FIRE INVESTIGATOR SAFETY; UNINFORMED, UNDER INFORMED, OR COMPLACENT

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ABSTRACT

Fire Investigator Safety on the fire or explosion scene is an essential knowledge base that an investigator should have prior to investigating a fire or explosion incident. Fire and explosion scenes by their very nature contain a wide variety of hazards that are required to be identified and controlled prior to commencing the investigation. Some hazards, commonly found on the fire and explosion scene can cause immediate harm to the investigator while other hazards and exposure the result may not become evident for many years. The delayed reaction can be difficult to relate back to a specific fire or explosion scene unless that exposure had been documented.

As a result of the transient nature of those involved in fire and explosion investigation in the public sector, the position of fire investigator may only be temporary as the firefighter ascends the career ladder. This transient nature does not allow the research community to determine the effects of fire debris exposure to the investigator. The situation in the private sector is similar as it relates to the determination of the effects of exposure to fire debris, the community is too small for the research community to survey and even if a cause of death related survey was started, it would be extremely difficult to determine when the exposure occurred. This would be especially true if the private sector investigator had been in the Fire Service.

The lack of hard data about Fire Investigator deaths and injury rates makes it extremely difficult to raise the awareness level of Fire Investigators of the safety related issues. If anyone looks at the available data on Public Sector Fire Investigators, there were two “line of duty deaths” from the first National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program report, November 15, 1984 through August 13, 2010.

This paper will endeavor to provide the investigator with an overview of the safety related issues that they may encounter while processing a fire or explosion scene, legal requirements for safety and health programs, and a summary of the current research that has been completed related to exposure to fire debris and other hazards.

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INTRODUCTION

Fire Investigator Safety on the fire or explosion scene is an essential knowledge base that an investigator should have prior to investigating a fire or explosion incident. Fire and explosion scenes by their very nature contain a wide variety of hazards that are required to be identified and controlled prior to commencing the investigation. The National Fire Protection Association (NFPA) in its Fire Code Component Document “Guide for Fire and Explosion Investigations (NFPA-921) Chapter 12 Safety includes the following statement:

> **12.1 General.** Fire scenes, by their nature, are dangerous places. Fire investigators have a duty to themselves and to others such as other investigators, equipment operators, laborers, property owners who may be endangered at fire scenes during the investigation.[1]

As should be known, some hazards commonly found on the fire and explosion scene can cause immediate harm (Acute Exposures) to the investigator and other hazards and exposures the result may not become evident for many years (Chronic Exposure). Given the potential of a delayed reaction, it may be impossible to relate the exposure back to a specific fire or explosion scene, unless that exposure had been documented. Since most investigators arrive at fire and explosion scenes after the emergency has been controlled, they mistakenly believe that the hazards that were previously present are no longer there. This is not a good practice.

Michael Donahue in his text; Safety and Health Guidelines for Fire and Explosion Investigators in Chapter 1 states;

> "The lack of experience, information, standard operating procedures (SOP's) and adequate training, along with complacency, can place personnel in an unsafe situation at any incident. The ability of investigators to safely investigate fires and explosions depends on their level of knowledge, training, and expertise; the level of available resources; proper personal protective clothing and equipment (PPE); and the development and implementation of, and adherence to, a structured system of strict safety policies, guidelines, and standard operating procedures." [2]

There are a number of documents and a federally mandated requirement that address fire service related safety and general safety. At the federal and state levels there is the Occupational Safety and Health Act (OSH Act) of 1970, to provide general guidance for General and Construction Industries as well as others. For the Fire Service "NFPA 1500 Standard on Fire Department Occupational Safety and Health Program", as well as a number of other related documents relate to specific situations and related equipment. Additionally, "NFPA 921 Guide for Fire and Explosion Investigations" provides key recommendations for the fire investigator relative to scene safety. However, each of the identified documents indirectly requires that someone on the fire and explosion scene has the knowledge, training, expertise, and the authority to evaluate and correct safety related issues and maintain compliance with the required laws, Standards of Care, and employers policies and procedures.

A. The Problem

The problem, while fairly easy to indentify, is more difficult to quantify. Namely, what safety related hazards and concerns are present during a fire and explosion scene investigation? Second, if an investigator is contaminated how do we decontaminate that investigator and how do we prevent cross contamination? Third, what regulations and requirements for fire scene safety are relevant to the investigator? Forth, what measures need to be taken to control the hazards present and how can the investigator be assured that the hazards no longer pose a threat?

