

**DEVELOPING A CANCER PREVENTION PROGRAM
FOR THE ARLINGTON COUNTY FIRE DEPARTMENT**

Executive Leadership

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An applied research project submitted to the National Fire Academy
As part of the Executive Fire Officer Program

September, 2001

ABSTRACT

This research project analyzed the association between the fire fighting occupation and the resulting exposure to cancer causing agents. The problem was the Arlington County Fire Department (ACFD) lacked a comprehensive, up to date policy focused on minimizing firefighter exposure to carcinogens within the work environment. The purpose of the project was to recommend a comprehensive cancer prevention program through adoption of a departmental Standard Operating Procedure (SOP).

This research employed both historical and action research methods to (a) determine the extent to which carcinogens are present in the line of duty; (b) examine current work practices which unnecessarily expose firefighters to carcinogens; and, (c) modify work practices to minimize the resulting health risks to firefighters.

Principle procedures employed were (a) a review of the literature written around the topics of cancer and firefighting, and (b) an analysis of potential work changes that decrease exposure to potential carcinogens.

Results from this project showed that firefighters are routinely exposed to carcinogenic agents. Additionally, the literature identified and supported implementation of additional work practice changes.

Accordingly, this project recommended (a) adopting a comprehensive cancer prevention SOP, (b) training all ACFD personnel with the SOP and relevant background material, (c) developing guidelines to report violations of the SOP, and (d) continuing to review the SOP to insure that cancer prevention remains a top ACFD priority.

TABLE OF CONTENTS

ABSTRACT.....	2
TABLE OF CONTENTS	3
INTRODUCTION.....	4
BACKGROUND AND SIGNIFICANCE	5
LITERATURE REVIEW	6
PROCEDURES.....	14
RESULTS	17
DISCUSSION	18
RECOMMENDATIONS.....	19
REFERENCES.....	21
APPENDIX A - DRAFT STANDARD OPERATING PROCEDURE	24

INTRODUCTION

The Arlington County, Virginia Fire Department (ACFD) has lost several members in recent years to various forms of cancer. These losses have not only been traumatic for those affected and their families, but also for the ACFD. These losses have also come in spite of the ACFD's existing health and wellness programs. Additionally, Virginia is one of several states that recognize cancer can be caused by exposure to carcinogens routinely found in the fire-fighting profession. The problem was the ACFD lacked a comprehensive, up to date policy focused on minimizing firefighter exposure to carcinogens within the work environment.

The purpose of this research project was to develop Standard Operating Procedure (SOP) regulating work practices so as to minimize exposure to potential carcinogens. The SOP needed to address all areas and types of work where employees may be exposed, including but not limited to: emergency operations, in-station work environments, training, and maintenance practices. Historical and action research methods were used to answer the following questions:

1. To what extent are firefighters exposed to potential carcinogenic agents as part of their normal work environment?
2. What current work practices expose fire fighters to potential carcinogenic agents?
3. What work practice changes could be instituted to minimize exposure to potential carcinogenic agents?

BACKGROUND AND SIGNIFICANCE

The Arlington County, Virginia, Fire Department (ACFD) serves the County of Arlington and the City of Falls Church, Virginia, both of which are densely urban municipalities bordering on the District of Columbia in the northern region of Virginia. The department, consisting of 283 personnel, operates from ten stations and provides the following services: fire suppression, emergency medical aide (including transport), technical rescue, hazardous materials control, code enforcement, and fire safety education. Viewed in many circles as a “state of the art” progressive department, the ACFD’s proud history includes hiring the nation’s first female professional firefighter in 1974. In partnership with the U. S. Public Health Service, the ACFD has been instrumental in the national program of Metropolitan Medical Strike Teams and the National Medical Response System in response to the terrorist attack on the Tokyo subway system in 1995.

During the past seven years, the ACFD has observed a number of current and recently retired members diagnosed with various forms of cancer. A Battalion Chief diagnosed with pancreatic cancer, and a firefighter, diagnosed with cancer of the intestines, both died as a result of their cancers. Another Battalion Chief diagnosed with cancer of the intestines, and a firefighter diagnosed with non-Hodgkin's lymphoma, are currently receiving medical treatment for their cancerous conditions. Furthermore, during the same time frame, a number of retired members have been diagnosed with cancer such as metastatic brain tumors, colorectal cancer, and numerous cases of lung cancer.

