



HEALTHY IN, HEALTHY OUT

**Best Practices for Reducing Fire Fighter
Risk of Exposures to Carcinogens**

Mission Statement:

The goal of this **best practices** manual is to encourage safe and healthy practices from the first day as a fire fighter to retirement. A career in the fire service exposes fire fighters to deadly carcinogens at every fire. This manual identifies the **best practices** that reduce fire fighter risk of exposure to carcinogens.

Cancer may never be eliminated from the fire service, but steps must be taken to reduce the number of fire fighters being diagnosed and dying every year. Common sense practices, equipment and guidelines are all components of these **best practices**.

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HEALTHY IN. HEALTHY OUT

**Best Practices for Reducing Fire Fighter
Risk of Exposures to Carcinogens**



In 2014, a Safety & Health Investment Projects (SHIP) grant project was awarded to the Kent Fire Department to establish a manual on the “**Best Practices** for Reducing Fire Fighter Risk of Exposures to Carcinogens.” The Washington State Council of Fire Fighters (WSCFF) provided the technical panel with members from the International Association of Fire Fighters (IAFF) locally across the state of Washington.

This technical panel searched fire service agencies across the state, the country and the world to identify the current practices that will, to the greatest extent possible, reduce the risk of exposures to carcinogens for fire fighting activities. The Kent Fire Department and the WSCFF jointly applied to the State of Washington Labor & Industries Safety & Health Investment Projects (SHIP).

A **best practice** is a method or technique that identifies a standard way of doing something that multiple organizations can use and adopt. A **best practice** can, and will, evolve to become better as improvements are discovered.

Today, structural hood manufacturers are designing prototypes that will help reduce dermal absorption. An AFG-funded research project is currently underway to address fire fighter personal protective equipment (PPE) cleaning validation.

A best practice is a method or technique that identifies a standard way of doing something that multiple organizations can use and adopt.

“If I had any advice for you, (it) is to pay as close attention to your body as you can. Even the tiniest bump could prove to be much worse than you ever could imagine it would be. When you do get that unfortunate news, go straight away to the best people in the area... This program can absolutely save your life.”

Donovan Eckhardt, Renton Fire and Emergency Services Department Fire Fighter, passed August 24, 2015 after a two-year battle with squamous cell carcinoma.

The University of Illinois Fire Service Institute (IFSI) has received a grant from the Federal Emergency Management Agency (FEMA) to continue its research on fire fighting exposures to occupational cardiovascular and chemical risks. In 2016, the University of Washington hopes to validate this **best practices** manual by testing the efficacy of methods identified within through another SHIP grant. This topic will be revisited periodically to identify the next practices that will continue to reduce fire fighter exposures to carcinogens.

This document is organized in the format of the Incident Management System (IMS) with Finance, Command, Planning, Operations and Logistics sections.

While not every fire department will have the capability or the budget capacity to implement these practices, this document refers to the **best practices** that have been identified to reduce exposures to carcinogens in the hopes of propagating potential change.

FINANCE

“An ounce of prevention is worth a pound of cure.”

BENJAMIN FRANKLIN

Over time, it has been shown that sick and injured members create financial costs to their organizations. The overall concept of this manual is to keep members safe from exposures, while protecting organizations from long-term injury, illness and even death.

Considering these various **best practices** and their implementation, fire departments may use a phased-in approach as necessary. While many of the practices identify low cost items like garbage bags, other items have a significant cost.

A fiscal analysis considers the money available, the money requested and the money actually spent. Fire departments are unique, they are funded differently—some are municipalities, some are fire districts, some employ career fire fighters, some have volunteers and some are combinations. In seeking a funding solution to implement the **best practices**, a “one size fits all” approach will not work for all fire departments. A fiscal analysis should be conducted to determine the level of participation for each individual department.

Funding sources to consider include local fees associated with fire and building permits as allowed, sales tax, real estate excise tax, impact fees, bonds, levies and fees for service. Grants, including Assistance to Firefighters Grant (AFG) may be considered for alternative funding for major/capital purchases.



IN THE LOW COST CATEGORY, ITEMS CAN INCLUDE:

- 2-3 mil, 42-gallon garbage bags for transporting contaminated PPE, equipment and hose; can be purchased for approximately 50 cents per bag
- Emergency Medical Services (EMS) latex or nitrile gloves
- N95 respirator for protection
- Splash gown
- Disposable wipes
- Hand wash station on every fire engine; retrofitting with time and materials for approximately \$300
- Station shoes; can range from \$30 to \$60



ON THE HIGHER COST END, ITEMS TO FUND CAN INCLUDE:

- Annual physicals for all suppression personnel, including cancer screening
- Initiating wellness/fitness programs
- Purchasing two sets of turnouts for all suppression personnel; having a variety of sizes available to wear while contaminated set is being cleaned is an option
- Direct source diesel exhaust capture and removal systems
- PPE cleaning by an independent service provider (ISP) or purchase extractor
- Ultrasonic helmet and self-contained breathing apparatus (SCBA) mask cleaner
- Steam cleaner for hard-to-clean soft surfaces, like cloth apparatus seats



ABOVE: Steam cleaning is capable of killing bacteria, like MRSA, and other pathogens while thoroughly cleaning surfaces by removing deeply embedded contaminants.

COMMAND

**“Leaders don't create
followers, they create more
leaders.”**

**TOM PETERS, BUSINESS AUTHOR
AND SPEAKER**

HEALTH AND SAFETY OFFICER

An important aspect of an organizational cancer prevention effort is developing the comprehensive accident, injury, illness and exposure policies and procedures as required by WAC 296-305-01501 and 01503. Such policies and procedures meet the dual needs of managing on-the-job injury processes, as well as providing organizations with data that may prevent future events. In the context of cancer prevention, it is desirable that an organization's policy and culture support precautionary reporting of exposure to carcinogens as a way to identify and mitigate hazards. Similar to near miss reporting, precautionary reporting of exposure to carcinogens allows organizations to identify the root causes of the exposure and to design and implement corrective interventions.

In developing policy that encourages precautionary reporting, it is important to clearly define the parameters of the organization's reporting system. The Washington State Council of Fire Fighters' Personal Injury, Illness and Exposure Reporting System (PIIERS) allows members to record all incidents where there is the potential to have been exposed to the products of combustion. An organizational reporting system, however, should only be used when an exposure actually occurs.

For example, acting as a pump operator upwind of a large commercial fire may warrant a PIIERS report, but may not warrant the filing of an organizational precautionary report. On the other hand, if the wind shifts and the pump operator suddenly finds himself engulfed in acrid smoke, then the member needs to fill out a PIIERS report as well as an internal report. These distinctions are clearly not black and white, and must be supported by good policy along with a culture of mutual trust within an organization.

From Labor's perspective, a robust organizational reporting system may reinforce the organization's commitment to transparency and safety. Labor must also recognize, however, that Management may feel exposed to increased scrutiny if every "routine" fire call generated a wave of exposure reports. Because of this, a collaborative effort between Labor and Management can be undertaken to clearly define the formal and informal parameters of reporting policy. After all, both groups





have a shared interest: the health and safety of the organization and its members. An additional benefit of maintaining a collaborative approach to precautionary reporting is that it moves training, policy and operational norms towards a culture of safety.

EXPOSURE REPORTING WITHIN FIRE DEPARTMENTS

In addition to strong policy, organizations are encouraged to develop strong processes for precautionary reporting. This begins by creating forms and other documents that are logical, accessible and user-friendly. In addition, these forms should not only support ease of use, but should also allow for advantageous data collection by the department. Check boxes, drop down menus and practical narrative prompts are methods that reduce subjectivity and allow for easier retrieval of data.

Exposure report forms should also have clean approval queues that require input from multiple layers within the organization. For example, the pump operator who breathed acrid smoke but did not require immediate medical attention should initiate the report and thoroughly complete all sections related directly to his experience. His company officer would then receive the report and would “proof” the pump operator’s work by checking it for completeness and accuracy, and would also provide their own version of events and recommendations to prevent future occurrences. This process should continue through a logical queue that involves all relevant individuals in the affected member’s chain of command.

WAC 296-305-01505 requires organizations to develop an accident prevention program. As part of this program, the statute includes language mandating both a safety orientation process as well as the development of a Safety Committee. The final review

of a precautionary report should lie with these groups. This policy states that the Safety Committee should be tasked with identifying the root causes of the event and, in doing so; it should suggest action items via the organization’s Health and Safety Officer (HSO). These items may include policy, procedural, training and/or operational changes to prevent future occurrences. All Safety Committee and HSO recommendations should be documented, managed and revisited until such a time that the corrective actions are complete.

A confidential document library is the final step for the precautionary report and associated Safety Committee and HSO records. The document library can be accessed should a precautionary report become relevant to an injury or illness that occurs downstream. At this point, both the organization and employee will have a record that the initiating event was reported, reviewed and acted upon.

An additional benefit of maintaining a collaborative approach to precautionary reporting is that it moves training, policy and operational norms towards a culture of safety.

PLANNING

“By failing to prepare, you are preparing to fail.”

BENJAMIN FRANKLIN

FIRE STATION DESIGN

When designing a fire station, consideration should be given to finding ways to reduce exposures and prevent the cross-contamination of possible carcinogens and other harmful agents. Existing stations can be retrofitted to best accomplish this where possible.

- Within the station, zones are easily established:

RED zone: A designated area, as per WAC 296-305-06505, for contaminated equipment including SCBA, EMS equipment from medical calls, fire hose, turnouts, etc., to be cleaned. When cleaning contaminated equipment, always wear appropriate PPE (gloves, splash gown and N95 if appropriate) to protect against exposures from contaminated equipment.