Many of the common safety related hazards that are found are relatively easy to identify and control. Things such as holes in a floor, partially collapsed walls or roofs, drums of hazardous materials remaining in a warehouse after a fire, free standing chimney, and broken glass. The National Institute of Occupational Safety and Health (NIOSH) wrote its first report as a result of the Fire Fighter Fatality Investigation and Prevention program November 15, 1984. Since that time, there have been two Fire Investigator Line of Duty Death (LODD) reported by NIOSH. The first of the LOD Death reports issued by NIOSH concerning a Fire Investigator occurred May 14, 1999: "**Fire Investigator Dies After Being Struck by a Chimney That Collapsed During an Origin and Cause Fire Investigation - New York"**

> "On January 19, 1999, a 43-year-old male career fire investigator (the victim) was killed during an investigation to determine the origin and cause of a residential fire that occurred on

January 14, 1999. The victim, as part of his regular duties, met with an insurance adjuster, a private fire investigator and an electrical consultant at the fire scene about 1030 hours on the day of the incident. All four men proceeded to the attic area of the remaining structure to conduct the investigation. About 10 minutes into the investigation, the insurance adjuster left the area and proceeded to the floors below to continue his review of the damage. The other three men, including the victim, remained in the attic and sifted through debris looking for clues to the origin of the fire. After working for 2 ½ hours near the front section of the attic, they moved to an area in proximity to a brick chimney that was free-standing about 13 feet above the floor level of the attic. After discussing the stability of the chimney, the three men decided to continue work near the chimney. *Note: Although all three men commented to one another that they had seen the chimney swaying slightly in the gusty breeze, they believed it was fairly stable because it had been free-standing for 5 days, in all weather conditions. Also, the chimney had not moved when the private investigator pushed and pulled on the stabilizing bar that was connected to it."*[3]

The second report of a Fire Investigator LODD occurred April 23, 2001: "**Arson Investigator Dies from Injuries Sustained from a Fall During an Arson Investigation. Illinois"**

"On July, 18, 2000, at 1351 hours, Central Dispatch notified the local fire department of a structure fire at a single-family dwelling. As fire fighters conducted suppression activities near the rear of the structure, they became suspicious of arson. Two arson investigators were dispatched to the scene to conduct an origin-and-cause fire investigation. During this investigation, Arson Investigator #1, a 47-year-old, career fire fighter (the victim) lost his balance and fell, pinning his camera between the left side of his chest and a bed frame/slats. After being assisted to his feet by Arson Investigator #2, he rested for a couple of minutes, regained his composure, and resumed his investigation. Later that evening the victim sought medical attention for persistent, severe pain in his left lower chest area. Over the next 3 weeks, the victim was evaluated and treated both in and out of the hospital for complications resulting from the fall. These complications ultimately led to his death on August 9, 2000, at 1118 hours. Two autopsies were performed. The first autopsy, performed by the County Coroner, showed (a) multiple organ system failure due to, or as a consequence of, (b) peritonitis with severe hypotension, ischemic necrosis of the liver and kidneys. due to, or as a consequence of, (c) blunt force trauma of the left chest wall with splenic hematomas and a perforated stress ulcer.

The second autopsy, performed by a forensic pathologist hired by the victim's widow, essentially confirmed these findings with two additional points mentioned. A left-arm contusion (bruise), a left-trunk contusion, and a left-10th rib fracture were noted, suggesting the initial fall on July 18 was quite severe. A second point in this autopsy was that post-injury medications, in addition to chronic hepatitis C virus (HCV) infection and cirrhosis due to HCV, contributed to his liver failure."[4]

Now, as Fire and Explosion Investigators, we know that additional investigators in the private sector may also have died while investigating a fire or explosion, but the information is not included in the NIOSH reports because their investigations are limited to the Fire Service. But, what about those investigators (Public or Private) that have died as a result of exposure to a chemical or died of heart failure that may be a side affect or similar situation. That data is either limited or not available. This is not to say that research has not been done, it is limited. Also the Fire Investigation Community needs to look at what research has been done concerning safety and health issues for Fire Fighters, as the investigator is exposed to many of the same exposures as Fire Fighters.

B. Research and Literature Survey
NIOSH Health Hazard Evaluation Report; Bureau of Alcohol, Tobacco, and Firearms, May 1998 EN

The Bureau of Alcohol, Tobacco, and Firearms (ATF) in April 1996 contacted the National Institute for Occupational Safety and Health (NIOSH) and requested a health hazard evaluation (HHE) regarding respiratory hazards associated with fire investigations.

