The Alberta Fire Fighters Association

OH&S Bulletin

January 29, 2018

Introduction

This document contains a collection of best practices on ***Post Fire Decontamination***. This document is not created to be prescriptive or a policy but an aid for Locals to in order to help advocate for the health of all of our members. Like most documents the field of Health and Safety is continually evolving due to the science and research. What we do know definitively is that exposures to carcinogens is a leading cause of illnesses and deaths in the fire service.

Craig Macdonald

President

Brad Readman

Secretary

Health Effects

It is widely understood that firefighters suffer from cancer at a rate higher than the general population. This has been shown empirically in studies comparing firefighters to the general population and anecdotally with the number of firefighters who are recognized as LODD's each year. It is hard to find a firefighter that doesn't know of another firefighter who has or had cancer. With the uniqueness of our job and the fact that firefighters cannot remove all the exposures only minimize them. Therefore, the importance on areas that can be controlled/managed, such as decontamination and post fire clean-up of equipment and personnel should be in the forefront of firefighters' minds while performing these duties.

In the Journal of Occupational and Environmental Hygiene the article *Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures* as published looking at on scene contamination. Below is the abstract of the article.

*Firefighters' skin may be exposed to chemicals via permeation/penetration of combustion byproducts through or around personal protective equipment (PPE) or from the cross-transfer of contaminants on PPE to the skin. Additionally, volatile contaminants can evaporate from PPE following a response and be inhaled by firefighters. Using polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) as respective markers for non-volatile and volatile substances, we investigated the contamination of firefighters' turnout gear and skin following controlled residential fire responses. Participants were grouped into three crews of twelve firefighters. Each crew was deployed to a fire scenario (one per day, four total) and then paired up to complete six fireground job assignments. Wipe sampling of the exterior of the turnout gear was conducted pre- and post-fire. Wipe samples were also collected from a subset of the gear after field decontamination. VOCs off-gassing from gear were also measured pre-fire, post-fire, and post-decontamination. Wipe sampling of the firefighters' hands and neck was conducted pre- and post-fire. Additional wipes were collected after cleaning neck skin. PAH levels on turnout gear increased after each response and were greatest for gear worn by firefighters assigned to fire attack and to search and rescue activities. Field decontamination using dish soap, water, and scrubbing was able to reduce PAH contamination on turnout jackets by a median of 85%. Off-gassing VOC levels increased post-fire and then decreased 17–36 min later regardless of whether field decontamination was performed. Median post-fire PAH levels on the neck were near or below the limit of detection (< 10.5 µg/m2). Cleansing wipes were able to reduce PAH contamination on neck skin by a median of 54%.**[1]***

Recommended Best Practices

On Scene Post Fire Decontamination

- All fire personnel that were exposed to products of combustion should perform Gross Decontamination prior to entering Rehab or leaving the incident scene.
- Post-fire decontamination can occur anywhere practical, but generally should take place at a location is far enough away from the affected structure's entrance to ensure firefighters are not exposed to harmful contaminants while also ensuring they are not in the way of ongoing suppression activities. This location is also close enough to the entrance/exit so as not to make travel to decontamination prohibitive and/or time-consuming.
- After exiting the Hot Zone, it is recommended that crews remain on air, when possible, and report directly to the designated decontamination hose line(s). NOTE: Those members with the lowest air supply should be decontaminated first and as a rule, personnel are to remain on-air until gross decontamination is complete, again when possible.
- While rinsing off debris and products of combustion in a systematic and thorough manner from the collar-line down; being mindful of higher potential collection points such as the armpit and groin areas. Personnel should be careful to not saturate the inner lining of the PPE.
- Ideally the goal is to keep the PPE operationally dry on the interior, but rinsed as clean as possible on the exterior. Soft bristle scrub brushes and department-approved soap/cleaner may be used to facilitate the cleaning process. Follow NFPA 1851 and the manufacturers' recommendations when cleaning PPE
- It is recommended to use of soapy water & scrub brushes as this may enhance post-fire decontamination, but the absence of these items will not preclude post-fire decontamination from occurring.
- Firefighters entering rehab after entry into an IDLH atmosphere should remove their jackets and helmets so as not to contaminate rehab.
- No personnel should ride in the apparatus with visible loose particulate contamination or suspected contamination on Personal Protective Equipment and insure that there is no visible loose particulate contamination on Personal Protective Equipment before leaving any suppression incident scene
- Personal Protective Clothing should be bagged for protection before being brought back to the station for decontamination; double bag if required
- In extreme cold weather situations where decontamination may be hampered due to freezing temperatures crews should do their best to maintain the principals described about.

Below are some options that may be implemented to maintain the post fire decontamination principles.

- If possible, spare gear may be brought to the scene for crews to exchange so that they return to the station in clean gear in order to maintain the clean cab concept and maintain operational readiness.
- If Tyvek coveralls are available on scene, crews have the option to put the coveralls over their duty gear for the ride back to the station. This is not an ideal option but it prevents the firefighter from cold exposure and contains the contaminates on the duty gear so they are not transferred into the cab of the apparatus.