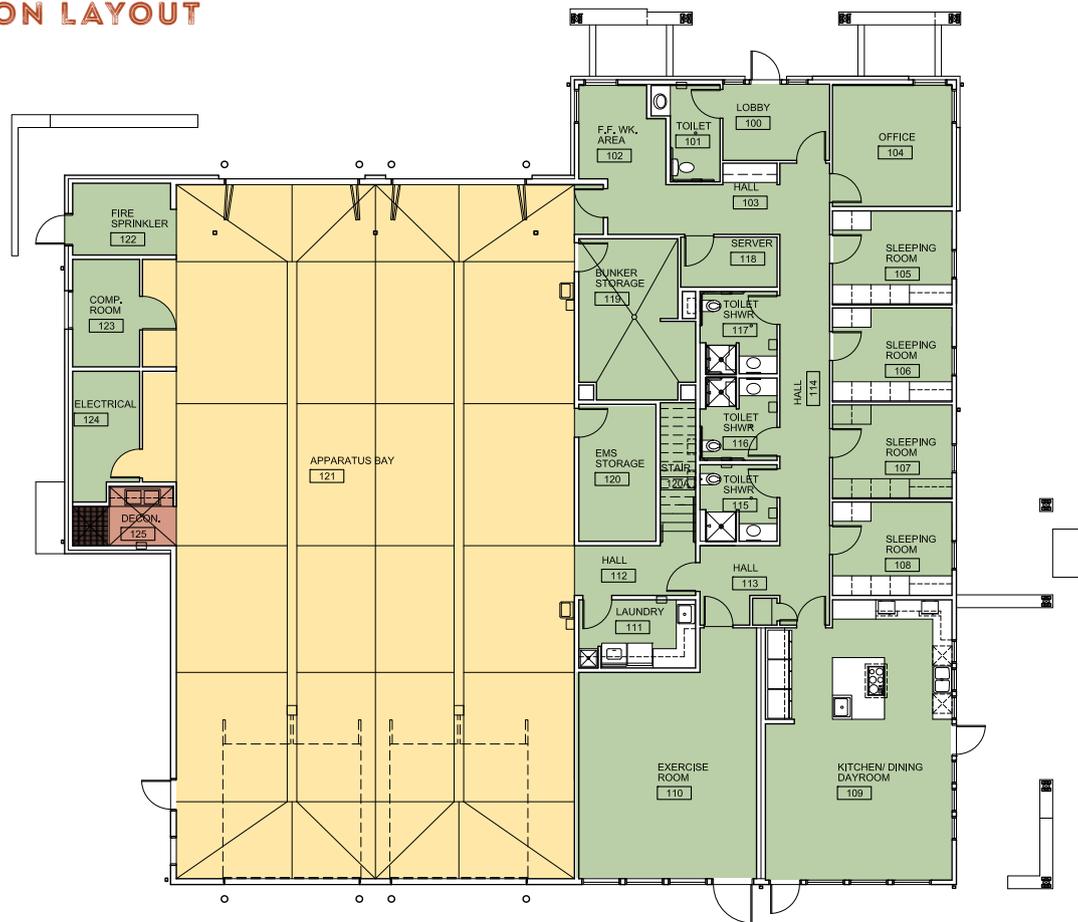
YELLOW zone: This is typically the apparatus bay. Equipment cleaned in the red zone can now be stored in the yellow zone.

GREEN zone: “Keep it clean in the green.” The green zone is the living quarters of the fire station including the kitchen, living, sleeping, personal hygiene and office. Contaminated EMS equipment, turnouts, etc., are never allowed.

- Direct source capture diesel exhaust handling systems for all vehicles and for every apparatus bay can be included in all new station design and retrofitted into existing stations.
- The air pressure in the living quarters should be higher than that of the apparatus bay to prevent airborne contaminants from entering the living quarters or green zone in general.
- To avoid exposures to UV light, turnout gear storage should be stored in an enclosed ventilated room (NFPA 1851).
- Carpet in fire stations acts like a sponge, collecting dirt, soot, feces, MRSA, staph, blood and OPIM from response footwear worn by fire and EMS personnel. Installing hard surface flooring, such as polished concrete, is one way to mitigate these exposures, as solid surfaces are easier to clean than carpet.



FIRE STATION LAYOUT



- Similarly, furniture and fixtures in fire stations attract and collect dirt and biological toxins. A 2011 study by the University of Washington Field Research and Consultation Group found MRSA on chairs, phones, computers and kitchen counters in fire stations in western Washington. This study shows the importance of keeping frequently touched items clean and disinfected.
- For new fire station design, plan adequate space requirements for turnout cleaning extractors to clean turnouts in-house, or provide an area to package turnouts at the station prior to shipping to an Independent Service Provider (ISP) for third party cleaning. Follow manufacturer's instructions on methods for cleaning turnouts.

FACILITIES MAINTENANCE

Initial and/or periodic testing should be conducted at fire stations to ensure a safe environment for fire and EMS personnel working in those stations.

- **Diesel exhaust:** Engineered systems such as direct source capture systems need to be maintained to ensure they are exhausting the gasses and particulate matter to the outside atmosphere. Diesel exhaust is classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (Group 1).

- **Staph, VRE, C Diff and MRSA:** Chronic health effects from bloodborne exposures that are persistent in the fire service.
- **Asbestos:** Older fire stations should be assessed for asbestos encapsulated pipe wrap. If the wrap is damaged, it needs to be repaired or replaced.
- **Radon:** A radioactive gas that occurs naturally in the ground. It can enter into living spaces—especially basements, through ground water or cracks in foundations—and congregate there. It is known to cause lung cancer. If found above EPA guidelines, mitigation options should be considered.

Diesel exhaust is classified by the International Agency for Research on Cancer (IARC) as carcinogenic to humans (Group 1).



STATION SHOES VS. WORK BOOTS

Fire and EMS personnel regularly respond to incidents in which exposures to biologics and carcinogens can occur. It is not uncommon for personnel to step in hazardous substances (e.g., soot, blood, urine, vomitus, feces, etc.) with their response footwear during a call.

- To further reduce contamination that may be brought into the stations on the soles of response footwear, an alternate form of footwear (the station shoe) is authorized for wear inside the stations. An example of a station shoe could be black in color, closed-toed and a non-safety shoe that is easy to clean if needed.
- The station shoe can be changed into and out of quickly without delaying response to a call.

Carpet in fire stations acts like a sponge—installing hard surface flooring, such as polished concrete, is one way to mitigate these exposures.

- Station shoes shall not be worn while performing apparatus checks, while responding to calls or when performing work where safety shoes (impact and crush protection) are required.

APPARATUS DESIGN

Apparatus can be designed with careful thought given to biological and chemical contamination and the potential for cross-contamination. The cab of the apparatus should be kept free of toxins, both in the hard and soft surfaces as well as in the air.

- SCBAs and turnouts should have their own compartment away from the cab. SCBAs that are designed into the seat should also come with provisions for decontamination and cleaning prior to placing back into the seat after a fire.
- All seat material should be of vinyl or other material to reduce absorption of toxins and for an easy clean.
- Apparatus can be adapted to have a warm water outlet, which provides a personal washing station. Prior to 2016, NFPA 1901 required a heat exchanger for the engine coolant, most apparatus manufacturers accomplish this with water from the tank through a heat exchanger. A simple diverter valve to the pump panel can create a warm water outlet for a personal hand washing station.
- All flooring can be designed with a waterproof material that can be washed with a hose and scrubbed out.
- Exhaust pipes can be designed to exit where fire fighters are least affected when opening cabinets and accessing pump panel controls.
- Pre-packaged water bottles carried on apparatus for personnel to rehydrate are a handy solution. A reusable water cooler container can be safely utilized, provided a timely cleaning and disinfecting plan is in place.
- All interior material used in the cab should be easily cleaned and designed to repel moisture. They must also be durable





ABOVE: SCBAs and turnouts should have their own compartment away from the cab.

enough to be cleaned weekly with disinfecting agents, soap and water. Do not use cloth for the apparatus seat materials.

- Contaminated equipment (SCBAs, fire hose, TICs, etc.) should not be allowed in the cab of the apparatus until the equipment has been properly decontaminated. This may involve arranging transportation of the contaminated equipment from the incident to the fire station for proper decontamination.
- As a **best practice**, groceries should not be routinely transported in fire department apparatus due to potential cross-contamination. Because this is a common practice while working 24-hour shifts, a designated cooler or insulated zippered container can be used to minimize cross-contamination.

APPARATUS TURNOUT STORAGE

- All apparatus should have a designated turnout compartment that is separate from the cab.

- Turnouts should not be routinely allowed in the cab of the apparatus with the exception of responding to emergencies or participating in trainings.
- No contaminated turnouts should be allowed in any apparatus cab.
- After an incident or training that involves contaminants, all turnouts should be grossly decontaminated on scene, encapsulated in a designated disposable bag and be transported to a fire station for proper cleaning.

Apparatus can be designed with careful thought given to biological and chemical contamination and the potential for cross-contamination

OPERATIONS: EMERGENCY

“We are what we repeatedly
do. Excellence therefore is not
an act but a habit.”

ARISTOTLE

Conduct a risk/benefit analysis that takes into consideration the risk of fire fighters being unnecessarily exposed to carcinogens. Limit toxic exposures to personnel on scene. Incident Commanders (IC) can cancel units who are not needed.

- Upon arrival at the incident, units should stage uphill and upwind to the fire when practical. Keep apparatus windows closed, air conditioner and heat turned off to minimize airborne contaminants from entering the cab and contaminating the interior.
- If the apparatus is not involved in an integral process of fireground operations (pumping, supplying or aerial operations), turn off the motor to reduce the diesel exhaust on the scene.
- On-deck and Rapid Intervention Crews (RIC) can be readily available without standing in the smoke. Stay outside of the smoke envelope—the area surrounding the scene where airborne contaminants are present—and be aware of the greater picture. This envelope depends on atmospheric conditions. For example, on low wind days with atmospheric inversion, the smoke envelope may surround a fire scene with a large spread of emissions in all directions.
- Responders should wear appropriate PPE whenever the situation warrants, including the pump operator/engineer and IC, and may have to wear SCBA whenever exposed to the products of combustion or hazardous materials.
- All personnel engaged in fire fighting shall utilize SCBA from initial attack throughout overhaul. FCSN 2011 states that not wearing SCBA is the “single most dangerous voluntary activity” in today’s fire service. Such usage should include not only interior structural fire fighting, but also for car fires and dumpster fires.