The recommendations as a result of the study include the following:

> "The contaminant concentrations measured during this investigation are not representative of all the potential exposures encountered by investigators because numerous factors are involved in contaminant generation in actual fire scenes. However, these results indicate that potential exposures encountered by fire investigators is a subject area which needs further research.
>
> The following recommendations are based on the environmental sampling results and observations made during this investigation and are offered in the interest of improving health and safety conditions for ATF fire investigators. These recommendations would also be applicable to fire fighters involved in the overhaul of a fire scene.
>
> 1. The ATF should require their investigators to wear appropriate respiratory protection when performing fire scene investigations. Since the use of SCBAs would most likely not be practical during most fire scene investigations, the use of half–face, air–purifying respirators equipped with combination filter cartridges (high–efficiency particulate, VOCs, acid mists, and formaldehyde) or powered air–purifying respirators with the appropriate filter cartridges should be used. If half–face respirators are used, they should be used in conjunction with eye goggles to help prevent eye irritation.
>
> 2. The ATF should establish a respiratory protection program for their fire investigators and ensure that it complies with the requirements described in 29 CFR 1910.134. Publications developed by NIOSH, which should also be referenced, include the NIOSH Guide to Industrial Respiratory Protection and NIOSH Respirator Decision Logic. The written program should designate one individual with the responsibility for administering the respiratory protection program.
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> The written respirator program should also contain information on the following topics:
> (a) the departments/operations which require respiratory protection;
> (b) the correct respirators required for each job/operation;
> (c) specifications that only NIOSH/MSHA approved respiratory devices shall be used; and
> (d) the criteria used for the proper selection, use, storage and maintenance of respirators, including limitations.
>
> A respiratory protection program should include the following elements:
> a. written operating procedures
> b. appropriate respirator selection
> c. employee training
> d. effective cleaning of respirators
> e. proper storage

f. routine inspection and repair
g. exposure surveillance
h. program review
i. medical approval
j. use of approved respirators

All of these elements are discussed in more detail in the referenced materials.

3. The use of mechanical ventilation equipment that removes the contaminants from the areas where fire investigators are working should be utilized whenever possible. Alteration of the fire scene (removing windows, doors, etc.) that promotes natural ventilation should also be considered when it would not affect the preservation of the fire scene.

4. The use of other protective clothing should be implemented. To reduce the potential for contaminants being carried home by fire investigators, the use of disposable coveralls, boots, and gloves should be considered. If disposable items are not used, the laundering of any potentially contaminated clothing should be provided by a contractor who is aware of the contamination potential. The ATF should also train its fire investigators in the use of appropriate decontamination procedures utilized by emergency responders."

NIOSH Health Hazard Evaluation Report 2004-0368-3030; Bureau of Alcohol, Tobacco, Firearms and Explosives, January 2007

August 19, 2004, the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) contacted the National Institute for Occupational Safety and Health (NIOSH) requesting an investigation concerning potential exposures during fire scene investigations. Concerns were raised about the presence of contamination of work uniforms upon completion of an investigation, removal of the contamination following home laundering, and contamination of home washing machines from contaminated uniforms. At the time of the request, employees had not reported health effects associated with chemical exposures during fire scene investigations.

The recommendations as a result of the study include the following:

"Due to the potential for exposure to PAHs, some of which may be carcinogenic, NIOSH investigators recommend the use of protective clothing for ATF agents involved in fire scene investigation. To reduce the potential for carrying these contaminants home, disposable coveralls should be worn at the fire scene then discarded when the investigation is finished prior to entering a personal or official vehicle.

Alternatively, a professional laundry service could be used to launder the uniforms currently worn by fire scene investigators. In addition, ATF agents should wear disposable, chemical resistant gloves to further protect themselves from dermal exposures at a fire scene."

Additional Related Research

"Characterization of Firefighter Exposures During Fire Overhaul"[7];

The following is the abstract of the research.

> "Previous studies have characterized firefighter exposures during fire suppression.
>
> However, minimal information is available regarding firefighter exposures during overhaul, when firefighters look for hidden fire inside attics, ceilings and walls, often without respiratory protection.
>
> A comprehensive air monitoring study was conducted to characterize City of Phoenix firefighter exposures during the overhaul phase of 25 structure fires. Personal samples were collected for aldehydes, benzene, toluene, ethyl benzene, xylene, hydrochloric acid, polynuclear aromatic hydrocarbons (PNA), respirable dust and hydrogen cyanide (HCN). Gas analyzers were employed to continuously monitor carbon monoxide (CO), HCN, nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). Area samples were collected for asbestos, metals (Cd, Cr, Pb) and total dust.
>
> During overhaul, the following exceeded published ceiling values: acrolein (ACGIH 0.1 ppm) at 1 fire; CO (NIOSH 200 ppm) at 5 fires; formaldehyde (NIOSH 0.1 ppm) at 22 fires; and glutaraldehyde (ACGIH 0.05 ppm) at 5 fires. In addition, the following exceeded published STEL values: benzene (NIOSH 1 ppm) at two fires, NO_2 (NIOSH 1 ppm) at two fires and SO_2 (ACGIH 5 ppm) at 5 fires. On an additive effects basis, PNA concentrations exceeded the NIOSH REL (0.1 mg/M_3) for coal tar pitch volatiles at two fires. Maximum concentrations of other sampled substances were below their respective PELs. Initial 10 minute average CO concentrations did not predict concentrations of other products of combustion.
>
> The results indicate that firefighters should use respiratory protection during overhaul. In addition, these findings suggest that CO should not be used as an indicator gas for other contaminants found in this atmosphere."

