The "Clean Cab Concept" Becomes a Reality

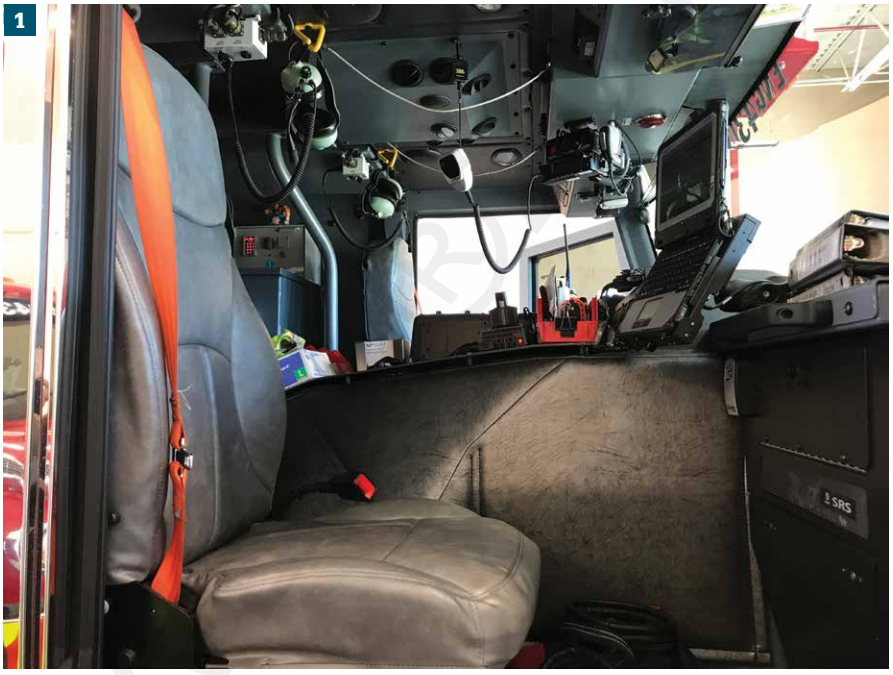
BY CHRISTOPHER BATOR AND SAMUEL A. EATON

AS YOU WALK TOWARD THE OPEN bays of your firehouse, something grabs your attention. It's pronounced, it's obvious. Jealousy immediately follows as you realize you missed another one. You *know* yesterday's shift had a fire just by that smell coming out of the bay and emanating off the fire apparatus. You go to the kitchen and grab a cup of coffee and you can't wait to hear "their version" of the fire they were on. All the while, you've missed something very important.

Today's modern fuels—and, yes, those in a typical house fire—are anything but "typical." They are inescapably and scientifically proven to be loaded with known carcinogens. We cannot completely avoid exposure to toxic fire gases and particulates while on the fireground. It's a danger of the job that is impossible to eliminate. However, we must begin reducing our exposure on the fireground and do everything possible to minimize the chances of these chemicals finding their way inside the apparatus cab and back to the firehouse.

Safety and Health Initiative

The "clean cab concept" is a safety and health initiative from the Coral Springs-Parkland (FL) Fire Department (CSPFD) and is another new approach to maintaining a healthy and safe environment for firefighters. It centers on specifically designing the cab of new apparatus to be free from firefighting equipment that is easily contaminated on the fireground such as self-contained breathing apparatus (SCBA), tools, hand lights, and so forth. The design provides a nonporous interior so that the cab can be easily cleaned after a fire to reduce any secondary cross-contamination. The goal is to reduce firefighter exposure to contaminated gear and off-gassing equipment and to address numerous other safety concerns (photo 1).



(1) Photos 1 and 2 by Christopher Bator.

Firefighter Cancer Epidemic

The firefighter cancer epidemic is getting national attention, and rightfully so. We now know that firefighters are more likely to get cancer simply because of the nature of their occupation. Individual leaders and organizations like the Firefighter Cancer Support Network (FCSN) have been saying this for years. In addition, many credible research studies have proven that firefighters are far more likely to get cancer than the general population.

A 2010 study by the National Institute for Occupational Safety and Health looked at a combined population of 30,000 career firefighters from Chicago, Philadelphia, and San Francisco and confirmed that firefighters have higher diagnosis rates in many types of cancer and higher cancer-related death rates than the general U.S. population. Those findings were generally consistent with the results of several previous research studies. The results strengthen the scientific evidence for a relationship between firefighting and cancer. So strong is the evidence that the International Association of Fire Fighters (IAFF) and the National Fire Protection Association (NFPA) have taken a recent proactive stance on the issue. The recent NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, instructs the authority having jurisdiction in training its firefighters on cancer prevention techniques specific to reduction/elimination of fireground cross-contamination, specifically calling some of the contaminants carcinogenic.