In the 25 years prior to 1994, the ACFD has no record of any active duty member being diagnosed with a potentially fatal cancer. These high profile cases have heightened the

department's awareness of the potential risk of cancer in the fire fighting profession. The department has reduced exposure to certain carcinogens, specifically vehicle exhaust and the use of tobacco products by members. However, the broad range of newly diagnosed cancers indicate the department must examine the entire spectrum of potential carcinogens and implement a comprehensive program to reduce potential cancer risks.

The National Fire Academy's Executive Leadership Course promotes problem-solving skills as essential for the Executive Fire Officer (National Fire Academy, 2000). Cancer as a potential threat to all firefighters' health and well-being is generally recognized. Implementing safeguards in the work environment can reduce this threat. This project provides guidance to the ACFD by examining studies on the cancer risk in fire fighting and developing a comprehensive program to limit exposure to known carcinogens. A Standard Operating Procedure, found in Appendix A, outlines this program for the Department.

LITERATURE REVIEW

Cancer is a broad term encompassing 200 diseases found in distinct body sites that have a common property - their cells divide wildly to create life-threatening tumors (Pierce, 1999, p. 3). Along with a number of states, Virginia presumes certain cancers are an occupational illness and, therefore, is compensable under the state's workers' compensation law (Code of Virginia, 1950).

General Fire Fighting and Cancer

Literature studies, from 1990 through to the present, were examined for evidence of a causal relationship between fire fighting and types of cancer and yield the following results. In 1990, Sama et al. reported a statistically significant elevation of risk for melanoma and bladder

cancer among firefighters in Massachusetts during the period of 1982 to 1986 (p. 53). A 1990 British report concluded "inhalation of carcinogenic and toxic compounds during fire fighting may constitute an occupational cancer risk" (Hansen, 1990, p. 805). Comparing firefighters with other civil servants, Hansen reported an excess mortality from cancer for firefighters aged 30 to 74, a significant increase in lung cancer in the age range 60 to 74, and an alarming increase in non-pulmonary cancer in the group aged 30 to 49 (p. 806-807).

Conversely, in 1991 Beaumont et al. reported on a cohort study of 3066 San Francisco firefighters. Fewer cancer deaths overall were noted during the period from 1940 through 1970 when compared to the general population, although a significant number of firefighter deaths from esophageal cancer (12 observed versus 6 expected), cirrhosis and other liver diseases (59 observed versus 26 expected), and accidental falls (21 observed versus 11 expected) exceeded expectations (p. 357). Being limited by studying only older cohorts, this study noted a changing risk of exposure for firefighters due to the increased use of synthetic materials in society, resulting in dangerous chemicals being found in the products of combustion. Additionally, this study recommends the effects of modern day exposures be documented for additional future research (p. 369).

Contrasting with the above retrospective studies, a Columbia University team reported a study that examined the blood samples of 226 New York City firefighters for traces of various oncogene proteins and growth factors that can induce human cancers (Ford, et al., 1992). Matched against control samples of similar age, sex, race and smoking status, 14 percent of those firefighters with no known exposure to asbestos demonstrated radio graphic evidence of asbestos exposure, a rate considerably higher than expected based on chest X-rays of the general

population. Samples manifested evidence of β -transforming growth factor in 14 percent of the firefighter samples compared to zero in the control group. In conclusion they state, "The statistically significant finding of such a high percentage of firefighters with abnormal expression of a particular growth factor related proteins in their serum results compared to negative results in otherwise similar, unexposed, healthy controls raises the possibility that this growth factor may be related to pathological processes induced by fire fighting exposures" (p. 41).

Demers, Heyer and Rosenstock (1992) reviewed mortality status of firefighters in Seattle and Tacoma, Washington, and Portland, Oregon, for evidence of increased risk of cancer (among other issues), resulting from occupational exposure to fire smoke. They concluded "there was no excess risk from cancer but excesses of brain tumors and lymphatic and haematopoetic cancers were found" (p.664). Alarmingly, the risk of lymphatic and haematopoetic cancer increased with tenure in the profession, especially for leukemia (p. 668). Furthermore, they detected a twofold excess of multiple myeloma relative to the control group (p. 668). In view of the fact that firefighters are a healthier group when compared to the general population, this is surprising. Stringent pre-employment physical standards as well as maintaining those standards throughout employment should give firefighters "the healthy work effect" (Monson, p. 425), not the elevated excesses found by Demers (1992, p. 664).

