



SOG#0000

Effective Date:5/1/2020

SCOPE:

This standard operating guideline is recommended for all fire investigators or those involved in the duties of fire and explosion scene investigations.

PURPOSE:

To establish procedures and provide a basic health and safety framework for fire investigators, fire inspectors, law enforcement officers and crime scene technicians conducting fire and explosion scene investigations.

AUTHORITY:

NFPA 921, NFPA 1033, NFPA 1730, NFPA 1851, NFPA 1974, 129 CFR 1910.134, and the IAAI Fire Investigator Health and Safety Best Practices.

DEFINITIONS:

HOT SCENE A – A fire scene where the fire has been extinguished but overhaul has not commenced or is in progress.

HOT SCENE B – A fire scene that has been fully extinguished for less than two hours.

WARM SCENE – A fire scene that has been fully extinguished for at least 2 hours but less than 72 hours.

COLD SCENE – A fire scene that has been fully extinguished for at least 72 hours and not generating detectable or visible dust, fumes, mists, particulates, gases, vapors or aerosols.

OVERHAUL – This is the process of final extinguishment after the main body of the fire has been knocked down. All traces of fire must be extinguished this time.

TOXIC ATMOSPHERE – An atmosphere that exposes a fire investigator or other persons to the risk of death, incapacitation, injury, or acute illness and may include flammable gas or vapor above 10% of the Lower Explosive Limit (LEL); an atmospheric concentration of any substance above

its Permissible Explosive Limit (PEL) or Threshold Limit Value (TLV); visible smoke or particulates, or as determined by a site safety officer.

LEL – Lower Explosive Limit is the minimum percentage of fuel in the air (by volume) in which combustion can occur.

PEL – Permissible Exposure Limit is the legal limit in the U.S. for maximum concentration of any chemical in the air to which a worker may be exposed continuously for eight hours without any danger to health and safety.

TLV – Threshold Limit Value is an occupational exposure value which it is believed that all workers can be exposed for a lifetime without affecting health.

OXYGEN DEFICIENCY – Air concentration at or less than 19.5% oxygen, or greater than 23.0% oxygen.

APPROVED AIR MONITORING EQUIPMENT – Scott Scout Portable Gas Detector/Photo Ionization Detector (PID), Dräger X-am 2500, Dräger PAC 7000, or a separate monitor.

RESPIRATORY PROTECTION DEVICE (RPD) – A NIOSH approved respirator facepiece which includes a filtering facepiece and air-purifying, tight-fitting, full or half-face respirator. Also, any full-facepiece, helmet, or hood system that utilizes compressed breathing air; such as a self-contained breathing apparatus (SCBA).

FILTER/CARTRIDGE – A NIOSH approved device specific to the full or half-face respirator that will filter out chemicals or particulates from the ambient breathing air. The manufacturer of the facepiece and the filter/cartridge must be the same.

PAPR – Powered Air Purifying Respirator Scott C420 is a NIOSH approved air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

PROCEDURE – A written directive that is a guideline for carrying out activities. A procedure may be made mandatory in tone by using “will” rather than “should” or “must” rather than “may”. Procedures sometimes allow some latitude and discretion in carrying out an activity.

IDLH – Immediately dangerous to life and health is an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

SCBA – A approved NIOSH and department/agency atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

HALF-FACE RESPIRATOR – A NIOSH approved North half-face respirator with a filter cartridge(s) of P100/OV/AG or higher.

FULL-FACE RESPIRATOR – A NIOSH approved North full-face respirator with a filter cartridge(s) of P100/OV/AG or higher.

SAR – Supplied-air respirator or airline respirator is an atmospheric-supplying respirator for which the source of breathing air is not designed to be carried by the user.

PPE – Personal protection equipment listed in NFPA 1971 which includes a turnout coat, turnout pants, helmet with eye shield, firefighting-type gloves and firefighting-type boots.