"Firefighter Exposure to Smoke Particulates", Executive Summary[8]

A study jointly completed by Underwriters Laboratories Inc., University of Cincinnati, and the Chicago Fire Department as a result of a Department of Homeland Security, Assistance to Firefighters Grant studied the exposure rate to fire fighters during fire suppression activities.

Key findings of the research project concerning health implications include:

> **"Health Implications**
> • Multiple asphyxiants (e.g. carbon monoxide, carbon dioxide and hydrogen sulfide), irritants (e.g. ammonia, hydrogen chloride, nitrogen oxides, phenol and sulfur dioxide), allergens (e.g.isocyanates), and chemicals carcinogenic for various tissues (e.g. benzene, chromium, formaldehyde and polycyclic aromatic hydrocarbons) were found in smoke during both suppression and overhaul phases. Carcinogenic

chemicals may act topically, following inhalation, or following dermal absorption, including from contaminated gear.

- o Concentrations of several of these toxicants exceeded OSHA regulatory exposure limits and/or recommended exposure limits from NIOSH or ACGIH.
- o Exposures to specific toxicants can produce acute respiratory effects that may result in chronic respiratory disease.

• High levels of ultrafine particles (relative to background levels) were found during both suppression and overhaul phases.

- o Exposure to particulate matter has been found to show a positive correlation with increased cardiovascular morbidity and mortality for general population studies.
- o The high efficiency of ultrafine particle deposition deep into the lung tissue can result in release of inflammatory mediators into the circulation, causing toxic effects on internal tissues such as the heart. Airborne toxics, such as metals and polycyclic aromatic hydrocarbons, can also be carried by the particles to the pulmonary interstitium, vasculature, and potentially subsequently to other body tissues, including the cardiovascular and nervous systems and liver.

• Interactions between individual exposure agents could lead to additive or synergistic effects exacerbating adverse health effects.

• Long-term repeated exposure may accelerate cardiovascular mortality and the initiation/progression of atherosclerosis.

Study of Cancer among United States Firefighters

In a NIOSH update, April 23, 2010, it was reported that NIOSH and the United States Fire Administration (USFA) were partnering to study Cancer among Firefighters. (www.cdc.gov/niosh/updates/upd-04-23-10.html)

> **"NIOSH and USFA Initiate Study of Cancer among Firefighters**
>
> The National Institute for Occupational Safety and Health (NIOSH) and the United States Fire Administration (USFA) are partnering on a study to examine the potential for increased risk of cancer among firefighters due to exposures from smoke, soot, and other contaminants in the line of duty.
>
> This multi-year USFA supported NIOSH study will include over 18,000 current and retired career firefighters. The project will improve upon previously published firefighter studies by significantly increasing the number of individuals for whom health data will be analyzed. A larger study provides greater statistical reliability.
>
> The study will also improve on past studies by analyzing not only deaths from cancer, but also the incidence of certain cancers that have higher survival rates than others, such as testicular and prostate cancer, as well as deaths from causes other than cancer. This will improve researchers' ability to estimate risk for various cancers and to compare risk of cancer with risks for other causes of death."

This is an important step towards looking at the health effects of what we do and do not do. After contacting Dr. Travis Kubale (http://www.cdc.gov/niosh/fire/cancerStudy.html) from NIOSH about this project he provided a copy of a comprehensive Bibliography (139 Titles and Abstracts)

concerning research papers and related studies about Fire Fighter Health and Safety which is too large to include in this paper, but is available on the TRACE Fire and Safety website.

LEGAL REQUIREMENTS FOR A HEALTH AND SAFETY PROGRAM

Many in the fire and explosion investigation community are not aware of the legal requirements for the provision of safety and health programs while investigating a scene, and as such have not considered the requirements contained in the Occupational Safety and Health Administration (OSHA) standards.

