



SOG#0000

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SCOPE:

This standard operating guideline shall apply to all Emergency Operations personnel.

PURPOSE:

The purpose of this SOG is to establish a safe and effective practice for removing toxic substances and particulate from personnel, equipment and the fire protective ensemble after exposure to products of combustion. These procedures will aid in reducing possible carcinogenic exposures and subsequently have potentially both short and long term positive health impacts.

AUTHORITY:

Fire Chief or Administrator, any Fire Rescue Department
NFPA 1851, 1971, 1972, 1973, and 1974
OSHA 29 CFR 1910.156(e)

PROCEDURE:

All members of _____ Fire Rescue Department shall protect themselves and their co-workers' health and safety by adhering to the following procedures.

CONTAMINATION:

1. Contamination is the exposure to chemicals (to include carcinogens), radioactive or biological material on personnel or physical material (equipment, structures, vehicles, etc...).
2. Contamination occurs when a foreign substance gets on, or in, clothing, equipment or the body (via absorption, ingestion, inhalation, etc...). Contamination implies these substances should be avoided because of their potential negative health effects.
3. When personnel are exposed to environments that can potentially contaminate their clothing, equipment or selves' (skin, lungs, etc...) the presumption should be that they have been contaminated. Some examples of hazardous environments or considerations are:

- Interior operations in environments where any amount of smoke is present. This includes potentially ANY duration of time. The smell of products of combustion indicates a potential exposure.
- Personnel should be cognizant that an exposure to products of combustion does not require visible smoke; inhalation and absorption of low doses, in the part per million (ppm) range or microscopic amounts, have a potential carcinogenic effect.
- Command Officers should always strive, when possible, to organize the scene and situate the command post in such a way to eliminate exposure.
- Exposures can, and are likely to, occur during exterior operations when in proximity to products of combustion such as:
 1. Vehicle fires
 2. Brush fires (trash, tires, fertilizers, pesticides, insecticides and unknowns)
 3. Trash/Dumpster fires
 4. Driver/Engineer performing pumping operations
 5. Incident Commanders (where there is exposure to the command post)
 6. Safety Officers
 7. Un-deployed Rapid Intervention Crews
 8. Crews assigned to an exterior exposure line
 9. Unintended exposure of any personnel due to significant wind shift, scene dynamics or complications

I. **Gross Decontamination Post Fire On Scene**

A. Overview:

The definition of Decontamination is

* "the removal of hazardous substances (bacteria, chemicals, radioactive materials) from employees' bodies, clothing, equipment, tools, and/or sites to the extent necessary to prevent the occurrences of adverse health and/or environmental effects."

* "to make safe by eliminating or reducing poisonous or otherwise harmful substances, such as noxious chemicals or radioactive materials."

Decontamination (Decon) may be necessary for exposed or contaminated civilians and/or emergency responders. There are two types of Decon:

1. Emergency/Gross Decon
2. Technical/Secondary Decon

The Decon process described in this SOG strictly refers to an immediate Gross Decon following exposure to products of combustion. This procedure shall be systematic and orderly.

The Gross Decon process shall be utilized for all fires where Personnel Protective Ensembles (PPE) are worn and exposed to products of combustion. This shall

include, but not be limited to, brush fires, vehicle fires, training fires and/or any other emergency or non-emergency incidents where the combustion process occurs.

The marking of formal isolation or control zones (as shown below) may not occur at every fire incident. All personnel should be aware that isolation or control zones still exist. Research has shown modern day fires produce harmful toxins (which may include Polycyclic Aromatic Hydrocarbons (PAH), Volatile Organic Compounds (VOC), Carbon Monoxide (CO), Hydrogen Cyanide (HCN), and numerous other gases, chemicals and toxins. It is important to remember that many of these toxins are colorless and/or odorless gasses and will not be visible. To limit the amount of exposure and the subsequent required Decon, consider apparatus placement and approach during any fire attack. Personnel can greatly reduce the amount of exposure by performing a fire attack from the upwind position, when possible, and utilizing the reach of the hose stream.

The following zones shall be defined on all fire type incidents:

- **Hot Zone**
 - Any area with high risk.
 - Any area within the immediate perimeter of any fire or products of combustion (which include smoke and soot).
- **Warm Zone**
 - The area between the hot and cold zone.
 - The area not in the immediate vicinity of any fire or products of combustion.
 - Gross Decon and cleaning of the body shall be located in the warm zone.
- **Cold Zone**
 - Any area without risk.
 - Any area outside of the hot and warm zone, ideally uphill and upwind.
 - Rehabilitation (Rehab) shall be located in the cold zone.

