EXPOSURE OF FIRE INVESTIGATORS TO THE PRODUCTS OF COMBUSTION

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August 22, 2003

ABSTRACT

The purpose of this research paper was to determine the risks involved with fire investigation in terms of exposure to the products of combustion. During the fire investigation phase, the air appears to be clean. This paper shows that this is in-fact false. There are many toxic gases produced during a fire and still present in the atmosphere after extinguishments such as acrolein, benzene, carbon monoxide, hydrogen chloride, hydrogen cyanide, nitrogen dioxide, polycyclic aromatic hydrocarbons (PAHs), and thousands more. Typically, during investigations no self-contained breathing apparatus (SCBA) are worn by fire investigators. This research paper shows that this is leaving them vulnerable to these toxins present in the air.

By wearing respiratory protection a fire investigator can greatly reduce the risks involved with exposure to the products of combustion.

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INTRODUCTION

Everyday fires occur across the country. Fire departments respond to these fires, don self-contained breathing apparatus (SCBA), and extinguish these fires. Once the smoke clears, that is when the fire investigators job is just getting started. The fire investigator enters the structure and begins the methodical evaluation of the scene to determine the cause and origin.

The fire investigator carefully sorts through the fire debris, causing the settled products of combustion to become airborne. These settled products of combustion consist of many toxins including cancer causing agents or carcinogens. Unlike the firefighters who have extinguished, these investigators normally do not put on SCBA's. Even short-term exposure to these products of combustion can cause chronic or acute health problems.

The purpose of this paper is to show that there are toxic products of combustion present during the overhaul phase of a fire when fire investigation takes place. This paper further shows that the toxins present during this phase pose a significant risk to fire investigators. These toxins are present in all fires regardless of the size.

BACKGROUND AND SIGNIFICANCE

Years ago firefighters never wore SCBA's while conducting any fire ground operations. If you did it was considered a sign of weakness. When it was realized in the firefighter community that the products of combustion were carcinogens, firefighters began to where SCBA's. Fire Departments developed standard operating procedures to require the use of SCBA's. As veteran firefighters retired and turn over occurred, the attitude quickly changed. They started thinking about the future, family, and retirement. The fire service has recognized the dangers posed to firefighters, but largely the dangers of exposure to fire investigators has been missed or ignored. This research paper will show that in this stage of the fire the products of combustion are present and every bite as dangerous to fire investigators as they are to firefighters during extinguishment.

If you were to investigate a fire, even a car fire, and then blow your after, you would find that your mucous is full of soot. This soot contains many toxins that are being carried into the lungs, causing damage and then are transferred into the bloodstream.

During a fire investigation you carefully and with an attentive eye sort through fire debris. You are sorting through a number of layers of fire debris, depending on the severity of the fire. A fire investigator must be able to identify where these layers begin and end. Not to mention that you must also take note the contents of the debris at the same time. The use of SCBA's in these circumstances makes it very difficult to see the contents of the debris. Difficulties in identifying important contents of the debris can result in delayed cause and origin determination or even an undetermined cause.

Some fire investigations can take many hours. To wear an SCBA for that period of time in a still hot environment, fatigue becomes a factor. Still there is a need to protect ourselves from the respiratory exposures that can affect our everyday quality of life.

LITERATURE REVIEW

Research shows that the products of combustion produced by today's building materials consist of many toxins. Further research shows that these toxins are present in seemingly clear atmospheres, such as those encountered by fire investigators. Fire investigators who do not wear proper personal protective equipment (SCBA's) are at great risk when exposed to these toxins.

A study by Jefferey L. Burgess, MD, Associate Professor, Environmental and Occupational Health, University of Arizona College of Public Health, found that firefighter often removed or wore no respiratory protection during the overhaul phase of fires.

A 2000 study by Bolstad-Johnson, Burgess, Crutchfield, and Clifton showed that toxins remained airborne after the fire had been extinguished. A 2001 article in Fire Fighting in Canada states that, "The greatest danger to staff lies when the fire is out and overhaul or an investigation is being conducted." The article confirms that the hazard increases when an fire investigator sorts through fire debris causing dust and soot to become airborne which can then be inhaled.

PROCEDURE

Research for this paper involved the review of literature from current periodicals, newspapers, and applied research projects. Resources were obtained primarily from the internet. Further information

DISCUSSION

It is my belief that all the information included in this report arrives at one conclusion. Toxins from the products of combustion are present in the atmosphere after fire extinguishment and things are seemingly clear. These toxins, which can include polyvinyl chloride, sulfur dioxide, hydrogen chloride, phosgene, nitrogen oxides, aldehydes, particulates, and thousands more, can do serious damage to the respiratory system even in small amounts

RECOMMENDATIONS

Fire departments must review their Standard Operating Procedures (SOP's) on fire investigation and the use of SCBA's. They must require fire investigators to wear proper respiratory protection. Continued exposure could result in time off for illness, medical retirements, and possibly even fire investigator death.

We, as fire investigators, must use SCBA's to prevent exposure to these toxins, even with the hindering effects of SCBA use on fire investigations. Meanwhile, researching the types and effectiveness of smaller respirators, which do not have the same hindering effects. Even NFPA 1404 itself, which defines a respiratory hazard as "any exposure to products of combustion, superheated atmospheres, toxic gases, vapors, or dust, or potentially explosive or oxygen deficient atmospheres, or any condition that creates a hazard to the respiratory system", specifically states, "Respiratory protection shall be used by all members who are exposed to respiratory hazards or who might be exposed to such hazards without warning. Members who are operating in areas that might be subject to these hazards where there is sufficient warning to don respiratory protection equipment shall have respiratory protection equipment readily available for use."

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