GROSS DECONTAMINATION (DECON)

- Prior to removing fire fighting ensembles worn in the hot zone, a gross decontamination shall be performed to remove potentially harmful contaminants (WAC 296-305-05002 (15)).
 - **Wet Decon:** Members should brush large debris first, and then spray each other with water to remove loose particulates from turnouts and equipment. Utilizing the pump operator for decontamination should not be allowed due to their lack of respiratory protection. The designated Gross Decon line should be deployed approximately 50 feet from the pump panel, towards the egress of the IDLH and designated by a cone. Do not connect decontamination line to a foam discharge port during foam operations.
 - **Dry Decon:** During cold weather operations, dry brushing should be conducted to remove the toxic products of combustions from the fire fighters prior to going off air and removing SCBA face pieces.
- All fire fighters engaged in suppression activities, overhaul or exposure to smoke should exchange their contaminated



LEFT: RTI conducted a fluorescent aerosol test that found aerosol particles can penetrate a firefighter's hood and deposit on the skin. There were very heavy aerosol deposits on the neck, cheeks, ears, and hair due to penetration through the hood. The dark bands below the ears were relatively clean areas that were covered by the mask straps.

Test conducted by: RTI International, Research Triangle Park, NC sponsored by the International Association of Fire Fighters.

hood for a clean one every time they exit the IDLH. Replacement hoods should be readily available on scene.

- After Gross Decon and before eating or drinking, a personal hand washing station, including hand soap and towels, will be set up. In lieu of soap and water, utilize disposable wipes for hands, face and neck. Personnel should wash their hands before Rehab, at the end of suppression activities including overhaul and before returning to the living quarters. The hand wash station or wipes should be available at the entry point to Rehab.
- When released from the incident, fire fighters need to bag their contaminated turnouts in large, encapsulating leak-proof bags for transport back to the station. Wearing contaminated turnouts back to the fire station will transfer contaminants to apparatus seats, resulting in exposure to the next member who sits there due to cross-contamination.
- To protect hands from dermal absorption of contaminants while packaging turnouts, wear a minimum of EMS latex or nitrile gloves. Personnel must shower upon returning to quarters, or as soon as practical. Keep a reserve set of turnouts at assigned stations. Clean contaminated turnouts, including hood, gloves, boots and helmets in accordance with NFPA 1851; or send them out to designated station or an ISP for cleaning.
- When cleaning contaminated equipment, always wear appropriate PPE (gloves, splash gown and N95 if equipment is dry and particles could become airborne) to protect against exposures from contaminated equipment (WAC 296.62).

INCIDENT REHABILITATION (REHAB)

Provide rehabilitation and medical monitoring to establish the mental and physical condition of personnel participating in tactical operations and training at the scene. Carcinogens can be absorbed, inhaled and ingested on a fire scene. Proper decontamination and rehabilitation procedures reduce exposures to carcinogens during these critical times.

- Rehab must be located in a place that allows enough space and protection from adverse environmental conditions including fire, smoke, exhaust, extreme heat and cold. An ideal location would be out of direct sight of the working incident, with room for separate areas to remove PPE, a rest and evaluation area, a treatment area and access to a restroom when possible.

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) CONTAMINANTS & CLASSIFICATIONS

CONTAMINANT	NOTE
Acetaldehyde	IARC Group 2B carcinogens
Acrolein	IARC Group 3 carcinogens
Aniline	IARC Group 3 carcinogens
Antimony compounds	Toxicity similar to arsenic poisoning
Arsenic	IARC Group 1 Carcinogens, endocrine disruptor
Benzene	IARC Group 1 Carcinogens
Beryllium compounds	IARC Group 1 Carcinogens
1,3-Butadiene	IARC Group 2A carcinogens
Cadmium	IARC Group 1 Carcinogens, endocrine disruptor
Dibutyl phthalate	Endocrine disruptor
1,8-dinitropyrene	Sufficient evidence in experimental animals
Dioxins and dibenzofurans	Are suspected human carcinogens
Formaldehyde	IARC Group 1 Carcinogens
Mercury compounds	IARC Group 3 carcinogens
Naphthalene	IARC Group 2B carcinogens
Nickel	IARC Group 2B carcinogens
3-Nitrobenzanthrone	One of the strongest carcinogens known
Benzo(e)pyrene	IARC group 3 carcinogens
Benzo(a)pyrene	IARC Group 1 carcinogen
Styrene	IARC Group 2B carcinogens
Toluene	IARC Group 3 carcinogens
Xylene isomers and mixtures: o-ylenes, m-xylenes, p-xylenes	IARC Group 3 carcinogens

- Personnel are to rotate through Rehab after IDLH work period of 2/30s or 1/45-minute SCBA cylinder or anytime the environment, workload and/or atmospheric conditions indicate the probability of injury or temperature related illness to personnel. This includes, but is not limited to, working fires and haz mat incidents when encapsulating suits are worn.
- At the entry point prior to entering Rehab, fire fighters are to use a personal hand washing station with water, hand soap and towels. In lieu of soap and water, utilize disposable wipes for hands, face and neck.
- An evaluation will occur each time a fire fighter enters Rehab to include the following: time, name, unit, mental status, any symptoms such as chief complaint, shortness of breath, poor gait, confusion, dizziness, nausea or vomiting, cramps, aches and pains. All symptoms will be thoroughly evaluated by the appropriate EMS level of care.
- Personnel not in the IDLH but within the hazard zone (pump operators, IC, etc.) should be observed and periodically monitored for potential exposure to toxic gasses and/or heat and cold stress.
- In warm weather, removal of turnout gear is necessary in order to allow the body's temperature regulating mechanism to function properly. The duration of the ventilation process will depend on the workload and atmospheric air temperatures.
- The use of tarps for shade and electric fans to provide airflow may be necessary during hot weather, and other appropriate shelter should be utilized during inclement weather.
- Fluid replacement is necessary in order to maintain the high metabolic demand placed on fire fighters during emergency operations. It is recommended that members drink one liter of water per hour in order to replace fluids lost due to dehydration. After one hour, electrolyte additives should be added to the water source (NFPA 1584).
- Caffeinated beverages and "energy drinks" should be avoided during the emergency incident due to their diuretic effect.

Accumulation of soot and chemicals on turnouts can lead to persistent exposures of carcinogens to fire fighters. Turnouts should then be cleaned after each exposure to toxic products of combustions.



'SCBA DURING OVERHAUL IS FOR PANSIES! BESIDES, WHAT'S THE WORST THAT CAN HAPPEN?'

OVERHAUL

The primary emphasis during post-fire operations should be the safety of all fire personnel operating on the scene. Decontamination, rehabilitation and rehydration procedures should already be in place. When crews are able to exit the structure as soon as reasonably possible, they allow for the chemicals to dissipate naturally and their overall exposure will be reduced. An additional benefit of timely crew removal is that it will allow Fire Investigators to gather information before a scene is further disturbed by overhaul.

As a **best practice**, the most contaminated crews should be sent home first for showers and change of clothing to remove the toxic products of combustion that accumulate on fire fighters during fire fighting operations. The Jacksonville (Florida) Fire and Rescue Department (JFRD) has had a policy in place since 2010 (SOG 437) that designates a new crew be dispatched to the scene of working fires as a CUT Team. An acronym for "Clean Up Team," the primary job of CUT is to "perform overhaul duties and assist the Fire Investigator at structure fires." This allows the original fire fighting crews to return to quarters and clean up after their fire fighting operations.

- During the structural cooling off period, the IC can develop an overhaul plan that includes the identification of safety issues like holes in floors or unstable walls/roofs and the establishment of hot, warm and cold zones.
- SCBA is mandatory to be used for any work performed inside the structure for duration of overhaul. Monitor for fatigue, hydrate and cool crews.
- Fire investigators can begin interviews and investigation outside the structure during the structural cooling off period.
- Fire investigators are subject to the same toxic environments as other fire fighting personnel. They must be protected from respiratory and dermal absorption hazards when operating inside the hot zone (WAC 296-305-05002 (16)).

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COMMUNITY ACTIVIST: ADAM VILLARD PREACHES BETTER PRACTICES

BY ERIN JAMES

I was that guy in the department who had the dirtiest helmet, the dirtiest gear and I was proud of it," says Adam Villard, union president and Fire Fighter EMT for Spokane County Fire District 8.

Villard admits he wore his ash-clad gear until he was instructed to clean it by his chief. However, in 2012, he went to a class hosted by the Firefighter Cancer Support Network and heard Washington State network director Eric Monroe speak about dirty gear and absorption through the skin. "He spoke about how if you don't shower and clean yourself after a fire, that exposure is in your system for a longer period of time," Villard says. "He opened my eyes—opened them enough to change my ways. I went back to the station and cleaned my gear and thought to myself that I might have dodged a bullet."

With a history of kidney stones and a specialist he visited regularly, Villard went in for a somewhat routine ultrasound shortly after he attended the cancer support class. His doctor found a mass on his left kidney and planned for him to monitor it on an annual basis. A few months after that first one-year mark, Villard developed another kidney stone and went to see his specialist who recommended doing an MRI. The mass was later diagnosed as left renal cell carcinoma. In May of 2014, Villard had the upper back slope of his left kidney removed, totaling as a third of the organ.

"The doctor says this would have gone asymptomatic for years but when they become symptomatic, we got real problems," Villard says. "I started doing research and all the guys from on the job that passed away from kidney cancer were 46- or 47-years-old, which would have put me right in that range."

Villard brought his investigation to his doctor and asked if he thought it was a result of his job. "He said he didn't have enough research but that it was probable and I was awfully young to get this," Villard remembers. "I said that was kind of my point."

He showed the specialist the RCW presumptive cancer list and the science backing from IAFF resident oncologists specifically on carcinogens and kidney cancer. "He read it and filled out the paperwork saying it was more probable than not that the job causes cancer," he says.

For a small department like his, Villard's diagnosis had a colossal impact on the practices in place—so much that policy changes were made and the department purchased additional turnout extractors to clean gear properly at all four stations.

"They are doing the best they can to limit the problem," Villard says. "I think the industry is coming around more and more as more tragic events and diagnoses take place. It's opening a lot of people's eyes."



Villard predicts a major culture shift that leans more toward cleanliness and safety than the "tough guy mantra."