B. Preparation:

Personnel shall be ready at all times to implement these protective procedures. Personnel may find it beneficial to assemble and maintain a personal "Go-Bag" with a clean uniform that can be accessed after any incident where they've been exposed to harmful substances. Recommended items could include: the department approved uniform or jumpsuit, socks, clean footwear, hat, towel, sun protection, etc.

The Driver Operator shall ensure that the apparatus tank water or any water used in the Decon process is from a clean municipal (hydrant) water source and is not from a stagnant or potentially contaminated water source.

C. Gross Decon Setup:

Generally, Gross Decon should be set up by the first arriving suppression apparatus closest to the incident where products of combustion exist. It shall be the Driver Operator's responsibility to establish and oversee the Gross Decon area and process. Where resources are sufficient, it is beneficial to assign an additional crew to oversee the Decon Process. The Gross Decon area shall be designated by deploying an approved Decon Hose Line and marking the nozzle location with a green (or if available an alternative colored) traffic cone.

OPTION (Preferred) - Decon Line Set Up:

The Decon Hose Line(s) shall include an in-line pressure regulator with a garden style hose and nozzle. This set up can be facilitated using a 2 1/2 to 3/4 (GHT) reducer. This garden hose setup is preferred as it will provide a flushing with sufficient flow but lower water pressure which better eliminates the possibility of embedding particulate / toxins further into fabric. It is also easier to control water flow and direction while performing the Gross Decon process. To facilitate Gross Decon of multiple personnel, additional Decon Hose Lines from other nearby suppression apparatus can be used.

OPTION - Decon Line Set Up:

The Decon Hose Line(s) can be a jump line, 1 3/4, or booster line (hose reel). The Driver Operator will ensure that the pressure on this line is as low as possible. Hydrant pressure is usually sufficient. With this setup, it is important to be mindful of water flow direction as random or haphazard direction can potentially saturate interface areas and lead to the interior of the gear getting overly wet. To facilitate Gross Decon of multiple personnel, additional Decon Hose Lines from other nearby suppression apparatus can be used.

D. Gross Decon Process:

All fire personnel that were exposed to products of combustion shall perform Gross Decon prior to entering Rehab or leaving the incident scene. After exiting the Hot Zone, it is recommended that crews remain on air, when possible, and report directly to the designated Decon Hose Line(s).

NOTE: Those members with the lowest air supply should be decontaminated first and as a rule, personnel are to remain on-air until Gross Decon is complete, again when possible. Maintaining crew integrity, they shall assist each other in rinsing off debris and products of combustion in a systematic and thorough manner from the collar-line down; being mindful of higher potential collection points such as

the armpit and groin areas. Personnel shall be careful to not saturate the inner lining of the PPE. The goal is to keep the PPE operationally dry on the interior, but rinsed as clean as possible on the exterior. Soft bristle scrub brushes and department-approved soap/cleaner may be used to facilitate the cleaning process. Follow NFPA 1851 and the manufacturers' recommendations when cleaning PPE.

After rinsing the exterior portion of the PPE, personnel may go off-air and begin to doff their PPE. Depending on the extent and length of the fire, all PPE, other than bunker pants and fire boots, shall be left in a prepared Drop Zone. If a formal rehab area is not established due to a quicker knock down and/or demobilization, a Drop Zone would not necessarily be needed.

The Drop Zone shall be located in the warm zone. The Drop Zone shall be remote and downwind of Rehab due to off-gassing PPE. Placement of tarps or salvage covers is suggested to designate this area. Next, personnel shall move away from the exposed gear and towards the Cold Zone zone and use department-approved wipes for a gross cleaning of their head, neck, face, hands and any other exposed areas as deemed necessary. The use of running water (a hose bib for instance) with department-approved soap/cleaner if available, for those same body areas is an optional method for on-scene gross cleaning. This should not be considered a substitute for a through "Shower within the Hour".

Personnel must resist the urge to consume food or hydrate until the Gross Decon process is completed and they have entered a clean Rehab area (The Cold Zone).

E. Reporting to Rehab:

Personnel that report to Rehab shall first go through the Gross Decon process. Once in Rehab, personnel shall lower their bunker pants to allow for rapid cooling and increase the distance between off gassing contaminated gear and their groin and respiratory system.

F. Reporting for Re-Assignment:

When crews are called from Rehab back into operations, they shall report ready for assignment as requested. If any new assignment involves further exposure to products of combustion (i.e. Overhaul, Secondary Search, retrieving hose lines, etc.), the crew shall then go back through the Gross Decon process as stated above.