I. EMPLOYERS

A. Have written policies covering all aspects of fire investigator health and safety including, but not limited to:

1. Conducting a site safety survey before starting every fire scene investigation and at the start of each day, the investigation continues.
 - a) Specifically addressing environmental, biological and chemical/toxic hazards.
2. Personal protective equipment (PPE) ensemble definitions, requirements, and use.
3. Approved respiratory protection that addresses (U.S.) 29 CFR 1910.134.
 - a) See the IAAI Fire Investigator Health and Safety Best Practices Appendix A for additional information regarding respiratory protection.
4. When to utilize respiratory protection equipment.
5. Identifying the support mechanisms necessary to have on-site whenever an SCBA is required (e.g, replacement bottles, cascade system).
6. The transportation of contaminated tools/equipment and PPE.
 - a) Follow the Clean Cab Approach
7. Decontamination procedures.
 - b) See the IAAI Fire Investigator Health and Safety Best Practices Appendix B for additional information regarding decontamination procedures.
8. Cleaning contaminated clothing.
9. Hygiene of personnel post-fire-scene or explosion examination.
10. Regular/annual physical/health checks.
 - a) Provide employees with annual physical
 - b) Provide employees with annual skin screening.

1. If there is or has been a prior positive skin exam, these screenings may need to be done more frequently.

c) Have a program for employee mental health awareness and peer support.

11. Equipment and/or evidence.

a) Containers of collected evidence, and soiled/dirty tools and clothing should all be stored in an area other than the vehicle's passenger compartment or trunk/boot.

b) All evidence should be sealed in department/agency approved containers.

c) Utilize tight-sealing tubs or containers for anything that could be contaminated.

12. Annual training

a) Health and safety hazards to the fire investigator.

b) Decontamination procedures.

II. INDIVIDUAL FIRE INVESTIGATOR

A. Maintain a healthy lifestyle.

B. Be physically fit and able to perform.

C. Immediately clean and bandage any skin area that receives a cut or abrasion before a scene examination.

D. Shower within the hour. Remove all gear and/or equipment exposed to the scene. Shower within the hour of completing a fire or explosion scene (e.g., fire station, office or residence)

E. Maintain a written log of every fire scene or explosion examination that includes; Date, location, nature of the incident, case/event number. The hours spent on the scene as well as the time in an IDLH. Document the presence of any hazardous conditions, or any injury or unprotected exposure possibility.

III. INCIDENT RESPONSE/ARRIVAL

A. It is important to know where you are going, the best route of travel and the weather conditions that may be encountered, it is also important to drive safely so you can arrive at the incident scene in a timely fashion and to do your job in a more relaxed and positive state of mind.

B. Know about and understand the type of incident you are responding to before you respond. Ask any questions necessary to gain a full understanding.

C. If the incident is an active fire scene, check-in with the incident commander first and inquire or make inquiries about any known safety concerns. Include checking for the presence of hazardous materials, including asbestos, and physical hazards and biological hazards.

- D. Verify the status of all utilities before entering any structure. Utilize department/agency lock-out tag-out system and procedures for electrical systems as necessary.
- E. Ensure that you are wearing the proper PPE for the incident before approaching the scene including an appropriately selected respirator that is department/agency approved.

IV. DURING THE INCIDENT

- A. Utilize air quality monitoring during all interior and exterior scene examinations.
 - 1. Understand the monitoring limitations, detection ranges, interferences, maintenance and sustainment requirements.
 - 2. Continuous monitoring for carbon monoxide (CO), hydrogen cyanide (HCN) Hydrogen sulfide (H₂S) and lower explosive limit (LEL).
- B. Utilize powered ventilation fans, preferably electric, to physically move ambient air and propel contaminants downward away from the investigation scene. For gas and vapors, ventilation is your friend. If utilizing a gas-powered fan, continuously monitor the area for CO.
- C. Wear appropriate PPE for the incident you are examining. Every scene is different and includes:
 - 1. Steel-toed leather or rubber boots/shoes with a puncture-resistant sole, understanding the limitations of each type.
 - 2. Disposable Tyvek suit with hood. If not available, wear fire-retardant coveralls or long pants with a long-sleeved shirt and Tyvek sleeves if available. The intent is to reduce the skin absorption of any hazardous chemicals.
 - 3. Protective safety that meets or exceeds ANSI Z89.1-2014 for industrial use along with a chin strap. Also, an approved NFPA 1971 fire helmet.
 - 4. Hearing protection that meets or exceeds ANSI A10.46-2013.
 - 5. Proper respiratory protection equipment for the situation as found.
 - 6. Vented goggles if wearing a half-face respirator.
 - 7. Disposable outer puncture-resistant gloves and nitrile inner gloves.
 - 8. Ensure that all PPE technologies in use can be pre-determined as being compliant to an existing standard development organization published technical standards (i.e., NFPA, UL, OSHA).
- D. Have a process where someone knows where you are and what you are doing.
- E. Conduct fire or explosive scenes with at least two investigators unless the incident determines that only one investigator is necessary. If investigating alone, check-in regularly but no less frequent than every one-half hour.
- F. Take breaks as needed, well away from the fire or explosive scene.
 - 1. If you are going to eat remove all PPE and wash your hands and face with soap and water, cleansing wipes or a waterless cleaner.