Second, some employers in the field believe that if you have fewer than 10 employees, you are exempt from the Occupational Safety and Health Act (OSH Act) Requirements and from the standards developed and enforced by the Occupational Safety and Health Administration (OSHA) or the State Program Requirements. This is not true, if you put an employee into a hazardous situation, you could still be cited under OSHA's compliance program. There are some exemption requirements for written programs, for employers less than ten, but that exemption is for the reporting of policies and procedures, check with OSHA prior to taking for granted that you are exempt.

The second exemption is if you operate out of a Federal OSHA state (http://www.osha.gov/dcsp/osp/index.html) and you are an employee of a state or local government, then you are exempted from the Federal Act Guidelines (http://www.osha.gov/dcsp/osp/public_sector.html). However, as a requirement to the states for state plans is to included state and local employees. Additionally, some states that are still under the Federal Plan have adopted legislation that includes State and Local Government workers (Public Employee Safety and Health [PESH] Plans). (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=11240)

A key concept to consider is not whether you are covered by OSHA and subject to OSHA's Inspection and Citation Policies, but rather to looking at the establishment of a safety and health program on your investigation scene for your own protection.

A. The Williams-Steiger Occupational Safety and Health Act of 1970

The primary goal of the OSH Act of 1970 as stated in the act is as follows:

> "**To assure safe and healthful working conditions for working men and women**; by authorizing enforcement of the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes." [9]

Congress when they were preparing the legislation were faced with data that included worker fatalities, injuries, and illnesses in the workplace were on the rise, the numbers were unacceptable, and that if employers and employees were involved in safety and health plans that a reduction in the losses and economic costs could be dramatically reduced. The goals continue to be achieved and the act has done what it was supposed to do.

B. "General Duty Clause"

The "General Duty Clause" is included in Section 5 of the Act and is an important component of the enforcement of the standards when there is no specific safety related requirement.

Section 5 of the Act states the following important text concerning “Duties”.

> Section 5: Duties
>
> (a) Each employer
>
> > (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;
> >
> > (2) shall comply with occupational safety and health standards promulgated under this Act.
>
> (b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.[10]

The “General Duty Clause” includes 5 (a) 1, 2 and (b). The burden is on the employer to provide a safe workplace and to enforce the rules if an employee does not participate. As indicated the “General Duty Clause” can be enforced when there is not specific requirement in the OSHA Standards and an unsafe condition exists.

C. Inspections and Penalties

The intent of this paper is to provide sufficient information to the reader that they will endeavor to follow the minimum guidelines prescribed by law (OSH Act), Federal and State Plan standards, Recognized National Standards (non-law), organizational Standard Operating Procedures, and common sense as it relates to personal safety and health. However, it should be noted that failure to follow the OSHA (Federal or State) requirements do come with a citation and a Penalty. Authority for the development of Inspection, Citation, and Penalties was included in the original act in Sections 8, 9, 10. A summary of the types of OSHA violations is provided in the following discussion for complete information about the OSHA violations, see Field Operations Manual (FOM) CPL_02-00-148, Chapter 4.

> **Serious Violation** (Section II) “a serious violation shall be deemed to exist in a place of employment if there is a substantial probability that death or serious physical harm could result from a condition which exists, or from one or more practices, means, methods, operations, or processes which have been adopted or are in use”.[11] This violation has a high probability of causing a serious injury or death.
>
> **Other-Than-Serious** Violation (Section IV) “This type of violation shall be cited in situations where the accident/incident or illness that would be most likely result from a hazardous condition would probably not cause death or serious physical harm, but would have a direct and immediate relationship to the safety and health of employees.”[12]
>
> **Willful Violation** (Section V) “A willful violation exists under the Act where an employer has demonstrated either an intentional disregard for the requirements of the Act or a plain indifference to employee safety and health.” [13]
>
> **Repeated Violation** (Section VII) “An employer may be cited for a repeated violation if that employer has been cited previously for the same or substantially similar condition or hazard **and the citation has become a final order of the Review Commission**. A citation may

become a final order by operation of law when an employer does not contest the citation, or pursuant to court decision or settlement."[14]

Failure to Abate (Section VII) "A failure to abate exists when a previously cited hazardous condition, practice or non-complying equipment has not been brought into compliance since the prior inspection (i.e., the violation is continuously present) and is discovered at a later inspection. If, however, the violation was corrected, but later reoccurs, the subsequent occurrence is a repeated violation." [15]

De Minimis (Section VIII) "De minimis conditions are those where an employer has implemented a measure different than one specified in a standard, that has no direct or immediate relationship to safety or health. Whenever de minimis conditions are found during an inspection, they shall be documented in the same manner as violations." [16]

It should be noted that not all of the types of violations were included in this discussion due to space limitations.