G. Release from the Scene:

To keep the cab of the apparatus as clean as possible and to avoid transferring toxins and harmful products back to the fire station, it is extremely important to perform Gross Decon prior to leaving the incident scene.

Once released by command and prior to leaving the scene, it is recommended that all PPE be bagged at the scene using department-approved bags that are at least 6mil thick. The bag opening will be twisted and taped (or otherwise)closed, then “goose-necked“ (folded over on itself, and twisted and taped (or otherwise closed)a second time). This procedure will greatly minimize any off-gassing in the apparatus cab.

Helmets: Decontamination of the helmet will follow the same objective as all PPE for Gross Decon, when cleaning the helmet; it’s acceptable to carefully wash the exterior to remove any heavy particulate. However, when cleaning the interior do not saturate any fabric, including the liners with water. Any interior cloth pieces should be wiped down with department-approved wipes.

All other equipment (SCBA packs and cylinders, tools, radio straps, etc.) will be thoroughly cleaned using water and any available department-approved cleaner (unless specified below). Soft bristle scrub brushes should be used. Radios shall be cleaned using appropriate techniques, refer to equipment’s manufacturers guidelines. Once the gear is cleaned, it may then be loaded into the apparatus cab. Ideally, no potentially contaminated equipment will be stored in the apparatus cab.

OPTION (Preferred) - Clean Cab Concept:

No equipment that has its designated use for interior firefighting shall be housed, bracketed or otherwise kept in the interior passenger compartment of any response vehicle. The cab shall be considered a safe, clean place for our fire rescue personnel and free of contamination. By establishing a Clean Cab Concept for apparatuses, it reduces any potential secondary and tertiary exposures and establishes a high standard for all to follow.

H. Personal Protective Equipment Exchange at the scene: Hood Swap

Personnel determined by the Incident Commander and/or Incident Safety Officer to have been exposed to products of combustion due to IDLH source proximity (see above examples of "CONTAMINATION" pg 1)shall have their hood exchanged prior to leaving the scene (according to the established Hood Swap Policy). These exposed PPE components shall be properly cleaned by an ISP or by Extractor /Washer before being placed back into circulation.

OPTION – Personal Protective Equipment Exchange at scene: Hood and Glove Swap

Personnel determined by the Incident Commander and/or Incident Safety Officer to have been exposed to products of combustiondue to IDLH source proximity (see above examples of "CONTAMINATION" pg 1) shall have their hood and fire gloves exchanged prior to leaving the scene (according to the established Hood and Glove Swap Policy). These exposed PPE components shall be properly

cleaned by an ISP or by Extractor /Washer before being placed back into circulation.

OPTION - Personal Protective Equipment Exchange at scene:
(The Department has issued a 2nd hood)

Personnel determined by the Incident Commander and/or Incident Safety Officer to have been exposed to products of combustion due to IDLH source proximity (see above examples of "CONTAMINATION" pg 1) shall be instructed to send their exposed hood in for cleaning, clean by extractor washer, if available, or otherwise take the exposed hood out of service until it is cleaned and dry. Each firefighter has been issued a second hood and such hood is to be kept clean and available to swap into. As a recommendation, the second hood, and a second pair of clean gloves, could be ready and on the scene with the utilization of a Go Bag as in section "B" above.

NOTE: A second hood and/or set of gloves are not to be stored in the firefighter's structural firefighting gear, as this will expose it to products of combustion just the same.

OPTION ** - On Scene Full (PPE) Personal Protective Protection Exchange

Personnel determined by the Incident Commander and/or Incident Safety Officer to have been exposed to products of combustion due to proximity to or interior assignment shall have their full PPE (coat, pants, hood and gloves at a minimum) exchanged prior to leaving the scene (according to the established Logistics PPE Exchange Policy **). Personnel will leave the scene in properly sized clean gear and the dirty gear will be transported off the scene. These exposed PPE components shall be properly cleaned by an ISP or by Extractor /Washer before being placed back into circulation. Equipment left with the Firefighter (helmet / boots) shall be fully cleaned at the scene and / or bagged for transport back to the station for additional cleaning.

** The FFSHC State FACE Team will be drafting this recommended PPE Exchange Policy.

II. **Post Fire Decon at the Fire Station**

A. Overview:

It is highly recommended that all personnel exposed to the products of combustion, or any potentially harmful chemical (or biological) toxins, complete a full Personal Decon as soon as possible after the exposure.