Firefighter Cancer Initiative

In 2015, the Sylvester Comprehensive Cancer Center at the University of Miami launched Florida's Firefighter Cancer Initiative (FCI) to research the relationship between firefighters and cancer exposure risk. This multilayered research project, now in its fourth year of funding by the state of Florida, has identified firefighters' exposure to carcinogens; their

risks for developing cancer; and methods of education for awareness, culture change, early detection, and prevention. Although the research is a long-term longitudinal study, the process has already identified numerous carcinogenic exposure issues such as personal protective equipment (PPE) contaminants off-gassing, secondary cross contamination, vehicle exhaust exposures, and exposure to volatile organic compounds and polycyclic aromatic hydrocarbons at fire incidents. Most importantly, these proven exposure risks have now resulted in the development of statewide culture and prevention awareness training for the fire service. For more on this evolving study, see www.sylvester.org/firefighters.

Science is one thing, but the evidence and knowledge of lives being affected are profoundly obvious and impactful. Although some firefighters may not know about the national and international research studies that have been conducted, they do know that active-duty firefighters and retirees are contracting and dying from cancer at an alarming rate. You would be hard-pressed to find a fire department in this nation that has not sustained a loss in their ranks; in many departments, the losses have been significant. Moreover, for every firefighter life lost, there are hundreds of firefighters fighting cancer. Although some of them are older or retired, too many are younger and the types of cancer with which they are afflicted occur at a younger age than in the general population and are many times more aggressive.

The IAFF considers all cancer deaths of fire service members as line-of-duty deaths (LODDs) and has reported that 62 percent—and, more recently, in the 70th percentile—of firefighters' LODDs annually are cancer-related. Although this statistic is staggering, it may not represent the full picture, as many have died from cancer while in retirement and these deaths have not been reported as firefighter deaths; therefore these statistics may be even higher.

Reducing Exposure

Armed with this new knowledge and increased firefighter cancer awareness, fire service leaders in Florida and beyond are developing ways to reduce their firefighters' exposure to carcinogens. These prevention methods include the following:

- Developing firefighter training curriculum on firefighter cancer exposure and prevention techniques.
- Developing procedures for hood and glove exchange on the fire scene.
- Designing postfire on-scene gross decontamination procedures for personnel and equipment.
- Providing wipes for cleaning exposed skin.
- Purchasing two sets of PPE or providing a consistent option to swap into clean gear.
- Designing new stations with cancer prevention upgrades such as PPE isolation areas and exhaust capturing.
- Providing extractors and dryers for the PPE cleaning.
- Incorporating the use of independent service providers to provide advanced and regular cleaning of PPE immediately following a fire.

Clean Cab Concept

In the typical fire apparatus design, contaminated firefighter protective gear and equipment are loaded or bracketed into the apparatus cab as firefighters leave a fire incident and return to the fire station. The smell of a "fire" and associated carcinogen particles lingers in the cab and is noticeable even days later. The science has proven that carcinogens attach to the PPE and equipment and continue to off-gas while firefighters are in the apparatus. What is desperately needed is a culture change to break this dangerous and repeated exposure.

When the CSPFD designed apparatus with a clean cab concept, the main firefighting equipment such as SCBAs was removed from the cab and strategically located in exterior compartments (photo 2). Research indicates that these volatile organic compounds imbedded in firefighters' gear and equipment continue to off-gas for hours after the fire. Removing this equipment from the apparatus cab virtually eliminates exposure to carcinogenic gases and creates a safe environment for personnel who will use the apparatus for decades during their career. In addition, all firefighters on fire incidents complete postfire gross decon of their PPE and equipment. To further minimize exposure, their gear is also put in plastic bags after decon and stored in an outside compartment.

Other Changes

One specific equipment change is to provide flashlights that are color coded based on function: Those for immediately dangerous to life or health operations that may be contaminated are kept mounted in an outside compartment, and those that are used for emergency medical services

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or other types of nonfire incidents are kept in the clean cab. Additional specifically designed interior elements of the clean cab concept include lighter color interiors to easily identify dirt or particulates from fires, vinyl seating, smooth flooring surfaces, and elevated electronics off the floor for easy cleaning. There is also an option for a 30-day reminder in the instrumentation to decon the truck monthly. On the exterior, compartment space is designed for SCBA and fire equipment. In the CSPFD's system, a booster line is incorporated and used for postfire on-scene decon. A vertical exhaust design minimizes diesel emission exposure to firefighters while on an incident or in routine use.

When designing this model, four important objectives were considered:

- *Reduce firefighter carcinogenic exposure.*
- *Reduce firefighter injuries.* Removing the SCBA and other tools has already reduced common firefighter back, knee, and ankle injuries incurred while getting into and out of the cab wearing heavy, bulky SCBA and equipment.
- *Provide for better size-up.* Timed responses to an incident have proven that the response time and turnout time remain the same; in some cases, they are even better regardless of the SCBA location. However, with the SCBA on the exterior, the officer has a few additional seconds to evaluate the scene and obtain a more comprehensive size-up to determine the appropriate strategy and tactics without reducing response time. It also creates a rally point for all firefighters to meet prior to the operational task.
- *Increase safety during response.* By removing the SCBA from the apparatus cab, firefighters remain belted in their seats for the entire response, eliminating the tendency to remove their seat belts while the apparatus is in motion to put on their SCBA. In a vehicular accident, the clean cab concept also minimizes the potential for items coming loose and becoming projectiles within the cab. The cab interior is now made significantly safer by simply moving the equipment to outside compartments.