2. All nitrile gloves and puncture-resistant gloves are one use and done. In addition to any evidence collection requirements, nitrile gloves are to be replaced each time they are removed.
3. The use of an SCBA in high temperatures or high humidity, and/or extensive excavating may necessitate more frequent and longer breaks and plenty of hydration.

V. AFTER THE INCIDENT

- A. Following proper doffing/de-robing procedures immediately remove all PPE. Refer to IAAI Fire Investigator Health and Safety Best Practices Appendix B for additional information regarding decontamination procedures.
 1. Place all disposable items in a minimum 6 mil thick plastic bag, seal it with duct tape or similar and dispose of it properly. Do not leave this bag on the scene unless you know that it will be disposed of by a remediation company.
 2. Place all to be cleaned clothing items in a separate 6 mil thick plastic bag and seal it with duct tape or similar. When this bag is re-opened, you should wear nitrile gloves, goggles, and proper respiratory protection. This bag should be opened in a well-ventilated area or outdoors to allow any volatile substances to dissipate before handling these items. Close and reseal the empty bag to prevent any further exposure or contamination. The clothing should be decontaminated and washed as soon as possible.
- B. Using soap and water or cleaning wipes clean all skin areas that may have been exposed to soot contamination.
- C. Clean tools and respirator assembly immediately after use with a department/agency approved cleaning agent and water before returning them to your vehicle. If this is not possible, store them out of the passenger compartment and trunk/boot.
- D. Do not transport dirty tools and/or contaminated clothing, PPE, or evidence containers containing samples in the passenger compartment of your vehicle.
- E. Remove all outer clothing using the proper decontamination methodology. Refer to IAAI Fire Investigator Health and Safety Best Practices Appendix B for additional information regarding decontamination procedures.
- F. Do not enter, or allow to enter, your vehicle's passenger compartment unless ALL potentially contaminated clothing has been removed and all exposed skin areas have been cleaned.
- G. Disposable coveralls are preferred; however, if not available, do not wash contaminated clothing in your washing machine.
 - Utilize an extractor-type washing machine, commonly found at fire stations or use a commercial laundry/dry cleaner and advise them that the items are contaminated.
 - Avoid using local laundromat machines.

- If a home washing machine must be used, wash fire-contaminated clothing by themselves. When finished run an empty complete wash cycle with soap.

VI. RESPIRATORY PROTECTION

A. It should be the policy of the department/agency supporting fire scene investigations to ensure fire investigators work in a safe environment, by using any combination of:

- Engineering controls (mechanical and/or natural ventilation)
- Scene evaluation
- Air monitoring
- Respiratory Protection Device (RPD)
- Other Personal Protective Equipment (PPE)

B. Medical clearance for respirator use, including fit testing and training, must be current before any use of a respiratory device.

C. Whenever specific health or environmental hazard has been identified, specific procedures for that material should be followed. A greater level of respiratory protection shall be utilized based upon:

- Scene level (Hot A, Hot B, Warm, or Cold)
- Type of fire
- Atmospheric monitoring results
- Amount of debris disturbance during the investigation

D. Physically disturbing a fire scene through overhaul or investigative activities may cause an increase in or a reoccurrence of combustion or ignition. A change in atmospheric conditions (e.g., wind, heat, etc.) may also cause deterioration of air quality that requires a return to a higher scene hazard status. This will require a higher level of respiratory protection.

E. An SCBA will be worn when operating in or around any respiratory hazard; such as, visible smoke, vapors, or unidentified odors. The SCBA will not be removed until the scene has been identified as a Cold Scene, the time at which the scene has been ventilated sufficiently to remove all products of combustion, as verified by approved air monitoring equipment, or when there is no toxic atmosphere present.