Severe Violator Enforcement Program (SVEP) directive CPL 02-00-149 was put in place June 18, 2010. The purpose of this directive was to establish enforcement policies and procedures for OSHA's Severe Violator Enforcement Program (SVEP), which concentrates resources on inspecting employers who have demonstrated indifference to their OSH Act obligations by willful, repeated, or failure-to-abate violations. High-Emphasis Hazards are targeted, which include fall hazards and specific hazards identified from selected National Emphasis Programs. Fall hazards are commonplace on fire and explosion investigation scenes.

D. Multi-Employer Workplace

OSHA Multi-Employer Workplace Citation Policy directive CPL 2-0.124 effective December 10, 1999 clarifies OSHA's multi-employer citation policy and suspends Chapter III. C. 6 of OSHA's Field Inspection Reference Manual (FIRM).

On multi-employer worksites (in all industry sectors), more than one employer may be citable for a hazardous condition that violates an OSHA standard. The first task is to determine who the creating, exposing, correcting, or controlling employers are.

Creating: This is the employer that creates the hazard.

Exposing: This is the employer that allowed their employees to be exposed to the hazard, frequently because they did nothing to prevent exposure to their employees.

Correcting: An employer who is engaged in a common undertaking, on the same worksite, as the exposing employer and is responsible for correcting a hazard. This usually occurs where an employer is given the responsibility of installing and/or maintaining particular safety/health equipment or devices.

Now, if a contractor is brought to the site to correct the violation by the creating employer and the correcting employer does not violate any of the safety requirements outlined by OSHA, then this employer will be exempt from a citation from the original violation.

Controlling: An employer who has general supervisory authority over the worksite, including the power to correct safety and health violations itself or require others to correct them. Control can be established by contract or, in the absence of explicit contractual provisions, by the exercise of control in practice.

There is a discussion in the directive concerning the different types of "Controlling Employers" and their roles. Based on the discussion contained in the directive there could be two ways the "Entity in Charge of a Fire or Explosion Scene" could be defined as the "Controlling Employer" under the OSHA directive.

> First," Control Established by a Combination of Other Contract Rights: Where there is no explicit contract provision granting the right to control safety, or where the contract says the employer does not have such a right, an employer may still be a controlling employer. The ability of an employer to control safety in this circumstance can result from a combination of contractual rights that, together, give it broad responsibility at the site involving almost all aspects of the job. Its responsibility is broad enough so that its contractual authority necessarily involves safety. The authority to resolve disputes between subcontractors, set schedules and determine construction sequencing are particularly significant because they are likely to affect safety."[16]
>
> Second, "Control Without Explicit Contractual Authority . Even where an employer has no explicit contract rights with respect to safety, an employer can still be a controlling employer if, in actual practice, it exercises broad control over subcontractors at the site." [17]

After OSHA has completed that task, one of more of the categories listed above can be cited for the same violation.

E. Voluntary General Safety and Health Management Guidelines

In 1991, OSHA Issued the Voluntary General Safety and Health Management Guidelines (See Fact Sheet Number 91-37 or the TRACE Fire and Safety Website), as guidance for those that are responsible for the management of safety and health programs. The Guidelines include four major Elements with a number of subcomponents;

- Management Commitment and Employee Involvement.
- Worksite Analysis.
- Hazard Prevention and Control.
- Safety and Health Training.

These four major elements are as critical today as they were when they were released in 1991.

FIRE INVESTIGATOR SAFETY HAZARD AND RISK ASSESSMENTS

Hazard and Risk Assessments are one of several tools that safety professionals have utilized for many years to identify and control hazards in the workplace. This technique was first introduced in NFPA-921 Guide for Fire and Explosions, 2008 Edition, Chapter 12. NFPA-921, 2008 Edition in Chapter 17 Origin Determination specifically references the need for Hazard and Risk Assessments during the origin determination.

> **17.3.1.1 Safety Assessment.** The investigator should first make an initial safety assessment. The investigator should determine if it is safe to enter the scene. If it is not safe to enter, the investigator must determine what steps are required to provide for personal safety or to render the scene safe to enter. Each of the hazards described in Chapter 12 should be assessed. There is no reason the investigator should compromise safety.[18]

As indicated one of the first tasks that an investigator should complete upon arrival at a fire or explosion investigation scene is a Hazard and Risk Assessment. By completing this assessment the investigator will be able to determine the hazards present and develop control methodologies for those hazards. Hazard and Risk Assessments are comprised of four different actions, including the identification of hazards present, determining the risk that each hazard poses, the development and implementation of control strategies and finally the continued auditing the scene for changes and compliance.