"I'm a ten-year fire fighter, we're right in the middle of Gen X and we have a certain mindset," he says, tongue-in-cheek. "I think that mindset is starting to change. With this manual coming out, most of this class of the fire service is going to be open to the change."

Outspoken and active, Villard says he is not shy about discussing his own trials and tribulations with cancer as a fire fighter and regularly speaks to new recruit classes in his district.

"I want folks to know that I was the guy who kind of had a bad attitude about it but someone changed my mind, but at that time, I had already gotten sick," he says. "I'm just trying to prevent someone else from having the blinders on."



TRANSPORTING CONTAMINATED EQUIPMENT

Contaminated equipment, turnouts and hose should be transported back to the fire station in a manner, designed to reduce cross-contamination.

- Gear should be encapsulated utilizing a single-use, heavy-duty plastic bag. The bag should be of sufficient size (42-gallon) and strength (2-3 mil) to contain all contaminated gear, including turnouts, helmet, mask, gloves and boots.
- The encapsulated gear should be placed outside of the passenger compartment, in an external compartment. Transport gear in a similar manner to a facility with an extractor or to an ISP.
- Upon arrival back at fire station, and prior to personnel taking showers, open the turnout bag and let the turnouts off-gas outside the

fire station. After showering and changing to a clean uniform, remove any tools from turnouts and launder in extractor or repackage for transport to designated cleaning station or ISP.

- Transporting contaminated equipment, hose and turnouts in the bed of a utility pickup will not need to be encapsulated. Be sure to wear appropriate PPE when handling contaminated equipment and clean the transport vehicle after use.

CLEANING TURNOUTS

Gross Decon happens at the fire scene first. Turnouts should then be cleaned after each exposure to toxic products of combustions. Exposures can be from car fires, dumpster fires, structure fires and training burns. Accumulation of soot and chemicals on turnouts can lead to persistent exposures of carcinogens to fire fighters. Structural turnouts, including gloves, helmet, hood, boots, pant and coat, should be cleaned according to manufacturer's recommendation and NFPA 1851.

BELOW: Bagging up contaminated turnouts and SCBAs prevents cross-contamination.



IMMEDIATE ACTION: JEFF GREENE'S ROAD TO RECOVERY

BY ERIN JAMES

The great outdoors have always spoken to Jeff Greene. Growing up in Lake Stevens, Washington and moving to Wenatchee later in his childhood, he found his calling in the open air and fire fighting seemed the perfect fit for a career. He is an avid fisherman and hunter, has worked in departments throughout the Pacific Northwest and spent eight years on the haz mat team in an industrial area of Kent.

In December of 2014, at the prime age of 32, Greene was diagnosed with chromophobe renal cell carcinoma. A rare sub-type of the greater renal cell carcinoma umbrella, Greene's type of cancer holds up just 5 percent of all kidney cancers and only seen in 60 cases a year on average.

After waking up with a side pain he soothed with a heating pad six months prior, the second occurrence of the pain was too much to bear and Greene's wife insisted he visit his primary care doctor. Several screenings and tests later, his doctor determined there was a spot on his kidney that was renal cell carcinoma, but it was weeks out until he was able to see a specialist.

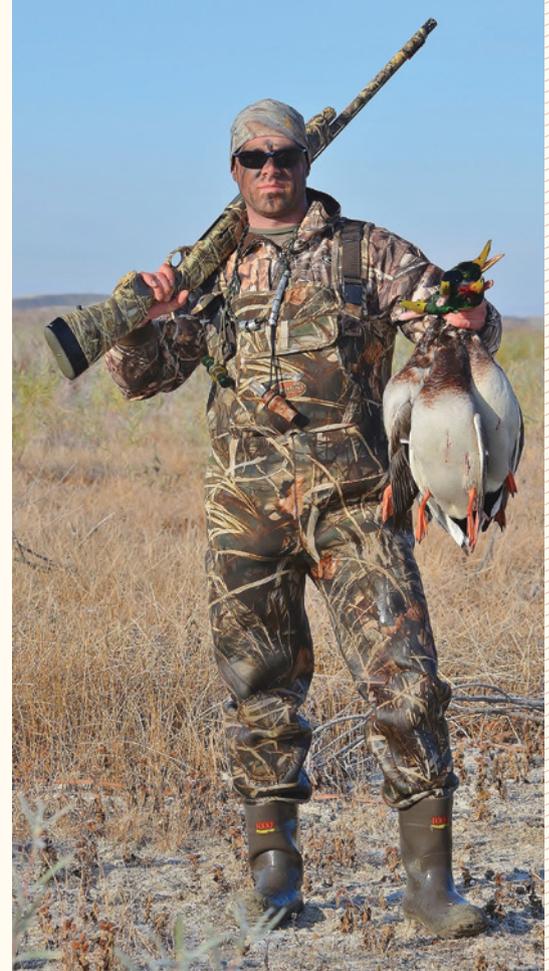
"When I got the news, I was sitting at work and called Seattle Cancer Care, told them my story and asked if I could come in," Greene says, noting he was in their hospital just three days later. "I met

with a surgeon there, he looked at my file and said that it really didn't matter at this point what it was. That at my age, it's going to grow to a point that it's going to be in the way, whether that's just a tumor or cancer. We had to cut it out."

This type of cancer forms in the cells lining the small tubules that help filter waste from the blood and produce urine in the kidney—and the only treatment is surgery. Thankfully for Greene, the procedure was simple; the affected portion was cut out and he quickly returned to the world he loved.

Unlike many other fire fighters who battle cancer, Greene, who is an Engineer/driver for the Kent Fire Department, always had his best practices dialed in. He says he can only recall a singular, yet distinctive, time when his safety might have been in jeopardy.

"When I was on probation my very first year, we went to a pipeline fire and we were breathing the fumes with raw fuel spraying everywhere," he says. "One of the possible causes of kidney cancers is benzenes (a natural part of crude oil and gasoline)... We were only 100-200 feet away from the active fuel, we were breathing fumes the entire time. It wasn't until hours later when they realized the potential of it and moved everybody back."



With a heightened sense of consciousness, Greene encourages his fellow fire fighters to be aware of everything they do on the job. "Don't bring that home to your kids, you don't want carcinogens at home," he says. "If you can smell it, you know carcinogens are all over everything."

Today, Greene is behind the fire service's movement toward cancer awareness. He says he understands it might take time for change to be reinforced, but for now, he shares his story to help better practices sink in on a personal level.

"As long as we are getting this data and information out there, maybe there will be more looked into as far as finding a definitive cause," Greene says. "If it's something that we are doing—at the station or on calls—that's causing it, it'd be nice to know so that somebody else doesn't have to go through with this."

OPERATIONS: ROUTINE

“Take care of yourself,
take care of each other and
be safe.”

MARTY HAUER,
KENT FIRE DEPARTMENT ENGINEER
PASSED JUNE 3, 2008

WELLNESS COMPONENT

How the body performs is the best indicator of what is going on inside of it. If it doesn't feel right, it might not be. It is encouraged that all fire fighters listen to their bodies and get checked at the first signs of abnormal issues and symptoms.

There are many important components to help the body stay cancer-free in the fire service. A key step is to never start using tobacco products, of any kind. If a member occasionally smokes cigarettes, e-cigs, cigars or dips smokeless tobacco, it is encouraged they stop immediately. Regular use of a sunscreen or sunblock can help protect from skin cancer. General wellness can be achieved by regular exercise, a healthy diet and, most of all, awareness of what is going on in the body.

Physical fitness is extremely important as a fire fighter. Being physically fit can prevent or reduce injury, increase performance, increase career longevity and help improve one's quality of retirement. There is a physical fitness standard that must be reached when someone initially joins the fire service, but fitness throughout one's career is just as important.

Research has demonstrated the need for high levels of aerobic fitness, muscular endurance, muscular strength, muscular power and flexibility in order to perform safely and effectively in the fire service. The activities required while performing work on the fireground are physically demanding and can put stress on the heart. Heart attacks are one of the leading causes of fire fighter fatalities. Healthier, physically fit and conditioned fire fighters will lead to fewer injuries and improved performance on the fireground. Staying in shape and working out throughout one's tenure will also lead to a healthier life after retirement and allow the retiree to have a higher quality of life during their retirement years. Working out while on shift also provides camaraderie within a crew and station.

Sleep habits are another consideration for fire fighters. This chosen profession often makes regular sleeping habits difficult or impossible. Long shifts of 24 or 48 hours contribute to irregular sleep habits, which have been shown to have a negative impact on health. As recommended by the National Institute of Occupational Safety and Health (NIOSH), fire fighters should focus on getting plenty of rest while off-duty, rather than exacerbating potential health hazards by going without sleep or limiting the opportunity to get adequate rest when available.

According to the Center for Disease Control, **alcohol** is a leading cause, as well as a contributing factor, to many forms of cancer. Over time, excessive alcohol use can lead to the development of chronic diseases and other serious problems including high blood pressure, heart disease, stroke, liver disease, digestive problems and cancers of the breast, mouth, throat, esophagus, liver and colon. Limit alcohol consumption to not more than one drink per day for women, two drinks per day for men.



ANNUAL PHYSICALS

Fire fighters enter toxic atmospheres, perform strenuous physical activities and do so over an expansive 20-30 year career. WAC 296-842 mandates respiratory protection if a member is entering an atmosphere with toxic products of combustion. WAC 296-842-14005 requires a medical evaluation prior to being fitted for

ABOVE: Research shows that aerobic fitness and muscular strength and endurance help members to perform safely and effectively in the fire service.

respiratory protection. WAC 296-62-07314 also requires a medical exam for any employee prior to being assigned to work in an area that may release carcinogens. For fire fighters, members often enter unknown carcinogenic environments including structure fires, car fires or dumpster fires. These exams are to be provided at no cost to the employee and provided annually after an initial examination.

A sample recommendation of an annual physical provided by the Firefighter Cancer Support Network (FCSN) is included in Appendix C. The IAFF/IAFC Joint Wellness Fitness Initiative (WFI) also provides an annual recommended physical for incumbent fire fighters. Specific tests such as red and white blood cell count tests, heavy metals screenings and cancer screenings can assist with early detection of many common cancers seen in the fire service today. These simple exams can determine if cancer is a risk, as well as if it is present. Having this annual exam is imperative to early detection and aggressive action to address any problems.