VII. FIRE SCENE INVESTIGATOR PRECAUTIONS & PPE PROTECTION

A. All fire and explosion scenes have the potential for being unsafe in many ways and the proper use of PPE and safety procedures can mitigate these risks. However, many fire investigators do not fully understand the health risks associated with fire investigations. To help fire investigators understand the precautions that should be taken at the various types of fire

scenes, a hazardous materials-style, time-based scene classification system is offered to denote the various stages of fire scenes, from an investigative perspective, to help fire investigators recognize the PPE safety measures needed.

- B. It is understood and acknowledged that every fire scene is somewhat different, and it is difficult to make across-the-board recommendations or requirements. However, the health risks associated with fires are broad-based and apply to almost every fire situation. Likely one of the most misunderstood concepts has to do with particulates. Some investigators believe that if they don't see any particulates in the air then things are OK. However, very small particulates (< 5 micrometers in size) are invisible to the naked eye, and these particles can penetrate deep into the lungs where clearance mechanisms are less effective and where inflammation and systemic absorption can occur. Repeated exposure to these small particles could lead to chronic health conditions down the road.

A. HOT SCENE A

1. In this situation, fire investigators sometimes need to enter the structure of the scene after consultation with the incident commander to identify those areas that can be overhauled and those areas, usually, the room of origin where overhaul should be limited or not done at all.
2. While it is strongly recommended that fire investigators not enter fire scenes during this period, the fire investigator is typically entering to make a quick initial determination and possibly take photos while wearing the following PPE:
 - Turnout gear, including bunker pants and coat, structural firefighting helmet and boots, and structural firefighting gloves.
 - Proper respiratory protection equipment offering the below NIOSH (or similar in other countries) awarded protection.
 - o SCBA as a primary technology with the ability to downgrade to an APR, PAPR, full or half-mask after site characterization and determination of an accurate maximum hazard ratio, and with a tight-fitting full face mask with a minimum of P100/OV/FM/CL (multi-gas/vapor) canisters or serviceable CBRN Cap 1 canisters.
 - Work duty coveralls or similar underneath turnout gear to aid in self-decontamination.

Note 1: In virtually every instance of this type, the fire investigator is working for a public fire agency. Private fire investigators are typically not at a fire scene during this period.

Note 2: Fire investigators should only enter scenes that have not yet been fully extinguished under the most extenuating circumstances, and then only when wearing full structural firefighter PPE and SCBA.

B. HOT SCENE B

1. Regardless of the amount of ventilation, these scenes can be potentially dangerous for fire investigators because of the potential for high levels of gases and particulates (e.g., smoldering items). It is strongly recommended the fire investigators not enter the fire scene to undertake any investigations during this period. If there is a need to enter, the fire investigator should limit their actions and time in the scene while following a vetted respirator selection logic (i.e., (U.S.) Respirator Selection Logic 2004 <https://www.cdc.gov/niosh/docs/2005-100/pdfs/2005-100.pdf>) and wearing the below PPE.

- Turnout gear, including structural firefighting bunker pants and coat.
- Structural firefighting helmet with a chin strap and boots with steel toe and puncture-resistant sole.
- Structural firefighting gloves or disposable outer puncture-resistant gloves and nitrile inner gloves.
- Coveralls (preferably disposable with hood) that completely cover the arms and legs. Coveralls should not be worn if there is a chance for re-ignition.
- Respiratory protection should include an SCBA (see U.S. OSHA <https://osha.gov/Publications/3352-APF-respirators.pdf>)
- Other respiratory protection equipment as identified in the IAAI Fire Investigator Health and Safety Best Practices Appendix A Respiratory Protection Guidelines.

C. WARM SCENE

1. This is the typical time when many public investigator fire scene examinations are conducted. This is also the time when a significant particulate and gas/vapor exposure hazard exists. All fire investigators conducting any type of examination in the fire scene during this period should wear the below PPE and be aware of or have immediate access to environmental data stay times, escape times and time-weighted averages of Toxic Industrial Chemicals (TIC). The following PPE should be worn in the warm scene.

- Coveralls (preferably disposable with hood) that completely cover the arms and legs.
- Helmet with chin strap.
- Boots with steel toe and puncture-resistant sole.