In the Canadian Province of Alberta, Guidotti (1993) studied the mortality statistics of urban firefighters in Edmonton and Calgary during the period from 1927 to 1987. Previous studies found malignant neoplasms and cancers of the lung, bladder, kidney and ureter, colon and rectum, pancreas, as well as leukemia, lymphoma, and myeloma. Further reports associated

fire fighting with cancers at genitourinary sites (p. 921). All other cancers appeared uncorrelated (p. 934).

Continuing their previous research, Demers et al. examined the incidence of cancer in a cohort of 2,447 male firefighters in Seattle and Tacoma, Washington, during the period 1974 to 1989. This 1994 study compared the incidence of cancer among a cohort of firefighters with a similar cohort of police officers and a statistically relevant group of the general population. Overall risk of cancer between the groups of firefighters, police officers, and the general population appeared similar (p. 129). Risks of colon and prostate cancer slightly elevated for firefighters and increased with duration of employment. Fortunately, these results are less distressing than their 1992 study. Demers attributed this to increased use of personal protective equipment and the self-contained breathing apparatus (p. 134).

Following the 1993 study of Canadian firefighters, Guidotti (1995) published a review of then current literature assessing the association between firefighters and disease risk (p. 1348).

Among Guidotti's conclusions are:

- Lung Cancer: Evidence exists for an association but not of sufficient magnitude for a general presumption of risk.
- Cancers of the genitourinary tract, including kidney, ureter and bladder: The evidence strongly suggests both an association and a general presumption of risk.
- Cancer of the brain: Incomplete evidence suggests a possible correlation at a magnitude consistent with a general presumption of risk.
- Cancer of lymphatic and hematopoietic tissue: By group, there is some evidence for both an association and a general presumption of risk. However, the aggregate is

medically meaningless. Recommend a case-by-case approach.

- Cancer of the colon and rectum: There is sufficient evidence to conclude an association but not a general presumption of risk (p. 1354).

Golden, Markowitz and Landrigan (1995) investigated the association between fire fighting and cancer by expanding sources of exposure beyond fire ground to include the fire station environment (p. 804). By examining 19 epidemiological studies of cancer and firefighters, they deduced that firefighters daily risk exposure to the following known carcinogens: benzene, asbestos, polycyclic aromatic hydrocarbons (PAHs), formaldehyde, diesel exhaust and PCBs (pp. 804-807). Well established as a human carcinogen, benzene is second only to carbon monoxide as the most common chemical substance detected at fires (p. 804). Exposure to asbestos has been detected in 13% of firefighters that had no known prior asbestos exposure (p. 805). The presence of PAHs exposes firefighters to a variety of cancers, including cancer of the skin, lung, kidney, and bladder (p. 806). Formaldehyde, a probable human carcinogen, has been measured at fire scenes (p. 806). Also potentially carcinogenic constituents of diesel exhaust from diesel engine emissions pollute the workplace when vehicles are started inside or backed into fire stations (p.807). Consequently, Golden et al. state that, "...employment as a firefighter increases the risk of developing and dying from certain specific cancers: leukemia, non-Hodgkin's lymphoma, multiple myeloma, and cancers of the brain, urinary bladder, and, possibly, prostate, large intestine and skin" (p. 807).

Moen and Øvrebø (1997), focusing on firefighters' exposure to PAHs, tested students at a firefighter training school for metabolites of PAHs after extinguishment exercises. The metabolite 1-Hydroxypyrene is detectable in the urine of test subjects even after brief periods of

fire fighting. Apparently, even momentary periods of exposure to products of combustion could present a cancer risk to firefighters (pp. 515-518).

The most recent examination of these issues conducted by Melius (2001) concluded that firefighters are at risk for the following: leukemia, multiple myeloma, a non-Hodgkin's lymphoma, and cancer of the brain as well as bladder. The literature is replete with studies that suggest an increased risk for cancers of the rectum, colon, and prostate along with melanoma (p. 105).

Diesel Engine Exhaust

In the period between 1986-1988, five long-term animal studies and two epidemiologic human studies all conclude that exposure to diesel exhaust causes cancer (Montague, 1989). Compared to gasoline-powered engines, diesel engines emit 50 to 80 times more particles, which are easily inhaled into the lungs and consist of carbon coated with PAHs (New Jersey Department of Health and Senior Services [NJDHSS], 1994, p. 1). The 1988 release of *Current Intelligence Bulletin 50, Carcinogenic Effects of Exposure to Diesel Exhaust* by the National Institute for Occupational Safety and Health (NIOSH) reverses previously held opinions concerning diesel exhaust toxicity and states there is "Potential occupational carcinogenic hazard in human exposure to diesel exhaust" (NJDHSS, p. 2).