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THE LIFESAVING PHYSICAL: HOW FAMILY MAN CHRIS LINES SURVIVES MULTIPLE MYELOMA

BY ERIN JAMES

In the 20th year of Chris Lines' fire fighting tenure, he was diagnosed with multiple myeloma, a rare and incurable blood cancer. Myeloma makes up just 1 percent of cancers, but it is the second most prevalent blood cancer after lymphoma. According to multiple studies, it is 1.5 times more likely a fire fighter will develop multiple myeloma compared to the general population.

Multiple myeloma begins when plasma cells, white blood cells found in bone marrow, mutate and start to reproduce themselves. According to Lines' doctor who handed the now 52-year-old the diagnosis eight years ago, his line of work caused his cancer.

"I got a call from the doctor and he said I was anemic and my red blood cells were low," Lines says. "I did a blood test and a bone marrow biopsy and they gave me the big diagnosis. They caught it real early, not early enough to cure, but before it caused really any damage to the bones or organs or anything."

The Vancouver Fire Department requires its members to take annual wellness tests—a requirement that saved Lines' life. He says if his doctor hadn't done the extra tests after the red flags rose from his physical, he wouldn't have known until it was too late to even medicate. The immediate solution was for a stem cell transplant, modern medicine's "golden ticket" for putting cancer into remission and keeping it at bay for a few years.

"The kind I have always comes back, it never goes away forever," the Battalion Chief explains. "When they

offered the transplant to me, I had a nine-year-old boy getting ready to play All-Star little league—I wasn't going to go into the hospital for a couple weeks and be out of commission for four months. I said I wasn't going to do the transplant, I'll take all the stem cells out and freeze them and watch this kid play baseball."

Considering himself lucky, Lines' treatment consists of 14 pills per month that have helped him to continue on with his life, without pulling him away from his family or his passion in the fire service. Today, he uses that fervor to tell his story and encourage better practices in the field.

"I tell the guys at work all the time the best thing that can happen to you is to pull in the driveway in the morning and have two little screaming kids come out and give you a big hug," says the father of two teenage boys, the eldest currently enrolled in fire school. "You guys want to make sure you get to that in life and don't jeopardize your future by doing anything crazy in the fire service or the same thing with taking care of yourself."

Steadfast to the rules of better practices, Lines says he never took any risks when it came to his time on calls, but recognizes that his education of carcinogen exposure was limited prior to his diagnosis. He strives to change that mindset as younger fire fighter classes come on board, encouraging them to take care of themselves and for his own generation to adapt to new safety precautions.



"I think the fire service has really taken a positive role in getting their members tested, buying some of the best practices available," Lines says. "Fire fighting is always going to be dangerous because of the chemicals you're involved with. After talking to some experts, you don't know how bad you're exposed to something until 20 years down the road. If you can do what you can do in the mean time, then I think that's a huge benefit and I do think that's happening now in the fire service."

His advice to fire fighters on carcinogen exposure? Check yourself constantly. "If you're in a fire, take the time, not just for you but for your family, to do all the best practices even if you're tired," Lines says. "But if I could give any kind of encouragement, it is to continually get a physical every year. Make sure you do it."



BASIC NUTRITION

Diet is a primary consideration. It is the responsibility of every member to try to follow a diet that helps minimize a cancer-related occurrence. The best nutrition for the body is to eat as many whole foods as possible for each meal. Whole foods naturally provide necessary vitamins, minerals and other nutrients that are vital to keeping the human body healthy and free of disease. Processed foods, on the other hand, tend to have fewer nutrients and more unhealthy fats, sugars and other additives, which can increase the risk for diseases such as diabetes, heart disease and certain types of cancer. The cleaner the diet, the better the body will run and the immune system will be more effective when it has to deal with viruses, bacteria and other toxic exposures.

Most fire fighters get adequate amounts of proteins and grains but tend to lack vegetables. Vegetables help the body process food and should be eaten prior to the bulk of your meal, such as having a salad before dinner. When presented with an opportunity to select vegetables, choose a variety of colors, as each different colored vegetable provides a different health benefit when consumed.

Most nutritionists will tell you to eat three meals a day (breakfast, lunch and dinner) with two to three snacks in between the larger meals and avoid eating past the hour of 8 p.m. In the fire service, this can be difficult, if not impossible, due to the erratic schedule, and the use of food as a comfort to a high stress job.

In general, it is advised to eat a large breakfast and start off the day well nourished, and then as the day unfolds, try to hold to the ideal of lunch around noon and dinner around 6 or 7 p.m. When snacking, try to pick a low sugar snack, especially the closer it is to the sleeping hours. Caffeinated beverages, especially energy drinks, and a high sugar diet at night will increase the inability to fall asleep, coupled with calls, this can lead to severe sleep deprivation.

Lastly, getting 64-88 ounces of water per day helps the body process and move food/fuel through the digestive system, and has a huge impact on nutrition overall. A good rule is to drink a glass of water prior to each meal, prior to training and after any call that requires physical exertion or the donning of bunker gear.

TRAINING: CANCER AWARENESS

Training, education and recognition of the epidemic of cancer in the fire service has been a goal of the Firefighter Cancer Support Network for many years. It is imperative that new generations of fire fighters are made aware of how large and impactful this problem is. The following is a list of the highlights that are taught during these cancer awareness outreach classes. This curriculum should be taught at every recruit school, and annually at every fire department. WAC 296.62 also requires an awareness of the hazards of carcinogens on the job and annual refresher training is required prior to entering any live fire training scenario or actual fire scenario.

- Carcinogenic hazards of chemicals encountered on the fireground including local and systemic toxicity.
- Benefits of personal wellness efforts including exercise, nutrition and annual physicals.
- The most common types of cancer in the fire service that fire fighters are more likely to develop than the general population: multiple myeloma, non-Hodgkin's lymphoma, esophageal cancer, brain cancer, colon cancer, prostate cancer, skin cancer and testicular cancer.
- Supporting research and findings demonstrating the scope of cancer in the fire service.
- Laws and standards applicable in the specific state and jurisdiction regarding cancer in the fire service.
- Common materials that pose a risk to fire fighters.
- Methods of reducing exposures to carcinogens at incident scenes.
- Benefits of Gross Decontamination, such as hand, face and neck washing on scene.
- Methods for cleaning turnouts and self after an incident.
- Methods of documentation of exposures after an incident.
- Education on exposures and cancer risks before any training or incidents that have the potential to expose fire fighters to known carcinogens, asphyxiates, poisons, irritants and allergens.
- Provision of all appropriate PPE to minimize exposures.
- Requirements to use all appropriate PPE to minimize exposures.
- All staff that participates in the training of fire fighters should conform to the practices listed in this document.





DOCUMENTING EXPOSURES FOR INDIVIDUALS

It's no secret this profession puts its members in environments filled with known and unknown chemicals, carcinogens, toxins and diseases. As a result, it has been proven that fire fighters are more prone to certain illnesses and cancers than the general population.

At Convention in 2014, the WSCFF passed a resolution to create an exposure tracking system for its membership. The Personal Injury, Illness and Exposure Reporting System (PIERS) was created and is designed to follow fire fighters throughout their career and into retirement. It is a one-stop place to record

PIERS is a one-stop place to record injuries, illnesses and exposures experienced while on the job.

injuries, illnesses and exposures experienced while on the job. Confidentiality of information will always be safeguarded, only the user will have access to personal information.

As a PIERS user, one can track their exposures to chemicals, smoke, toxins and diseases throughout their career. The system can be used to track work-related injury claim information such as sprains, strains and broken bones, along with illnesses such as any cardiac events. Users have access to the results of preventative and wellness exams into the PIERS program as part of a complete health history. Before annual physicals, users can download a report including current exposures to share with their doctor. PIERS may show changes over time, and throughout a career.

For the WSCFF, PIERS provides the ability to run reports on non-protected and generic information to track trends and to develop health education or prevention materials. PIERS can also be used for legislative and safe work-place initiatives.



ALL IN THE FAMILY: JACK WALLER'S FIRE SERVICE SUPPORT SYSTEM

BY ERIN JAMES

“Brotherhood” is a term that pulls its weight in the fire service. Among shifts, pushing throughout the station, into the department and out into the state as a whole, the family that is the fire service ties its members in through the job’s passion, dedication and loyalty. This is something Jack Waller witnessed first hand when he was diagnosed with Hodgkin’s lymphoma in 2014 at the age of 49.

Waller had been positioned at the South King County Training Consortium as a Captain for only a handful of months when he received his diagnosis. When talking about his health verdict, he lists off more than a dozen names of fellow servicemen and women that took him in as their own.

“They just bear-hugged me, they treated me like family and I think that was huge in my ultimate positive outcome,” says Waller, who is in his second year of remission. “I got lucky that I got a cancer I could get rid of but I think that having them working with me—that support—was crucial for me and was a positive part of the process.”

Hodgkin’s lymphoma, like its sibling type non-Hodgkin’s lymphoma, is a cancer of the lymphatic system, a vital component of the defense of the immune system. Hodgkin’s causes abnormal cell growth in the lymphatic

system and, as it progresses, compromises the body’s ability to fight off infection.

For Waller, after finally coming to terms with the abnormalities occurring in his body, he spoke with his sister, a former oncology nurse. She insisted he see a specialist, as he was showing textbook symptoms for lymphoma, like unexpected weight loss and a persistent cough.

“In the fire service historically, we’re all 10-feet-tall and bulletproof and nothing can happen to us,” Waller says. “So when goofy, funky things start happening to your body that we can’t explain, we deny it and try to explain it away. If something is happening to your body that you can’t explain, don’t wait, go to your doctor and don’t stop with your doctor until you get an answer.”

Although this type of lymphoma is not on the RCW’s list of presumptive fire fighter cancers, it lists a primary cause as farm chemicals, something that Waller was exposed to growing up as a child and young adult in Eastern Washington as well as on the job. He plans to file an L&I claim over the diagnosis so the data is documented. “The more of us that come forward in this profession, at some point, there’s a tipping point where they’ll go ‘wow, there are 5,000 fire fighters who’ve got

Hodgkin’s lymphoma.”