- Proper respiratory protection equipment as identified in the IAAI Fire Investigator Health and Safety Best Practices Appendix A Respiratory Protection Guidelines.
- Disposable outer puncture-resistant gloves and nitrile inner gloves.

Note 3: The 72-hour threshold is used here because the Tualatin Valley Study cited in footnote 11, and the Nelson study has shown that some gas residue can be present at some fire scenes for as long as 72-hours. Should future research amend this number then this may be changed accordingly.

D. COLD SCENE

1. Current research indicates that particulate and gas hazards are greatly reduced after 72-hours when the debris is not disturbed. However, when moving fire debris or excavating a fire scene, particulates are introduced into the localized air and gas pockets can be released, thus creating potential health hazards for the fire investigator. While certain situations may warrant a cursory, unprotected look at a fire scene, the fire investigator conducting any type of scene examination during this time should wear the following PPE and address the rehabilitation/recovery needs of the fire investigator.
 - Coveralls (preferably disposable with hood) that completely cover the arms and legs.
 - Helmet with chin strap.
 - Boots with steel toe and puncture-resistant sole.
 - Proper respiratory protection equipment as identified in the IAAI Fire Investigator Health and Safety Best Practices Appendix A Respiratory Protection Guidelines.
 - Disposable outer puncture-resistant gloves and nitrile inner gloves.

VIII. ATMOSPHERIC MONITORING

- A. Specific procedures in atmospheric monitoring shall be followed before the decision to remove an investigators' SCBA could be made. These guidelines are to be used in conjunction with the knowledge, experience, and training of the incident safety officer.
- B. Continuous atmospheric monitoring must be conducted beginning after the extinguishment and continue throughout the fire scene examination. Atmospheric monitoring should be conducted at the Warm and Cold Scenes, even if time has passed.
- C. There will be an initial survey of the fire scene with approved equipment where fire investigators would be working. Continuous personal

atmospheric monitoring is recommended, but if personal monitors are not available, atmospheric monitoring will be conducted in 15-minute intervals for each fire investigator on the scene.

Appendix A – Respiratory Protection Guidelines

The United States Department of Labor, Occupational Safety and Health Administration, has a tool on their website to assist with proper respirator selection and related information at <https://www.osha.gov/SLTC/etools/respiratory/index.html>. One of the information subsets provided discusses the employer’s responsibility to conduct an exposure assessment. “Employers must make a ‘reasonable estimate’ of the employee exposures anticipated to occur as a result of those hazards, including those likely to be encountered in reasonably foreseeable emergencies, and must also identify the physical state and chemical form of such contaminant(s).” This includes an identification of the respiratory hazards that could be present.

While it is known that some hazards, such as particulates, will be present at virtually every post-fire scene, we don’t know their precise make-up and typically don’t know exactly what gas and/or vapor hazards might be present unless extensive sampling is done. While sampling is the “gold standard” of hazard detection, it is often not practical in these situations. There are other alternatives:

- “You can use data on the physical and chemical properties of air contaminants, combined with information on room dimensions, air exchange rates, contaminant release rates, and other pertinent data, including exposure patterns and work practices, to estimate the maximum exposure that could be anticipated in the workplace.
- Data from industry-wide surveys by trade associations for use by their members, as well as from stewardship programs operated by manufacturers for their customers, are often useful in assisting employers, particularly small-business owners, to obtain information on employee exposures in their workplaces.”

➤ From https://www.osha.gov/SLTC/etools/respiratory/change_schedule_exposure.html

Although there is ample information that identifies the many harmful gases and vapors that could be present at a post-fire scene, very little research data exists today regarding the actual composition and amounts, and there are so many scene variables that definitive numbers may be very hard to come by. The IAAI Health and Safety committee is working to conduct studies that will help identify the presence and levels of gases and vapors in the post-fire environment and the future, this information will help with respirator selection. Until then the OSHA website says that “you should account for potential variation in exposure by using exposure data collected with a strategy that recognizes exposure variability, or by using worst-case assumptions and estimation techniques to evaluate the highest foreseeable employee exposure levels. The use of safety factors may be necessary to account for uneven dispersion of the contaminant in the air and the proximity of the worker to the emission

source.”