The above benefits are so overwhelming that CSPFD Chief Frank Babinec has made a financial commitment to retrofit all existing and spare apparatus to clean cab design by the end of 2018. The clean cab concept is gaining momentum, with several manufacturers providing this option and now other departments purchasing or showing interest. There is little doubt that not only will this model be considered a regular option but it potentially could become the standard for fire apparatus design.

Design Gets Validation

In the summer of 2017, at the CSPFD headquarters, the department's fire chief met with an apparatus manufacturer's chief operating officer, the FCSN's vice president of education, a research member from the Sylvester Comprehensive Cancer Center FCI team, and the Florida Firefighters Safety and Health Collaborative's Firefighters Attacking the Cancer Epidemic team.

In 2015, the CSPFD had helped to launch the Florida Firefighters Safety and Health Collaborative and reached out to fire departments, state institutions, safety and health advocates, and research institutions across the state to work together on firefighter safety and health. (See www.floridafirefightersafety.org for more information.)

They discussed the firefighter cancer problem and why the CSPFD has taken a proactive stance in designing an apparatus that would address and provide solutions to the repetitive toxic exposures to firefighters. The CSPFD leadership presented the clean cab concept in January 2018 at the manufacturer's annual sales meeting with more than 800 in attendance. It is refreshing and exciting to see leading apparatus companies understand the firefighter cancer problem and assist in engineering solutions to improve firefighter safety and health.

The "Why"

The clean cab concept's primary goal is to improve firefighter safety and health. Several young firefighters with the CSPFD have been diagnosed with cancer within the past few years; one, Driver/Engineer Paul Pietrafesa, 46, received a terminal diagnosis (photo 3). The fire department's leadership and health and safety officers had already begun to ask questions and look for answers on the cancer/career connection.

(3) Photo courtesy of the Florida Firefighters Safety and Health Collaborative.

Under the CSPFD-Sylvester Cancer Center partnership, a statewide firefighter cancer study to better understand the magnitude of the issue was already in year two. With that knowledge, the department began designing and budgeting for a variety of firefighter cancer prevention changes to reduce exposure risk to their firefighters.

Within the Florida Firefighters Collaborative, other departments across the state started to implement firefighter cancer prevention initiatives. The CSPFD has shared in the lead and embraced these prevention initiatives including on-scene clean hood and glove swap procedures, providing two sets of PPE for all firefighters to ensure stations are equipped or designed with extractors/washers and dryers to clean contaminated gear.

Together with statewide initiatives, the CSPFD has led a push along with 15 other collaborative departments to implement a postfire on-scene gross decon policy. This initiative was complete with specific decon equipment kits on all apparatus that are used to reduce the contamination of firefighters and equipment at the scene and to further eliminate cross-contamination to the apparatus and the fire station. Education and awareness training were important factors in this culture change.

All employees have completed several classes on firefighter cancer awareness and prevention including a course specifically on postfire on-scene gross decon. Additionally, the department helped pilot a portion of the statewide cancer study and was selected as one of four departments involved in the Firefighter Cancer Initative's "Culture Change" research study by Sylvester Cancer Center, led by Dr. Tyler Harrison.

During his battle with cancer, Pietrafesa ("Pauly Strong," as he was known for his strong handshakes) was part of the apparatus committee and the development process for the first clean cab apparatus. He even traveled to the manufacturing facility in 2015 to see the first clean cab vehicle being built. In early 2016, the first clean cab apparatus, a 100-foot platform arrived and was named the "Pauly Strong" Truck. Pietrafesa, fortunately, had the opportunity to drive *his* apparatus and witness one of the first substantial commitments of change to reduce the exposure of firefighters to carcinogens (photo 4).

(4) Photo by David Eickwort

Research, collaboration, and department leadership, combined with firefighters who desired to make change, were needed to design and implement positive prevention steps such as the clean cab concept. In November 2016, Pietrafesa succumbed to his battle with cancer. Nothing has as much impact on an organization as losing one of your own, and he will always be part of the driving force that created this change.

The next time you arrive at the firehouse and load your PPE onto your apparatus at the start of your shift, if you smell the obvious odor of "yesterday's fire," we hope that you'll have a different perspective or impression—one that will compel you to protect yourself and effect change.

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SAMUEL A. EATON is a 27-year veteran of the fire service and an operations battalion chief for the Palm Beach County (FL) Fire Rescue (PBCFR). He helped found the PBCFR and Florida Firefighter Safety and Health (FFSHC) Collaborative State F.A.C.E. (Firefighters Attacking the Cancer Epidemic) teams, which offer the fire service cancer prevention and best practice recommendations. Both teams are partnered with Sylvester Comprehensive Cancer Center at the University of Miami and have been very active statewide over the past four years. The State FACE Team functions under the FFSHC Collaborative and meets monthly on state and firefighter cancer prevention.