Muscat and Wynder published two papers, one on diesel engine exhaust and lung cancer (1995, *Diesel Engine Exhaust...*) and the second studying the role of diesel engine exhaust with laryngeal cancer (1995, *Diesel Exhaust, Diesel Fumes...*). Both studies employed purely retrospective methods and statistical analyses to report their findings of unproven associations. With regard to lung cancer, they detected a statistical but no causal relationship between long-

term exposure (greater than 20 years) to diesel exhaust and the risk of lung cancer for locomotive engineers, brakemen, and diesel engine mechanics (1995, *Diesel Engine Exhaust...*, p. 817).

With regard to laryngeal cancer they reported, "No association was observed between jobs that entailed exposure to diesel fumes, such as automobile mechanics, and the risk of laryngeal cancer" (*Diesel Exhaust, Diesel Fumes...*, p. 440).

Nevertheless, Nauss (1997) reporting on the analysis done by the Diesel Working Group (DWG) that reviewed over 30 epidemiologic studies of workers exposed to diesel emissions in occupational settings for the period 1950 through the early 1980s empirically states, "The epidemiologic data are consistent in showing weak associations between exposure to diesel exhaust in lung cancer. The available evidence suggests that that long-term exposure to diesel exhaust in a variety of occupational circumstances is associated with a 1.2 to 1.5 fold increase in the relative risk of lung cancer compared with workers' classified as not exposed" (p. 4).

Furthermore, they decry that most epidemiological studies involving diesel exhaust rely solely on work histories reported by the subjects or their next of kin. The absence of concurrent exposure information is the key factor that limits interpreting these epidemiological findings, making them poor models for quantitative estimates of cancer risks. Whereas animal studies have been used to determine exposure-dependent increases in the incidence of benign or malignant tumors, the DWG recommends caution in extrapolating these results to humans because various animal species respond differently to high level exposure to diesel exhaust (p. 5). Acknowledging the existence of a large amount of data about the cancer risks of emissions, the DWG recommended further study to scientifically determine the link between lung cancer and exposure to diesel emissions (p. 7).

Confirming the results of the DWG, Valberg and Crouch (1999) reported that rats exposed to varying concentrations of diesel exhaust particulates unless exposed to high concentrations ($>1,000\mu\text{g}/\text{m}^3$) over a lifetime, do not develop tumors. Statistically translating this to the human likelihood of tumor generation, the results approach zero (pp. 663-667).

However, there are other hazards associated with exposure to diesel exhaust. The Kilburn report (2000) evaluated the pulmonary function, symptom frequencies, and Profiles of Mood States of subjects chemically exposed to diesel exhaust. Findings include: impaired balance, blink reflex latency, reduced visual field performance, delayed ability to perform simple or complex tasks, and general confusion (p. 6). Kilburn concluded that diesel fumes impair the central nervous system (CNS) function even when exposure is less than one year (p. 6). These serious findings indicate that further investigation between diesel exhaust exposure and CNS impairment is imperative (p. 7).

The Environmental Protection Agency's National Center for Environmental Assessment is in the final stages of producing *Health Assessment Document for Diesel Exhaust* with publication due later this year. Draft documents are available for review, though pre-publication notices preclude citing or quoting from the draft. Once published, this tool may be the definitive work on this topic.

Summary

Eleven studies and reports were examined under the category general fire fighting and cancer. Of those eleven studies or reports, ten directly linked exposure to the products of combustion and the development of cancer. Only one study (Demers et al., 1992) concluded no excess risk of developing cancer. Demers et al. (1992) did however report an excess correlation

for brain tumors, lymphatic and haematopoietic cancer and myeloma but did not commit to stating there was a direct cause and effect relationship between the two. Golden et al. (1995) and Scannell and Balmes (1995) additionally linked fire fighting with specific carcinogens found both in the fire incident scene and in the fire station work environment. This was confirmed, in part, by Moen and Øvrebø (1997) for the fire scene work environment with their report of urinalysis results post fire fighting. Fortunately, Demers et al. in their 1994 study point to a lower incidence of cancer from levels anticipated and attribute the decrease to more prevalent use of personal protective equipment and self-contained breathing apparatus.