Even with this information, deciding on the best respirator solution for fire investigators can be challenging. To use the OSHA respirator selection advisor genius software, you must know the several workplace parameters, two of them being the OSHA permissible exposure limit (PEL) and the maximum exposure level (TWA) in the workplace of a single contaminant and its physical state: gases, vapors, and particulates.

https://www.osha.gov/SLTC/etools/respiratory/advisor_genius_nrdl/work_categories.html

This, of course, requires the identification of specific items which, as discussed above, is very challenging in the post-fire environment.

In the U.S., OSHA regulations require that a competent decision-maker determine the best respirator for employees to use based on recognized hazards. Based on the best information presently available regarding the potential hazards to fire investigators, the IAAI-recommended minimum respirator assembly to be used is either a half or full facepiece with P100/OV/AG filters at a minimum. NIOSH rated CBRN Cap 1 canisters can also be used for fire scene examinations when specified by the policy, the incident commander or lead fire investigator and used as subcomponents of industrial respirators. In the U.K., based on the information in Health and Safety Executive Guidance 53 the recommendation is the P3 filter and appropriate gas filter. SCBA (an open circuit, pressure-demand, self-contained breathing apparatus respirator) is required by the U.S. and U.K. if it is necessary to enter an IDLH (immediately dangerous to life or health) environment, which includes the post-fire overhaul phase.

Respirator users and competent decision-makers should read the relevant literature and information available at the website of the NIOSH National Personal Protective Technology Laboratory (<https://www.cdc.gov/niosh/npptl/>) regarding respirator approval standards, respirator recognition, and access to the NIOSH certified equipment list when developing procedures to validate a written respiratory protection program based on U.S. Department of Labor, OSHA requirements.

Workplace administrators charged with writing and managing written respiratory protection programs play a vital role in working with management personnel on the use of engineering controls to eliminate the airborne respiratory hazards, and if not able to eliminate them, control them by implementing feasible engineering controls, workplace environmental sampling and monitors, administrative signage/area restrictions and as necessary introducing workplace-specific personal protective technologies and equipment designed to lower the potential or actual exposure of assigned workers.

A field sample of a written industrial respiratory protection program can be found at the following link:

<http://www.radford.edu/content/dam/departments/administrative/ehs/Respiratory%20Protection%20Program.pdf>. This is an evolving document that is tailored to a specific workplace and demonstrates a concerted effort to address all the known and implied variables present. It also shows how perishable the information is/can be if the document responsibilities are not revisited, reevaluated, improved, and republished over a known period.

P100/OV/AG is a respiratory protection filter that removes 100% of particulates down to .3 microns (also known as HEPA or high-efficiency particulate air filter) in combination with protection for organic vapors (OV) and acid gases (AG). Organic vapors typically refer to liquids that evaporate quickly (hence giving off vapors) and are petroleum-based. Examples include solvents in paint, nail polish remover, and gasoline. Acid gas is any gas that contains significant amounts of acidic gases such as carbon dioxide or hydrogen sulfide.

There have been adverse respiratory effects while wearing P100/OV/AG cartridges during overhaul (Burgess et al., 2001), with a likely cause being formaldehyde breakthrough (Anthony et al., 2007). SCBA should be used by fire investigators who must enter a fire scene during the overhaul phase.

29 CFR 1910.

34 (OSHA) and 42 CFR 84 (NIOSH)

Appendix B – Decontamination Procedures

In addition to cleaning and decontaminating tools after every scene exam use, it is also sometimes necessary to decontaminate (decon) investigative personnel at fire scenes. There are two types of decon situations that fire investigators must be aware of:

1. Persons entering the scene who may contaminate it (IN)
2. Persons leaving the scene and are contaminated from the scene contents (OUT)

These recommended procedures or similar should be implemented for the investigation of all fatal fires, arson fires and any other fire scene where dictated by the circumstances of the post-fire scene. The incident commander or lead fire investigator should determine when these procedures are necessary and implement them accordingly.

IN Procedures

Each person entering each fire scene hot zone must wear new gloves, disposable coveralls or other approved clean outerwear, and any other necessary pristine PPE. In those instances where the possibility of scene contamination exists, all persons entering the scene should clean their boots, using the below procedures, immediately before entering. The lead investigator/scene manager is responsible for determining if this procedure is necessary and, if so, ensuring that the decon station is in place and properly used before anyone entering to ensure that all items are either new or fully cleaned to prevent any cross-contamination. (If this procedure is used it is to be documented in the investigation report and photographed.)