More common among people half his age, Waller’s diagnosis was a statistical oddity and struck a chord with his colleagues. “I was told there was a pretty sizable uptick in tenured people my age in the service that were going to the doctor for physicals,” he says. “If nothing else, it got people to go to the doctor.”

Waller, now a Battalion Chief at the Tukwila Fire Department, understands that the change in policy, especially on a statewide level, will take both time and money. “You’re fighting 100 years of tradition unhampered by progress,” he says. “It’ll be gradual but our probationary fire fighters and the recruits that are coming in now won’t know any different. As time goes by, we advance technology and our understanding of the disease and how it’s affecting us as an occupation.”

Cancer is an epidemic within this brotherhood of fire fighters, Waller insists as he counts the number of cancer-related funerals within the last few months. “Cancer is not discriminatory,” he says. “It’s not the 50-somethings or the 20-somethings in the service, it’s all of us. Any little thing, no matter how inconvenient it might be at the time, if it’s going to prevent you from what I had to go through and increase your quality of life when you retire, I’d have to say it’s worth it.”

LOGISTICS

“I never see what has been done. I only see what remains to be done.”

BUDDHA



LAUNDRY

The employer will provide personnel with uniforms. This uniform is not designed to protect against hazardous materials, toxins or bloodborne pathogens, although these contaminants will occasionally come in direct contact with uniforms. Under no circumstances will employees take home uniforms that have been worn in a contaminated environment, nor those that are soiled with blood or other potentially infectious materials (OPIM).

- Washers, dryers or laundry services are to be provided by the employer. No equipment, detergents or disinfectants should be used other than those provided by the employer.
- Contaminated uniforms and linens should be washed with detergent in water between 140 and 160 degrees Fahrenheit for a minimum of 25 minutes. If low temperature laundry cycles are used, chemicals suitable for low temperature washing at proper concentration must be used.

HOUSEKEEPING

Develop cleaning procedures to mitigate contamination and to avoid cross-contamination from fire incident scenes to living quarters. Employees handling contaminated equipment, hose and turnouts will wear appropriate PPE (gloves, splash gown and N95 if appropriate) to protect against exposures from contaminated equipment.

Written schedules for station cleaning and methods of equipment decontamination, cleaning and disinfecting should be located at each work site.

DECONTAMINATION, CLEANING AND DISINFECTING

Gross Decontamination occurs at the scene and removes many of the toxic products of combustion or biological contaminants. Cleaning occurs back at the fire station and uses soap, other cleaning products and warm water rinses. Disinfection can only happen after the object has been cleaned. Contact, or dwell, time is the amount of time required to “kill” the microorganisms. Disinfection products vary widely on their contact time, read the labels before using.

EQUIPMENT CLEANING

SCBA facemasks and tools are exposed to the same products of combustion as turnout gear. They are contaminated any time they are exposed to a smoky atmosphere, including, but not limited, to structure fires, car fires, dumpster fires, training fires or burnt food on the stove. If not properly cleaned, contaminated equipment will continue to expose personnel to carcinogens long after the fire.

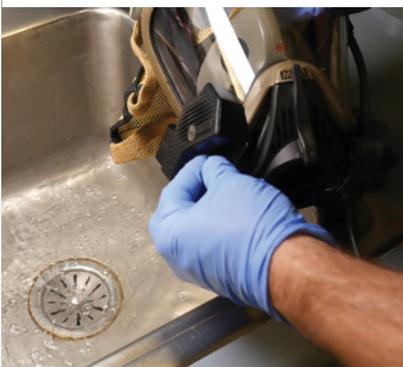
- Gross decontamination of equipment should be done at the scene.
- Any time contact is made with the contaminated equipment at the scene or while cleaning, proper PPE that will limit dermal absorption should be used.
- Transportation of contaminated SCBAs, masks and other equipment:
 - Contaminated equipment should be grossly decontaminated first, then encapsulated if transporting in the fire engine to further reduce exposure or contamination to uncontaminated areas.
 - Contaminated equipment does not need to be encapsulated if it can be transported to the cleaning facility in a vehicle (e.g., pickup) that will not allow further cross-contamination of the apparatus cab, compartments or exposure to personnel.
- Equipment should be cleaned in a location that will allow for proper cleaning without further exposure to personnel or living quarters.
- After each use, all equipment will be cleaned according to manufacturer's recommendations.
- For most hand tools (axe, hooligan, shovel, etc.), use mild soap and water.
 - If necessary, scrub with a soft to medium bristled brush to remove stubborn contaminants.
 - Using a garden hose, completely rinse the soap from the tools.
- Gas powered equipment can be wiped free of smoke, soot and debris.



COMMON CHEMICALS FOUND IN RESIDENTIAL HOUSE FIRES:

- Acrolein
- Aldehydes
- Ammonia
- Arsenic
- Benzene
- Benzyl chloride
- Carbon disulfide
- Carbon monoxide
- Formaldehyde
- Furfural
- Glutaraldehyde
- Hydrogen chloride
- Mercury vapor
- Naphthalene
- Nitrogen dioxide
- Nitrogen monoxide
- Ozone
- Phenol
- Sulfur dioxide
- Styrene
- Toluene
- Particulates

BELOW: To clean SCBA masks, remove electronic components and use a damp sponge or cloth to clean those parts. Scrub face piece with a brush, then ensure exhalation valve moves freely and hang mask to dry.



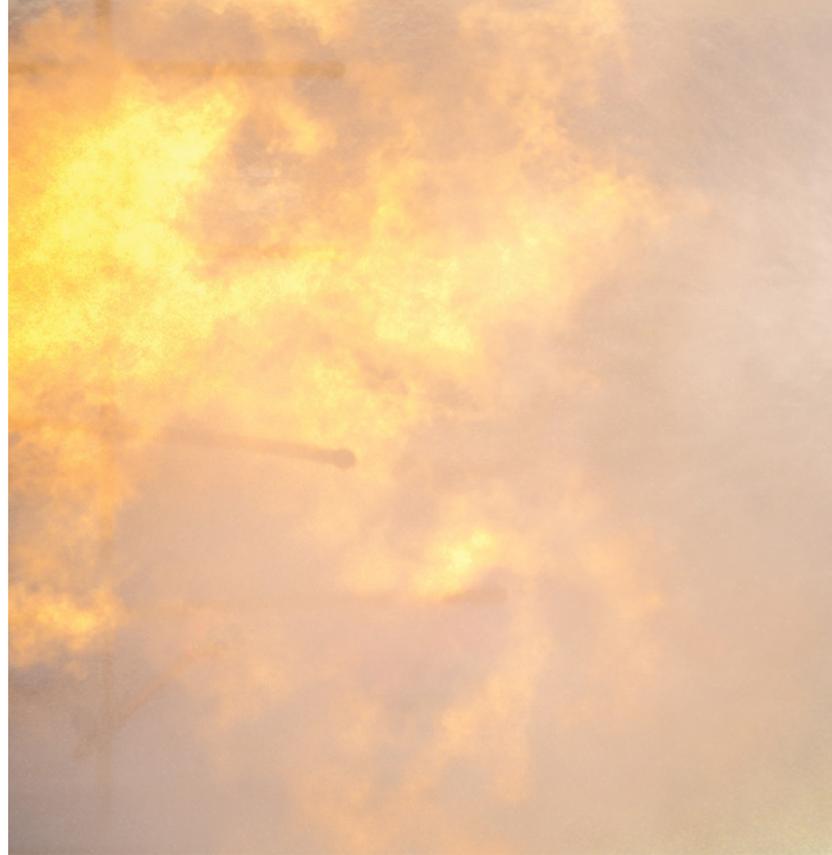
SPECIFICS ON SCBA AND FACEMASKS CLEANING:

- The cylinder needs to be removed from the backpack for proper cleaning. It should be washed with warm, soapy water and thoroughly rinsed, making sure to clean all components of the cylinder (i.e., cylinder valve, gauge and cylinder body). After cleaning, the cylinder valve should be cracked opened to blow out any moisture that has collected in the valve opening.
- Masks can be cleaned in a commercial mask washer or ultrasonic cleaner designed specifically for SCBA masks, if allowed by the specific manufacturer; otherwise it can be cleaned inside and out to remove all contaminants and sanitized prior to being placed back in service.
- The backpack (minus cylinder) should be thoroughly cleaned in accordance to the manufacturer's recommendations. Warm soapy water, sponge and soft bristled brush should be used, with care taken to make sure all surfaces are thoroughly cleaned, including hard and soft surfaces (WAC 296-842).

SPECIFICS ON HOSE CLEANING:

- Contaminated fire hose should be cleaned per NFPA 1962 Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose.
- It is recommended to "dry" brush the hose using a soft/medium bristle brush. However, if the dirt cannot be thoroughly brushed from the hose, or if the hose has come in contact with harmful materials, the hose should be washed. Covered (nitrile, rubber) hoses are can be wiped dry.
- Unroll the hose and stretch it out in its entirety on a clean, level surface. Thoroughly rinse the fire hose with clean water.
- Fill a large bucket with mild, soapy water. The water should be ambient temperature. Using a long-handled brush with soft to medium bristles, scrub the entire length of hose.
- Turn the hose over to the opposite side and scrub.

Preliminary results presented in the Illinois Fire Service Institute's 2015 Cardiovascular & Chemical Exposure Risks in Modern Firefighting Interim Report indicate that "gross on-scene decon with water/detergent and scrubbing appears to be effective in bringing the PAH (polycyclic aromatic hydrocarbons) contamination to pre-fire levels."



- Using a garden hose, completely rinse the soap from the hose on both sides.
- Dry the hose thoroughly using the method best suited for the weather conditions and facility equipment (hanging in hose tower, hose dryer, etc.).

APPARATUS DECONTAMINATION, CLEANING AND DISINFECTING

Proper apparatus decontamination, cleaning and disinfecting are vital in limiting fire fighter exposure to contaminants.