Similar trends exist with respect to diesel exhaust and exposure of fire fighters. Most studies (Muscat and Wynder, both 1995 studies; Nauss, 1997; Valberg and Crouch, 1999) link exposure to exhaust emissions and the development of cancer. These reports were based on both retrospective analysis and animal studies and were reticent to draw direct cause and effect relationship between the two. More recent reports, including Kilburn (2000) and the soon to be released EPA report, however, point to specific physiologic results from exposure to diesel exhaust.

With the identification of carcinogenic agents present in the fire fighting work environment and these more recent studies drawing direct links between carcinogens and specific physiologic changes, work practices can be altered to minimize exposure.

PROCEDURES

Definition of Terms

Cancer. A group of diseases characterized by uncontrolled growth and spread of abnormal cells. Uncontrolled spread can result in death (Haylock, 2001, p. 8).

Carcinogenic. A substance or agent producing or inciting cancer (Mish, 1987, p. 206).

Cohort Study. A group of individuals having a statistical factor (as age or class membership) in common in a demographic study (Mish, 1987, p. 257).

Epidemiology. The study of disease in the population, defining its incidence and prevalence and examining the role of external influences (Gooderson, 1998).

Tumor. An abnormal mass of tissue that is not inflammatory, arises without obvious cause from cells of preexisting tissue, and possesses no physiologic function (Mish, 1987, p. 1270).

Research Methodology

The purpose of this research project is to proffer a Standard Operating Procedure (SOP) instituting changes in work practices for members of the ACFD. While conducting historical research through a comprehensive literature review, the potential cancer risks of current occupational fire fighting activities became apparent. Fortunately, the literature review also identified specific recommendations to reduce exposure to potential carcinogens.

The action research method applied the principles gleaned from the historical portion of the research to the work environment of the ACFD. Consolidated principles and guidelines which correlate with the desired goals of the ACFD, make up the practices within the draft SOP. The standard for inclusion within the SOP were guidelines or recommendations that appeared in similar form in multiple publications or sources. Work practice guidelines were then adapted specifically to target cancer risk areas for firefighters by preventing or limiting firefighter exposure to carcinogens. Additionally, the proposed guidelines were written in the form and style customary to the ACFD. This process has produced a draft SOP for submission to the

ACFD for adoption and appears as Appendix A of this report.

Assumptions and Limitations

This project assumed that the following statements are true. Firefighters within the ACFD statistically correlate to firefighters around the country that various investigators have studied. The potential for exposure to carcinogenic agents within the firefighter occupation in Arlington County parallels the occupational hazards experienced by other fire fighting departments.

Tobacco use and its association with cancer (lung, oral, etc.) comprise no part of the preventative practices included in the draft SOP for several reasons. First, the ACFD has prohibited employees hired after 1981 from smoking as a result of the Commonwealth of Virginia passing its Heart and Lung Law (Code of Virginia). Secondly, the ACFD prohibits the use of smokeless tobacco by employees hired after 2000. Finally, overwhelming evidence exists in the general domain connecting tobacco use with cancer.

This research reviews multiple studies with similar topics and few direct studies. For example, Beaumont et al., Golden et al., Gooderson, Guidotti (1995), and Melius all review multiple studies related to their research topic. The remaining sources are large studies, like the reports by Demers et al. on firefighters in the State of Washington; Guidotti's 1995 study of firefighters in the Province of Alberta, Canada; and the Sama et al. review of Massachusetts' firefighters during the 1980s.

RESULTS

This project has led to a draft Standard Operating Procedure that delineates, among other things, a Cancer Prevention Program for the ACFD (see Appendix A).

Answers to Research Questions

Research Question 1. Based on the review of available literature on this topic, firefighters are routinely exposed to carcinogenic agents. These agents result directly from combustion and correlate positively with the development of specific cancers (Sama et al., 1990; Hansen, 1990; Golden et al., 1995; Melius, 2001). Additionally, fire apparatus poses a threat of cancer as diesel engine exhaust, composed of carcinogenic polycyclic aromatic hydrocarbons, also correlates positively with the development of specific cancers (Montague, 1989; NJDHSS, 1994; Nauss, 1997; Roache, 2000).

Research Question 2. Current work practices that expose firefighters to carcinogenic agents include structural fire fighting; emergency medical services, hazardous materials incident mitigation, and the presence of vehicles that emit diesel exhaust.

