

Based on the risk assessment, employers must implement control measures using the hierarchy of controls to eliminate hazards completely or minimize any risks to workers. The hierarchy of controls is a step-by-step approach that ranks control measures from the most effective level of protection (elimination) to the least effective level of protection (personal protective equipment).

The following list of control measures are examples of workplace controls that can be used to reduce the risk of exposure to carcinogens during firefighting. These controls should be layered as every additional control measure that is implemented reduces the risk further. When implementing controls, make sure that the controls selected do not introduce any new hazards.

Elimination

Elimination involves removing the hazard from the workplace. It is the most effective way to control a risk because the hazard is no longer present. It is the preferred way to control a hazard and should be used whenever possible.

Elimination of hazards in the fire service is not always possible. However, public education programs about dangerous materials or unsafe habits, as well as the use of smoke alarms and the installation of sprinkler systems in buildings, can prevent fires, including large-scale events.

Substitution

Substitution replaces a hazard with a less hazardous alternative. It is important to thoroughly assess the hazards and risks associated with an alternative to make sure it is an appropriate replacement. Care must be taken to make sure the substitution is less hazardous, and that one hazard is not being replaced with another that is just as harmful or more harmful. Examples of substitution controls include:

- Use per- and polyfluoroalkyl (PFAS)-free foam, when possible.
- Replace bunker gear with PFAS-free gear as it becomes available.
- Purchase battery electric vehicles or hybrid-electric fire trucks to reduce exposures to diesel exhaust.
- Substitute engineered wood products bonded with synthetic resins in training fires with propane or untreated lumber such as spruce and pine.

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Engineering Controls

Engineering controls are methods that control the hazard at the source, before it comes in contact with the worker. Engineering controls can be built into the design of a structure, facility, equipment, or process to minimize the hazard. Engineering controls are a reliable way to control worker exposures if the controls are designed, used, and maintained properly. Examples of engineering controls include:

- Install diesel exhaust capture systems in fire hall bays.
- Provide dilution ventilation, in addition to the diesel exhaust capture systems, in the fire hall bays.
- Maintain negative pressure in the fire hall bays compared to adjacent areas.
- Use the air recirculation mode in vehicles to minimize the intake of outside air during heavy smoke conditions.
- Provide a ventilated laundry room that is kept under slight negative pressure.
- Install self-closing doors in living quarters, laundry rooms, and office areas and make sure they are properly sealed.
- Separate fire stations into “hazard zones” to prevent harmful chemicals from travelling within the station.
    - Red or hot zones: where contaminated equipment is decontaminated.
    - Yellow or warm zones (usually the apparatus bay): where cleaned equipment is stored.
    - Green or cold zones: where contaminated equipment is not allowed such as kitchens, bathrooms, and living quarters.
- Physically isolate contaminated personal protective equipment from workers by bagging and sealing it, followed by transporting it in an unoccupied compartment of the apparatus (fire vehicle).

Administrative Controls

Administrative controls involve developing procedures to ensure the work is conducted in a way that minimizes the hazard. Examples include developing or changing policies, implementing or improving training and education, and developing or enhancing work practices and procedures. Examples of administrative controls for both employers and workers are provided below.

Employers:

Policies and procedures

- Investigate and record incidents of exposure.
- Implement medical screening programs for the early detection of illnesses and health monitoring programs for tracking long-term trends and emerging occupational diseases such as cancer.

Work practices

- Limit the duration of exposures, for example, during live fire training.
- Where possible for structural fires, use an exterior attack (applying water through a window before entering a building) versus an interior attack (immediately entering a building to fight the fire from the inside).

Worker education and training

- Educate and train workers on hazards associated with their work and how to reduce the risk of illness.
- Clearly outline occupational hazards of firefighting during recruitment, including in job postings, to ensure candidates are informed before accepting a position.

Laundering practices

- Make sure regular laundry is washed separately from clothing worn under bunker gear.
- Have dedicated storage areas for equipment.

Personal hygiene

- Provide showers and encourage workers to shower as soon as possible or within one hour of returning from an incident response.

- If showers are not available, provide workers with facilities to wash exposed skin, such as the neck, face, and hands.

Fire station and apparatus (fire vehicle)

- Ensure the apparatus is washed inside and outside after every response.
- Ensure routine cleaning of the fire hall and all surfaces.

Healthy lifestyle

- Provide workers with options for healthy eating at work.
- Encourage workers to maintain a healthy lifestyle by keeping active, reducing stress and limiting alcohol. Encourage workers not to use tobacco products, smoke, or vape.

Workers:

Policies and procedures

- Record incidents of exposure after every incident response.
- Attend cancer screening programs at your workplace or with a health care provider.

Work practices

- Where possible for structural fires, use an exterior attack (applying water through a window before entering a building) versus an interior attack (immediately entering a building to fight the fire from the inside).
- Perform physical activity in areas of the fire hall that are safe for fitness activities, such as green or cold zones.

Worker education and training

- Participate in training on hazards associated with your work and how to reduce your risk of illness, and any health and wellness courses your employer offers.
- Leaders should recognize that dirty uniforms are sometimes viewed as “a badge of honour” and should provide education on the health risks associated with contaminated personal protective equipment and ensure proper cleaning protocols are followed. Leaders should explore ways to intentionally acknowledge courage, teamwork, and professionalism without tying recognition to exposure or contaminated equipment.

Laundering practices

- Wash regular laundry separately from clothing worn under bunker gear.
- Change into clean clothes after showering.

Personal hygiene

- Shower as soon as possible or within one hour of returning to the fire hall from a response.
- Wash hands with soap and water before eating or drinking.

Fire station and apparatus

- Clean the apparatus on the inside and outside after every response. Shut down the apparatus when it is safe and practical to do so.
- Regularly clean the fire hall and all surfaces.

Healthy lifestyle

- Maintain a healthy lifestyle by keeping active, eating well, reducing stress and limiting alcohol.
- Do not use tobacco products, smoke or vape.

Personal Protective Equipment

Personal protective equipment refers to anything workers wear to help protect them from workplace hazards.

Although personal protective equipment is considered the last line of defence based on the hierarchy of controls, it is a critical control measure for firefighters. Firefighters rely on personal protective equipment to protect them against inhalation (breathing) and dermal (skin) exposures on a regular basis.

In order to provide adequate protection, all personal protective equipment must fit, be used correctly, be in good condition, and be regularly cleaned and inspected.

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For more information, please refer to the tip sheet Personal Protective Equipment in the Fire Service.

This resource was developed in partnership with Health Canada to help raise awareness about the risk of occupational cancer for firefighters, in support of actions identified in the National Framework on Cancers Linked to Firefighting. This guidance reflects current understanding and may change as new information on firefighter health and safety is made available.