- All apparatus cabs, compartments and equipment should be cleaned weekly and decontaminated after every incident or training that involved contaminants.
- Parking upwind, keeping windows closed and heaters and air conditioners off during fireground operations will minimize airborne contaminants from entering the cab.
- All cleaning can be done utilizing cleaning solutions, designated rags, mop buckets, brushes and disinfectants. HEPA vacuums are useful tools to pick up soot and other loose debris prior to cleaning with wet agents.
- Apparatus cab cleaning should utilize a top-down cleaning method followed by disinfecting. Special attention should be paid to computers, radios, map books, seats, steering wheel, floorboards and headsets. Disinfecting is intended to prevent the spread of contagious illnesses such as C Diff, MRSA, staph, etc.
- All cloth surfaces should be cleaned using a vacuum and/or steam extractor.
- Remove all equipment and use the top-down method to clean apparatus compartments. All equipment should be cleaned prior to being placed back on the apparatus.



- After cleaning is complete, utilize the department's cleaning program for the rags and mops. Wash hands, face and neck or shower.

PERSONAL VEHICLE

Special care should be taken to ensure that contaminated turnouts are not transported in a personally owned vehicle in a fashion that would expose people or pets in the passenger compartment to harmful contaminants. Some guidelines are:

- If the personally owned vehicle is a pick-up truck with an open bed then transporting the contaminated turnouts in the bed of a pick-up without any riders would be an option.
- If the passenger vehicle has no trunk, like station wagons, passenger vans or SUV's, then the contaminated turnouts should be sealed into a container that prevents harmful contaminants from entering the passenger compartment.
- If the personally owned vehicle has a separate trunk, then the turnouts should be sealed in a bag or container and transported in the trunk.

IN ALL CASES, the transport of contaminated turnouts in a personally owned vehicle should only be done after a gross decontamination has been performed in the field.

The contaminated turnouts should be cleaned in accordance with approved fire department policy as soon as practical.

Clean turnout gear may be transported in a personal vehicle in an enclosed container or encapsulated in a designated bag to avoid cross-contamination to personal belongings.

HOW TO CLEAN STRUCTURAL FIRE FIGHTING GLOVES



- 1** || Wear appropriate PPE, EMS nitrile or latex gloves for dermal protection.
- 2** || Fill a decon sink with approximately two inches of warm water and detergent of choice.
- 3** || Grab gloves by gauntlet, pinching off end or wear one glove at a time.
- 4** || Using a medium bristled brush, submerge the glove and scrub the exterior of the glove; working from gauntlet toward tip. Turn glove over and repeat on other side. Continue until glove is clean then rinse under running water. Perform same procedure on other glove.
- 5** || Empty sink and fill with clean water and approved sanitizer to clean the inside of the glove.
- 6** || Do not wring as the lining may become dislodged from the shell.
- 7** || Hang upside down to dry.



MODEL GUIDELINE

Purpose:

Numerous studies have proven that fire fighters are at greater risk of contracting many cancers as a result of their assigned duties. These studies have shown that proper use of the PPE, SCBA and a gross decontamination process are beneficial in limiting the duration of fire fighter exposure to toxic carcinogens. The (insert Fire Department) is committed to the overall health of employees; the (insert Fire Department) recognizes the increased risk of cancer associated with fire fighting activities. In an effort to provide a safe and healthy work environment, the (insert Fire Department) has created the following guideline to reduce the cancer risk to its employees.

Scope:

This guideline applies to all (insert Fire Department) employees.

References:

NFPA, Jurisdiction Policy, WAC, RCW, FCSN and IAFF.

Definitions:

See Appendix B.

Statement of Intent:

It is the intent of (insert Fire Department) to take proactive and reasonable steps to limit employee exposures to carcinogens.





COMMAND

1. Develop comprehensive accident, injury, illness and exposure policies and procedures
2. The Safety Committee can identify root cause and suggest changes to prevent future occurrences.

FINANCE

1. Budget for two sets of turnouts for all emergency response personnel.
2. Budget for PPE cleaning by an ISP or by purchasing the necessary equipment to clean PPE in an area designated as safe and appropriate to do so.
3. Consider grants, including AFG, for alternative funding for major/capital purchases.
4. Provide engineering controls and associated equipment to reduce or eliminate exhaust from internal combustion equipment in living and work areas.
5. Budget for annual physicals, other wellness programs and equipment.

PLANNING

1. Develop an exposure control plan to include green zones in stations and apparatus.
2. Use an apparatus design that reduces exposures and prevents cross-contamination by using solid, cleanable surfaces whenever possible.
3. Provide a hand washing station on every fire apparatus.
4. Design fire station to address exposure reduction and cross-contamination prevention.
5. Conduct testing to ensure a hazard-free work environment: MRSA, radon, asbestos, diesel exhaust, etc.

OPERATIONS: EMERGENCY

1. Ensure that all personnel are wearing full PPE and SCBA on all fire calls.
2. Establish hot, warm and cold hazard zones at the scene. Limit entry to necessary personnel only, and limit time in hot zone.
3. Limit the time support personnel (including driver/engineer, rehab, incident commander and other support staff) are in potentially contaminated areas.
4. Establish Gross Decontamination for every entry into a toxic smoke environment (including car fires and dumpster fires).

5. Provide warm water and soap, or if unavailable, use disposable wipes to clean hands, face and neck.
6. Establish Rehabilitation with medical surveillance when work event exceeds 2/30s or 1/45 cylinder or 45 minutes of strenuous labor, or as needed.
7. Release most contaminated personnel first to reduce continued exposures to toxic products of combustion. First in, first home.
8. Transport contaminated PPE in encapsulated bag to prevent further exposure to apparatus and personnel.
9. Allow personnel to return to fire station out of service to shower and change into clean PPE. Monitor dispatch frequency and do not pass a critical call returning to quarters.

OPERATIONS: ROUTINE ACTIVITIES

1. Ensure diesel exhaust capture systems or similar engineering controls are used every time the apparatus enters and/or exits the fire station.
2. To further reduce contamination that may be brought into the stations by response footwear, it is encouraged a station shoe be worn inside the living quarters of the fire stations.
3. Practice wellness in general. Conduct annual physicals including cancer screenings. Use sunscreen when outdoors, don't use tobacco and participate in daily exercise.
4. Document exposures, injuries and illness throughout career.
5. Conduct initial recruit and annual refresher training to include cancer awareness, wellness and fitness.
6. The Safety Committee will review occupational exposures in order to identify root causes and/or necessary mitigation efforts.

LOGISTICS

1. Establish PPE and uniform cleaning program for all entries into contaminated environments.
2. Provide a second set of turnouts for all emergency response personnel.
3. Institute an on-scene hood exchange program.
4. Maintain the exposure control plan to include cleaning, disinfecting and maintenance programs to reduce exposures in the fire station.

DEFINITIONS

APPARATUS: A mobile piece of fire equipment such as a pumper, aerial, tender, automobile, etc.

APPROVED: A method, equipment, procedure, practice, tool, etc., that is sanctioned, consented to, confirmed or accepted as good or satisfactory for a particular purpose or use by a person, or organization authorized to make such a judgment.

BLOODBORNE PATHOGENS: Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV) and other potentially infectious materials (OPIM).

CBRN: Chemical, biological, radiological and nuclear.

CHRONIC HEALTH EFFECT: An adverse health effect resulting from long-term exposure to a substance. The term is also applied to a persistent (months, years or permanent) adverse health effect resulting from a short-term (acute) exposure.

CLEANING: To make (something or someone) free of dirt, marks or mess, especially by washing, wiping or brushing.

CONTAMINATED: The presence or the reasonably anticipated presence of materials foreign to the normal atmospheres, blood, hazardous waste or other potentially infectious materials on an item or surface.

CONTAMINATION: The process of transferring a hazardous material from its source to people, animals, the

environment or equipment, which may act as a carrier.

DECONTAMINATION: The physical or chemical process of cleansing an object to remove contaminants such as microorganisms or hazardous materials, including chemicals, radioactive substances and infectious diseases. Decontamination is sometimes abbreviated as "Decon." Also prevents the spread of contamination to other persons or equipment.

DISINFECTION: A procedure that inactivates virtually all recognized pathogenic microorganisms, but not necessarily all microbial forms (i.e., bacterial endospores) on inanimate objects.

ENGINE (PUMPER): A piece of apparatus equipped with hose and a pump for the purpose of supplying water under pressure through hose lines.



EXPOSURE OR EXPOSED: When an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g., accidental or possible) exposure. "Subjected" in terms of health hazards includes any route of entry like inhalation, ingestion, skin contact or absorption (OSHA - 29 CFR 1910.1200).

FIRE APPARATUS: A fire department emergency vehicle used for rescue, fire suppression or other specialized functions.

FIRE DEPARTMENT FACILITY: Any building or area owned, operated, occupied or used by a fire department on a routine basis.

GROSS DECONTAMINATION: The initial phase of the decontamination process during which the amount of surface contaminant is significantly reduced.

HAZARD CONTROL ZONES:

- **COLD zone:** The control zone of an incident that contains the command post and such other support functions as are deemed necessary to control the incident.
- **WARM zone:** The control zone outside the hot zone where personnel and equipment undergo decontamination and the hot zone support takes place.
- **HOT zone:** The control zone immediately surrounding the hazard area, which extends far enough to prevent adverse effects to personnel outside the zone. The hot zone is presenting the greatest risk to members and will often be classified as an IDLH atmosphere.

HEALTH AND SAFETY OFFICER: The member of the fire department assigned and authorized as the administrator of the fire department health and safety program.

IDLH: Immediately dangerous to life and health. Exposure to airborne contaminants that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.



RCW: Revised Code of Washington.

REHABILITATION: The process of providing mental and medical evaluation, rest, hydration and nourishment to members who are engaged in emergency operations.

RESPIRATORY PROTECTION: Equipment designed to protect the wearer from the inhalation of contaminants.

RISK ASSESSMENT: To set or determine the possibility of suffering harm or loss, and to what extent.

SCBA: Self-contained breathing apparatus.

STATION (FIRE STATION): Structure in which fire service apparatus and/or personnel are housed.