I. Identify the Hazards. To simplify the process of hazard identification and to allow a more systematic and complete identification process the investigator may use a classification system of the hazards. It should be remembered that classification of hazards according to the following is not the most important action. The most important aspect of this process is to identify the presence of the hazard.

A. Physical Hazards. Hazards that are present on the investigative scene that pose a physical hazard to the investigator. Items such as slip, trip and fall hazards; sharp surfaces and broken glass; working on ladders or around holes in floors; and other hazards that can cause physical harm to the investigator. Also included in this category would be environmental hazards such temperature extremes, the effect of fatigue and strenuous physical activity.

B. Structural Hazards. Hazards present on the investigative scene as a result of fire or explosion damage to the buildings structure. Many structural hazards are easily identified without the need to have specialized technical assistance, but in complex scenes or heavily damaged scenes the investigator may want to consider the assistance of a structural engineer.

C. Electrical Hazards. Electrical hazards at the investigation scene can come from the buildings electrical utility service, emergency or standby power or those tools and equipment the investigator brings on to the scene. Having the electrical service disconnected or isolating the area are means to control the hazard to the building, but will not have any effect on generators or other electrical sources brought on scene by the investigator. When using electrically powered equipment on scenes they should be connected to an accessory GFCI or be intrinsically safe depending on the conditions.

D. Chemical Hazards. Chemicals that are normally present at the scene or those that are a result of the incident should be considered. In commercial occupancies the investigator may wish to obtain copies of Material Safety Data Sheets (MSDS) to determine the hazards of those products. The identification of chemical hazards that may be present as a result of the incident is more difficult. There are many reference documents the investigator may use to determine the hazards of suspected chemicals present at the investigation scene including the National Institute of Safety and Health (NIOSH) Pocket Guide to Chemical Hazards

E. Biological Hazards. Sources of biological hazards include bacteria, viruses, insects, plants, birds, animals, and humans. These sources can cause a variety of health effects ranging from skin irritation and allergies to infections (e.g., tuberculosis, AIDS), cancer and so on. Some of these hazards may not be recognized without specialized assistance.

F. Mechanical Hazards. Machinery and equipment present on the scene may have stored energy. Prior to working around machinery and equipment the investigator will need to determine if they are at Zero Mechanical State (ZMS) or if they are still operational or functional. For specialized machinery or equipment the investigator may need to seek the

assistance of the property owner or other technical resource to assist in controlling the stored energy.

II. Determine the risk of the hazard. Depending on the specific hazard identified, the determination of the risks associated with the hazard could vary from simple qualitative assessments to complex quantitative assessments. Also, as a part of this analysis, the investigator will determine the likelihood that they will come in contact with that hazard. As an example, a chemical that is contained in a drum or other containment device, even if it is a chemical hazard, while contained, the risk is minimal. Given that example, a control mechanism may be to isolate the area where the container is to prevent damage and potential release.

During this phase of the analysis, the investigator may prioritize the hazards and establish or organize the implementation phase of the control strategies. The investigator will need to re-evaluate the risk and control strategies implementation as the investigation progresses the scene frequently changes over time.

There are a number of tools that can be used to evaluate and rate the "Risk" of the identified hazard, but the investigator should remember that estimating probability is an inexact science. Even the most rigorous risk assessment methods cannot accurately establish meaningful probabilities for all risk situations. Some would consider this part a "Common Sense" evaluation of the likelihood that an event will occur, but not all have the same ability to utilize "Common Sense". The investigator responsible for evaluating the hazard to determine the risk should include all of the factors in the evaluation process including the impact of part of the process on the whole. As an example, during debris removal, what impact will the weight of the investigator have on structural stability or what impact will debris removal including building materials have on the structural stability.

Lastly, in most situations the rating system should be kept simple and realistic rather than requiring complex calculations or classification systems that may or may not provide any better data to the user. Below is a sample rating system.

Rating	Impact	Probability
High	Disabling injury, loss of body part or fatality.	• Repetitive Event • Greater than 50% chance of occurring • Has happened frequently in similar circumstances
Medium/ **Moderate**	Medical Aid Injury	• Infrequent Event • 10 – 50% chance of occurring • Infrequent Event
Low	First Aid Injury	• Unlikely Event • Less than 10% chance of occurring • Has never been observed but is still felt to be possible.