Research Question 3. Based on the review of available literature on this topic, the following work practice changes will reduce exposure to carcinogenic agents and thereby reduce the potential for the development of certain cancers. First, greater use of self-contained breathing apparatus (SCBA) and personal protective equipment (PPE) can minimize the inhalation or absorption of carcinogenic agents. Firefighters should wear SCBA in circumstances beyond their currently accepted use, such as automobile fires and outside fires. Second, firefighters must check additional parameters before declaring atmospheres as non-

hazardous after the use of SCBA. These should include tests for presence of benzene, asbestos, polycyclic aromatic hydrocarbons (PAHs) or formaldehyde (Melius, 2001, p.106-107). Third, firefighters should decontaminate their PPE regularly to remove cumulated products of combustion. As PPE can spread contaminants, they should not be allowed in living quarters of fire stations (NJDHSS, 1994, p.2). Lastly, firefighters must control vehicle engine exhaust, especially diesel engine exhaust, in the fire station environment. Mandatory use of exhaust removal systems should be the standard practice. (NJDHSS, 1994; Nauss, 1997; and Roache, 2000).

DISCUSSION

Directly resulting from this project, the SOP on Cancer Protection, best presents the compilation of trends, warnings, and recommendations found in the literature. Although, the literature does not directly stipulate the importance of placing all the components in one document, the ACFD has previously disseminated global procedures and guidelines in this manner.

The purpose statement originates from the Code of Virginia. Medical terms used in the SOP have come from the literature (Haylock, 2001; Mish, 1987; and Gooderson, 1998). The background section expounds on the provisions of the Code of Virginia, specifically that cancer is presumed under the law to be an occupational disease under certain circumstances.

The procedure section briefly delineates the current scientific evidence, purposing to inform and exhort the reader, for their own welfare, to make prudent choices to minimize exposure to carcinogens. Procedures and practices outlined change current practice with respect to fire fighting operations, emergency medical operations, and fire station - work site practices.

With respect to fire fighting operations, the literature clearly shows that certain carcinogenic agents are present in products of combustion routinely seen at fires. Reducing exposure by greater use of SCBA, additional testing to assure clear air prior to removal of SCBAs, increased use of decontamination, and regular cleaning of PPE to remove cumulative contaminants are prudent practices that minimize exposure to carcinogens. Emergency medical practice recommendations re-emphasize those previously made in the components of the ACFD exposure control plan. These practices guard members from potentially infectious material while also protecting them from potential carcinogens.

Fire station work site practice changes cover the two main areas of isolating fire fighting PPE from living areas and controlling vehicle emissions while the fire apparatus is in the station. Fire fighting PPE accumulates contaminants between cleaning cycles. Isolation of PPE limits the time members are exposed to those contaminants. The literature clearly indicates the advantages of limiting exposure to contaminants so that the members' cumulative exposure level remains as low as possible. The National Institute of Occupational Safety and Health has deemed diesel emissions carcinogenic. Gasoline powered vehicles also emit toxic exhaust gases that can accumulate in fire stations. Work practice changes in the SOP expand the use of previously installed vehicle exhaust removal systems. Furthermore, it prohibits bringing any vehicle into the fire station that cannot be attached to the vehicle exhaust removal system, avoiding even small amounts of exhaust accumulation.

RECOMMENDATIONS

The Arlington County Fire Department (ACFD) should adopt the Standard Operating Procedure (SOP) on Cancer Protection. Additionally, and equally important, the department

should conduct mandatory training on the SOP for all members. By including scientific evidence for the correlation between fire fighting and cancer risk in addition to the carcinogenic nature of diesel engine exhaust, ACFD members can limit their cancer risk through wise personal choices. Training must also include violation-reporting guidelines for successful implementation of this SOP. Periodic review of violations and reporting guidelines can enable the ACFD management to address swiftly and comprehensively the serious issues arising from these infractions.

As scientific research continues to unfold, ACFD management should periodically review the state of the art as reported in the literature, as well as the SOP, to incorporate and implement the most up to date practices. Periodic reviews should not exceed 24 months in frequency and the release of a major study on the correlation between cancer and fire fighting should trigger an automatic review. Reviews should consider current work practices that need further adjustment and address the level of members' compliance with the SOP. Additions or changes should be made based on this review.

This project strongly encourages further, timely research into the potential risks inherent to the fire fighting profession. The health and welfare of firefighters is too important to squander through ignorance.