STRUCTURAL FIRE FIGHTING

PROTECTIVE CLOTHING: This category of clothing, often called turnout or bunker gear, refers to the protective clothing normally worn by fire fighters during structural fire fighting operations. It includes a helmet, coat, pants, boots, gloves and a hood. Structural fire fighters' protective clothing provides limited protection from heat but may not provide adequate protection from the harmful gases, vapors, liquids or dusts that are encountered during hazardous materials incidents.

TLV/TWA: Threshold limit values/ time weighted average.

TURNOUT CLOTHING: See structural fire fighting protective clothing.

VAPOR BARRIER: Material used to prevent or substantially inhibit the transfer of water, corrosive liquids and steam or other hot vapors from the outside of a garment to the wearer's body.

WAC: Washington Administrative Code: <http://apps.leg.wa.gov/wac/>.

WISHA: Washington Industrial Safety Health Act.

INCIDENT COMMANDER:

The person in overall command of an emergency incident. This person is responsible for the direction and coordination of the response effort.

INCIDENT SAFETY OFFICER:

The person assigned the command staff function of safety officer in the incident command system.

ISP: Independent Service Provider, relating to NFPA 1851 for the care and maintenance of structural fire fighting ensembles.

NFPA: National Fire Protection Association.

NIOSH: National Institute of Occupational Safety and Health.

OCCUPATIONAL EXPOSURE:

Reasonably anticipated skin, eye, mucous membrane or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

OSHA: Occupational Safety and Health Administration.

OPIM: Other potentially infectious materials, which include the following body fluids: semen, vaginal secretions,

cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva, any body fluid that is visibly contaminated with blood and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

OVERHAUL: A fire fighting term involving the process of final extinguishment after the main body of a fire has been knocked down. All traces of fire must be extinguished at this time.

PERSONAL PROTECTIVE EQUIPMENT (PPE):

- The equipment acts to shield or isolate a person from the chemical, physical and thermal hazards that may be encountered at an incident.
- Personal protective equipment includes both personal protective clothing and respiratory protection. Adequate personal protective equipment should protect the respiratory system, skin, eyes, face, hands, feet, head, body and hearing.
- Specialized clothing or equipment worn by an employee for protection against a hazard. General work clothes (e.g., uniforms, pants, shirts or blouses) not intended to function as protection against a hazard are not considered to be personal protective equipment.

SAMPLE WELLNESS MEDICAL PHYSICAL EXAM (FCSN)

HANDS-ON PHYSICAL EXAMINATION

- **Vital Signs:** Head, neck, eyes, ears, nose and throat
- **Cardiovascular:** Inspection, auscultation, percussion and palpation
- **Pulmonary:** Inspection, auscultation, percussion and palpation
- **Gastrointestinal:** Inspection, auscultation, percussion and palpation
- **Genitourinary:** Hernia exam (see cancer screening)
- **Lymph Nodes:** The examination of organ systems must be supplemented with an evaluation of lymph nodes in the cervical, auxiliary and inguinal regions.
- **Neurological:** The neurologic exam for uniformed personnel must include a general mental status evaluation and general assessment of the major cranial/peripheral nerves (motor, sensory, reflexes).
- **Musculoskeletal:** Includes an overall assessment of range of motion (ROM) of all joints. Additionally, observation of the personnel performing certain standard office exercises or functions is helpful in assessing joint mobility and function.

BLOOD ANALYSIS

The following are components of the blood analysis. At a minimum, laboratory services must provide these components in their automated chemistry panel (SMAC 20) and complete blood count (CBC) protocols:

- White Blood Cell Count, Differential, Red Blood Cell Count (Hematocrit) and Platelet Count
- Liver Function Tests, which includes SGOT/AST, SGPT/ALT, LDH, Alkaline Phosphatase and Bilirubin

- C-Reactive Protein and Triglycerides
- Cholesterol, which includes Total Cholesterol, Low Density Lipoprotein (LDL-C) level, High Density Lipoprotein (HDL-C) level and Total Cholesterol/HDL Ratio
- Glucose, if over 120 then HbA1c
- Blood Urea Nitrogen, Creatinine, Sodium, Potassium, Carbon Dioxide, Total Protein, Albumin and Calcium

URINALYSIS

- **Dip Stick:** Includes pH, Glucose, Ketones, Protein, Blood and Bilirubin
- **Microscopic:** Includes WBC, RBC, WBC Casts, RBC Casts and Crystals

VISION TESTS

Assessment of vision must include evaluation of distance, near, peripheral and color vision. Evaluate for common visual disorders.

PULMONARY (SPIOGRAM)

- Every year for smokers
- Every three years for nonsmoker

CHEST X-RAY

- Every five years

STRESS EKG* WITH VO₂ VALUE CALCULATED

- Members 30-years-old and under will be tested on treadmill every third year.
- Those 30 to 39-years-old will be tested on treadmill every other year.
- Those 40 and older will be tested yearly.

**Abnormal Cardiac Follow-up — Electron Beam Tomography (EBT)*

ONCOLOGY SCREENING ELEMENTS

- Prostate Specific Antigen (PSA), fecal occult blood testing and skin exam
- Additional screenings based on need or at the request of the patient may also be provided during the base-line exam.

CANCER SCREENING

- Digital rectal exam
- Testicular exam
- Clinical breast examination
- Pap smear

IMMUNIZATIONS AND INFECTIOUS DISEASE SCREENING

- Tuberculosis Screen (Annual PPD)
- Hepatitis C Virus Screen
- Hepatitis B Virus Vaccine
- Tetanus/Diphtheria Vaccine (Booster)
- Measles, Mumps, Rubella Vaccine (MMR)
- Measles Vaccine, Mumps Vaccine
- Rubella Vaccine, Polio Vaccine, Hepatitis A Vaccine
- Varicella Vaccine, Influenza Vaccine
- HIV Screening (required to be offered)

HEAVY METAL AND SPECIAL EXPOSURE SCREENING (AS NEEDED)

Arsenic (urine), Mercury (urine), Lead (urine), Lead (blood), Aluminum, Antimony, Bismuth, Cadmium, Chromium, Copper, Nickel, Zinc - Organophosphates (RBC cholinesterase), Polychlorinated Biphenyls (blood)

(i) A work history and medical history with special attention to skin, respiratory and gastrointestinal systems, and those nonspecific symptoms, such as headache, nausea, vomiting, dizziness, weakness or other central nervous system dysfunctions that may be associated with acute or chronic exposure to AN.

(ii) A physical examination giving particular attention to central nervous system, gastrointestinal system, respiratory system, skin and thyroid.

(iii) A 14" x 17" posteroanterior chest x-ray.

(iv) Further tests of the intestinal tract, including fecal occult blood screening and proctosigmoidoscopy, for all workers 40 years of age or older, and for any other affected employees for whom, in the opinion of the physician, such testing is appropriate.

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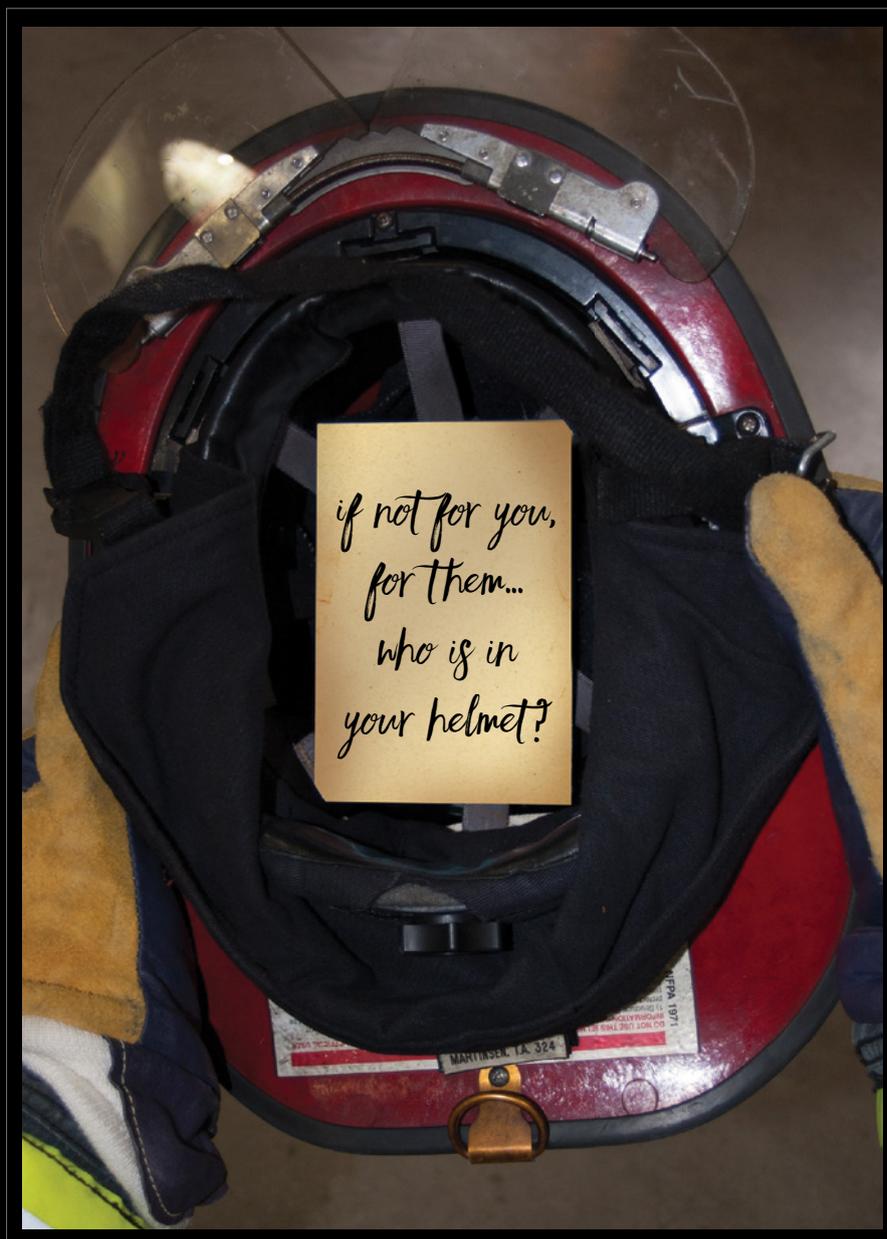
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