III. Control the hazard. Following the determination of the risk level, this should be compared to a suitable benchmark or acceptance criteria. In some cases, the acceptance criteria has been established by regulators (OSHA). To control a hazard, the investigator can utilize several methodologies that include Engineering Controls, Administrative Controls or the selection and use of appropriate PPE.

A. Engineering Controls. Engineering controls can be as simple as placing appropriate shoring to reinforce damaged structural elements or the demolition of those areas after they are properly documented. Or, they can be very complex solutions that will require a structural engineer to evaluate, design corrective measures, and manage the installation of the corrective measure.

B. Administrative Controls. Administrative controls can include the isolation of an area by the use of signs or barrier tape, briefing of those that will be working in the area of the hazards and that they are not to enter within the isolated area, obtaining specialized resources that have expertise dealing with the hazard present or a combination of methodologies.

C. Proper Selection and Use of Personal Protective Equipment (PPE). The use of PPE is generally considered the least effective of the control measures. However, due to the conditions that the investigator may encounter at the scene and the duration of the work, PPE can be a suitable control mechanism. Care will need to be taken to determine the hazard present to insure that the PPE selected is acceptable for the hazard present and that the user of the PPE is trained and capable to use it.

Examples of PPE

Eye	Safety Glasses, Goggles, UV, Welding and Laser
Face	Face Shield
Head	Hard Hat, Helmet
Feet	Safety Shoes, Boots
Hands and Arms	Gloves
Body	Vests, Aprons, Chemical Suits
Hearing	Earplugs, Canal Caps and Earmuffs
Respiratory	APR, PAPR, SCBA, Air Supplied

IV. Monitor and Re-Evaluate the Hazards as time and conditions change. During the course of the investigation, the person that completed the hazard and risk assessment should continue to monitor the safety conditions. As conditions change, adjustments to the safety plan will need to be completed.

FINDINGS AND CONCLUSIONS

The need for improved safety on the fire and explosion scene has been apparent for a long time. What has been missing in the equation is the availability of hard data that safety is an issue and someone or group to actively and honestly promote the cause and process. From the Public Side, the movement to improve health and safety has become more visible since the first edition of NFPA-1500, Standard on Fire Department Occupational Safety and Health Program in 1987. From the governmental arena NIOSH through the Fire Fighter Fatality Investigation and Prevention Program as well as the work that the Hazard Evaluations and Technical Assistance Branch has done with the two ATF studies have reinforced the need for improved safety and

health programs. Other public sector initiatives such as The National Fallen Firefighters Foundation through the Life Safety Initiatives has increased awareness and caused those in the fire service to recognize that they are individually responsible for their safety.

The two Fire Investigation related organizations have also attempted to bring greater awareness to safety and health issues by having "Safety" Committees and providing forums for presentations and journal articles that assist both the public and private sector investigators.

The research community, Government, Academic, Professional and Technical Associations, and the Private Sector (suppliers, private researchers) are now attempting to bring safety and health related issues to the "Fire" related community and as such, the fire investigation sector of the overall community will be able to assimilate similar data to focus on the identified issues and solutions. But, that process will take time to complete. Health related studies take time and require participation by a wide variety of those potentially affected to gather the hard data necessary to bring about change.

The last and possibly the most important element in the equation is the investigator themselves. When the investigator looks into the mirror first thing in the morning, a moment's recognition that today "I could get hurt at work" then followed by a second thought "but, I will do everything I can do to prevent it", will bring about a greater awareness of personal safety. But recognizing that will not happen, hopefully a greater awareness of the results and potential will cause the investigator to "change a behavior" that is not a part of the fire investigation sub-community. Part of that "change of behavior" will be the belief that "Safety" is one of the skill sets a good investigator must have to do their job correctly and effectively.

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Endnotes

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[10]**OSH Act, 1970**

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[12]**"Field Operations Manual"** (FOM), Page 4-28

[13]**"Field Operations Manual"** (FOM), Page 4-28

[14]**"Field Operations Manual"** (FOM), Page 4-32

[15]**"Field Operations Manual"** (FOM), Page 4-35

[16]**"Field Operations Manual"** (FOM), Page 4-36

[17]**"Multi-Employer Citation Policy"**; Occupational Safety and Health Administration, Directive CPL 2-0.124, December 10, 1999, Chapter X, Section E, Item B

[18]**"Multi-Employer Citation Policy"**; OSHA, Chapter X, Section E, Item C

[19]**"NFPA 921 Guide for Fire and Explosion Investigations"**, 2008 Edition, National Fire Protection Association; Quincy, MA Section 17.3.1.1

NOTE: Copies of all of the referenced documents will be available on the TRACE Fire and Safety website (www.TRACEfireandsafety.com) for 30 days after the ISFI Conference.