Release from Scene and At the Station

- Firefighters who have gone through post-fire decontamination during a fire incident, should double bag their gear prior to entering their apparatus and returning to quarters.
- To keep the cab of the apparatus as clean as possible and to avoid transferring toxins and harmful products back to the fire station, it is extremely important to perform gross decontamination prior to leaving the incident scene.
- Once released by command and prior to leaving the scene, it is recommended that all contaminated PPE be bagged at the scene using bags that are at least 6 mil thick. The bag opening should be twisted and taped (or otherwise) closed, then “goose-necked“ (folded over on itself, and twisted and taped (or otherwise closed) a second time). This procedure will greatly minimize any off-gassing in the apparatus cab.
- Decontamination of the helmet will follow the same objective as all PPE for gross decontamination, when cleaning the helmet; it’s acceptable to carefully wash the exterior to remove any heavy particulate. However, when cleaning the interior fabric, it is recommended to clean or launder it based on manufacturer recommendations
- All other equipment (SCBA packs and cylinders, tools, radio straps, etc.) will be thoroughly cleaned using water and any available approved cleaner based on manufacturer recommendations.
- Radios should be cleaned using appropriate techniques, refer to equipment manufacturers guidelines. Once the gear is cleaned, it may then be loaded into the apparatus cab. Ideally, no potentially contaminated equipment will be stored in the apparatus cab.
- Ideally, no equipment that has its designated use for interior firefighting should be housed, bracketed or otherwise kept in the interior passenger compartment of any response vehicle. The cab should be considered clean place and free of contamination. If SCBA are mounted

in the seats, the SCBAs should be gross decontaminated on scene before being put back in the mounts. Once at the station, SCBA should be thoroughly cleaned and decontaminated.

- It is highly recommended that all personnel exposed to the products of combustion, or any potentially harmful chemical (or biological) toxins, complete a full personal decontamination as soon as possible after the exposure.
- ”Shower within the Hour” should be a priority. If possible, personnel that are deemed exposed should be placed out-of-service until their personal decontamination is complete, with the goal to reduce the absorption rate of toxins into the body.
- The steps should be taken immediately upon arrival at the fire station:
    i. Perform a more thorough decontamination of equipment (radio, tools, fire hose, etc…) following NFPA 1851 and manufacturers’ recommendations.
    ii. Perform a more thorough decontamination of PPE (helmet, bunker gear, SCBA, etc…) following NFPA 1851 and manufacturers’ recommendations.
    iii. Perform a thorough decontamination of the apparatus cab.
    iv. Return apparatus to a state of readiness.
    v. Take a “shower within the hour” of being exposed to any products of combustion.
    vi. Change into clean station uniform wear.
    - Ideally Members should have two complete sets of gear that they can place into service once they return to the station and after preparing their contaminated gear for laundering. This should include gloves, balaclava, helmet liners, duty coat and pants.
    - Turnout gear that may be contaminated with particulate contaminate should be laundered at the station as soon as possible and should remain wet until laundered
    - The minimum PPE for a member handling soiled PPE on scene/back at station are medical gloves and N95 mask.
    - It is recommended that stations have dedicated industrial washing machines for duty gear cleaning or a contract with a company that specializes in duty gear cleaning to professionally launder the members duty gear.
    - It is recommended that if there are washers and dryers in all fire stations for cleaning of station wear and all members are encouraged to use them instead of taking their uniforms home

Post Fire

- Fire Investigator duties, often places them in a “post -fire”, chemical laden, hazardous environment.
- Protection is just as vital and important with this fire service position. They must adhere to respiratory and personal protective clothing requirements to protect against exposure to and possible contaminants at fire scenes.
- It is strongly recommended that all investigators wear SCBA or respiratory masks to protect their airway. The minimum recommendation is utilization of P100/VOC combination filter half mask.
- This should also include atmospheric monitoring for CO, HCN, O2, VOCs and formaldehyde to reduce exposure to these substances.
- Once the investigation of any fire is completed, the Fire Investigator should undergo the same gross decontamination process noted above, including changing out of coveralls or exterior exposed clothing.
- They should also follow personal decontamination procedures and “shower within the hour

Summary

It is all of our responsibility to work to reduce the exposures our members face through the sharing of best practices. It is important to understand that we are exposed to cancer causing carcinogens on scene and how we deal with contamination after the fire can reduce and decrease unnecessary exposures. If you have any comments or questions please don’t hesitate to contact the AFFA Standing Occupational Health and Safety Committee

Alberta Fire Fighters Association

Standing Occupational Health and Safety Committee

Jason Curry- Chair
Kris Adams
Stephen Belich
Codey McIntyre

Resources

Healthy In, Healthy Out - FireFighter Cancer Prevention Video

Healthy In, Healthy Out Booklet

Healthy In, Healthy Out Power Point Presentation

---

[1] Kenneth W. Fent, Barbara Alexander, Jennifer Roberts, Shirley Robertson, Christine Toennis, Deborah Sammons, Stephen Bertke, Steve Kerber, Denise Smith & Gavin Horn (2017) Contamination of firefighter personal protective equipment and skin and the effectiveness of decontamination procedures, Journal of Occupational and Environmental Hygiene, 14:10, 801-814, DOI: 10.1080/15459624.2017.1334904