"Shower within the Hour" shall be a priority. Personnel that are deemed exposed by the Incident Commander shall be placed out-of-service until their Personal Decon is complete. The Incident Commander should certainly consider exposed personnel as those that performed interior Fire Attack, Primary Search, Overhaul,

Roof or Ventilation Operations etc... with any smoke conditions. Further consideration for placing personnel out-of-service should be given to others on the scene. The Incident Commander should also evaluate other personnel working outside the IDLH environment as they may have been exposed due to wind shift, close proximity, etc. Showering shall be accomplished with the department-approved soap, if available, with the goal to reduce the absorption rate of toxins into the body. It is extremely important to use, when available, the department-approved wipes & soap for Personal Decon post fire. These products are not for standard use.

These steps including, but not limited to the following, shall be taken immediately upon arrival at the fire station:

- Perform a more thorough decontamination of equipment (radio, tools, fire hose, etc...) following NFPA 1851 and manufacturers' recommendations.
- Perform a more thorough decontamination of PPE (helmet, bunker gear, SCBA, etc...) following NFPA 1851 and manufacturers' recommendations.
- Perform a thorough decontamination of the apparatus cab.
- Return apparatus to a state of readiness.
- Take a "shower within the hour" of being exposed to any products of combustion.
- Change into clean station uniform wear.
- Units that have been approved to go out-of-service shall go available according to policy.

B. Ability to Respond:

Upon return to the station, all gear that was bagged at the scene shall be removed from the bag. The exterior shell shall be further decontaminated if needed, remembering to keep the inner liners dry and ready for response. The PPE should be hung to dry in a manner that allows for the drying but also allows for good turn out times. Racks with hangers and fans can facilitate and speed up this drying process.

The preferred method for cleaning contaminated PPE shall be to send all PPE to a third party cleaner. The next best option shall be to use extractor washers and commercial dryers as outlined in NFPA 1851 and according to manufacturer recommendations.

NOTES: * If this is occurring during the firefighter's shift, these methods require a second set of PPE.

* If there is not an ability to exchange PPE during the shift, the gear should be sent out at the end of the firefighter's shift.

Should the above options not be available, PPE ensembles should be cleaned as outlined in NFPA 1851 Routine Cleaning and according to manufacturer recommendations. The PPE should then be hung on a rack to improve drying times and allow for the continued off-gassing of the interior components. Fans

should be used to facilitate this process. Since a proper routine cleaning also involves cleaning the interior liners of the gear, this gear shall be considered OOS until fully cleaned and dried.

NOTES: * If this occurring during the firefighter's shift, this method requires a second set of PPE.

* If there is not an ability to exchange PPE during the shift, the NFPA 1851 Routine Cleaning of the PPE will occur at the end of the firefighter's shift.

C. Maintaining Readiness:

All personnel shall ensure their assigned unit has a clean apparatus cab. The potential for secondary exposures during routine apparatus use is high and must be limited. To aid in reducing secondary exposures, apparatus cabs shall be cleaned and decontaminated at a minimum on a monthly basis; more often may be necessary due to call load.

III. Post Fire - At the Scene: Fire Investigators

The Fire Investigator's duties, often places them in a "post -fire", chemical laden, hazardous environment. Protection is just as vital and important with this fire service position. They must adhere to respiratory and personal protective clothing requirements to protect against exposure to and possible contaminates at fire scenes. It is strongly recommended that all investigators wear SCBA or respiratory masks to protect their airway. The minimum recommendation is utilization of P100/VOC combination filter half mask. This should also include atmospheric monitoring for CO, HCN, O₂, VOCs and formaldehyde to reduce exposure to these substances. Once the investigation of any fire is completed, the Fire Investigator should undergo the same Gross Decon process noted above, including changing out of coveralls or exterior exposed clothing. They shall also follow Personal Decon procedures and "shower within the hour", at home or (preferably) at a fire station in close proximity to the fire scene. The goal is to prevent any transfer of contaminates from the fire scene to their homes and utilization of the department-approved soap to maximize Personal Decontamination.

NOTES:

1. **FACE Team Best Practices / SOG's**-Our SOG's are based on the patient and comprehensive group effort of the FFSHC FACE Team to develop model recommendations of SOG's Policies and Procedures that any department could use as a resource tool to adopt the concept as well as wording that best represents the needs of their own department. These best practices represent a consensus decision-making process (of our team) and demonstrates the balanced interest of all parties.
2. **FACE Team Review:** It is the intention of our team to review all recommendations at minimum on an annual basis to ensure that we are providing the latest known advancements on best practices in the SOG's / Procedures that we have made recommendations. We recommend that all fire departments hold this same mindset.