- If the ground is dry, set up two buckets or similar containers filled with water. To the first bucket add the recommended amount of cleaning solution. Using a poly-fiber, long-handle brush or similar, each person cleans their boots in the first bucket, rinses them in the second one, and then enters the scene.
 - It will likely be necessary to regularly rinse and refresh one or both buckets.
- If the ground is wet, it may be necessary to place a tarp under these buckets and to add a pre-rinse bucket in the first position. If used, the wet tarp will be slippery, and users need to exercise caution.

OUT Procedures

The decon procedures to be used after exiting a fire scene vary depending on the situation.

At crime scenes, including all fatal fires, it is strongly recommended that a decon station be established at the hot zone exit point. This process requires the assistance of additional people. While there are specific methodologies for this process in HazMat literature, a detailed discussion of this process is outside the scope of this document.

For Appendix B, a fire scene hot zone is defined as that portion of the scene that includes the structure or similar burned area and any adjacent debris field/area, and to which access is restricted to only those required to enter. It should be visually defined/outlined with red scene tape. The fire scene warm zone includes that area immediately outside the hot zone of sufficient size and shape to limit exposure to contaminants and shall contain the necessary decon areas. Access to this area is limited to decon personnel and those accessing the hot zone. It should be defined/outlined with yellow scene tape. The cold zone includes all areas of the scene outside the warm zone.

See Evans, M., and S. Trimber, "An Examination of Decontamination Procedures," Fire and Arson Investigator, July 2017, pp 10-15 for additional information regarding effective cleaning products.

Bunker Gear/Decon

- A. Gross decon shall be utilized on all fires where PPE is worn and exposed to products of combustion.
- B. All Fire Investigators that were exposed to products of combustion shall perform Gross Decon before leaving the incident scene.
- C. If on site, remain on air until the decontamination process is complete.
- D. Rinse off debris and products of combustion systematically and thoroughly from the collar-line down; being mindful of higher potential collection points such as the armpit and groin areas. 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.
- E. After rinsing the exterior portion of the PPE, the Fire Investigator may go off-air and begin to doff their PPE. Placement of tarps or salvage covers is suggested to designate this area.
- F. Next, move away from the exposed gear and towards the Cold 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 thorough "Shower within the Hour".

- G. To keep the interior of the vehicle as clean as possible and to avoid transferring toxins and harmful products back to the fire station/office, it is extremely important to perform Gross Decon before leaving the incident scene.
- H. 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 manufacturers' guidelines. Once the gear is cleaned, it may then be loaded into the vehicle. Ideally, no potentially contaminated equipment will be stored in the interior of the vehicle.
- I. If available, a glove swap should be performed.

Tyvek Clothing/Decon

For all other fire scenes, decon, which includes doffing/de-robing should be done away from the immediate scene and away from your vehicle, in this order:

1. Tools:
 - a. Wash tools using a bucket of clean water containing the recommended amount of cleaning solution, scrubbing with poly-fiber or similar brush for at least 30 seconds and then rinsing in a bucket of clean water or with a hose, or
 - b. Wipe them down with a damp cloth* or allow them to air dry; see step 13
 - c. Properly dispose of the dirty water
2. Remove outer gloves and place in the trash bag
3. Take off the helmet and wipe it off with a damp cloth*
4. Gently remove the hood portion of Tyvek[®] suit**
5. Gently unzip the suit and pull out arms. Roll down the suit with the inside out, to the top of boots
6. Remove boots
7. Remove suit and outer gloves and place in a trash bag
8. Clean boots using the same procedures as for tools; see step 13
9. Remove goggles and then respirator, taking care not to cross-contaminate facial areas in the removal, and wipe them off with a damp cloth*
10. Remove inner gloves and place in the trash bag
11. Close and seal the trash bag
12. Put on any clothing necessary to travel
13. Place tools, boots and trash bag in vehicle's utility area

* If you are going to dispose of these used clothes, they go in the trash bag before step 10. If you are going to wash and reuse them, place them in a separate bag that goes into your vehicle's utility area. Follow the best practices for cleaning information.

** If wearing something else, such as coveralls, a structural firefighting ensemble, or long pants and a long-sleeved shirt, substitute as appropriate following the same steps.