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APPENDIX A

DRAFT STANDARD OPERATING PROCEDURE

	ARLINGTON COUNTY FIRE DEPARTMENT STANDARD OPERATING PROCEDURE	
	OFFICE OF THE FIRE CHIEF	
	SUBJECT: Cancer Protection Program	SOP# OFC **
	APPROVED: John J. White Assistant Fire Chief, TSD	Initiated
APPROVED: Edward P. Plaucher Fire Chief	Revised	

A. PURPOSE

To provide procedures and guidelines for the Cancer Protection Program in response to the Commonwealth of Virginia's Workers' Compensation cancer presumption provision found in §§65.2-402 Code of Virginia, 1950 as amended.

B. DEFINITIONS

Cancer: A group of diseases characterized by uncontrolled growth and spread of abnormal cells. If the spread is not controlled, it can result in death.

Carcinogenic: A substance or agent producing or inciting cancer.

Epidemiology: The study of disease in the population, defining its incidence and prevalence and examining the role of external influences.

Occupational disease: a disease presumed to be contracted because of, or suffered in, the line of duty unless such presumption is overcome by a preponderance of competent evidence to the contrary.

Toxic substance: A known or suspected carcinogen, as defined by the International Agency for Research on Cancer, and which causes, or is suspected to cause, leukemia or pancreatic, prostate, rectal, throat, ovarian or breast cancer.

Tumor: An abnormal mass of tissue that is not inflammatory, arises without obvious cause from cells of preexisting tissue, and possesses no physiologic function.

C. BACKGROUND

§§65.2-402 Code of Virginia, 1950 as amended, recognizes certain cancers as occupational diseases for firefighters who have been exposed to a toxic substance during their employment and after the firefighter has had a minimum of twelve years service. The cancers referenced are pancreatic, prostate, rectal, throat, ovarian or breast cancer or leukemia. This provision is enacted in response to growing evidence that fire fighting as an occupation has been linked to development of the listed cancers. Exposures to toxic substances have thus been judged to be part of the occupation and firefighters who contract these cancers, and who meet the other provisions cited in the Code, are presumed to have contracted them in the line of duty. Line of duty injuries and occupational diseases are compensable under the Commonwealth's Workers' Compensation Act.

The Arlington County Fire Department remains committed to the health, welfare and safety of its members and as such, is instituting the following procedures and guidelines to reduce exposure of these toxic substances. The reduced exposure should translate to lower potential for the development of these cancers in members. All members need to be personally aware of the nature of these toxic substances and do their part in controlling their personal exposure levels.

D. PROCEDURE

1. General

Like any environmental factor linked to cancer, there has been no direct cause to effect relationship between any single agent (fume, chemical, behavior, activity, etc.) and the formation of cancer. However, there is a large body of evidence correlating fire fighting and cancers, sufficient to warrant the occupational disease presumption listed previously. As such, it is prudent to take every possible precaution to prevent and/or limit exposure to known carcinogens present in the environment firefighters find themselves. Many studies also note that single event exposures translating to the formation of cancer is, while possible, less likely than the cumulative effect of repeated exposures over time.

These practices are only as effective as the choice individuals make to follow them or disregard them. The more frequently these practices are followed the sum of cumulative exposures is reduced which in turn lowers the risk for cancer formation. Additionally, each time an exposure is prevented another potential single exposure event is eliminated.

2. Fire Fighting Operations

a. Self-contained Breathing Apparatus (SCBA)

- i. Members shall don SCBA on any incident where the potential exists for exposure to the products of combustion.

- ii. Members shall go 'on-air' any time there is smoke and/or vapors of any kind present in the atmosphere. This includes outside fires and vehicle fires. If a member questions themselves whether they should be 'on-air' or not, the answer is YES.
 - iii. Every effort should be made to use detectors or meters to investigate an odor rather than the member's sense of smell.
 - iv. Once members are 'on-air' during an incident, they shall not go 'off-air' until either they are clear of the immediate area of contamination or the atmosphere has been declared safe and the Incident Commander has approved an 'all-clear' message.
 - v. An 'all clear' message shall not be transmitted until the atmosphere has been tested and the following potentially carcinogenic products of combustion are found not to be present: benzene, asbestos, polycyclic aromatic hydrocarbons (PAHs) or formaldehyde. These are in addition to the parameters currently tested to declare an 'all clear'.
- b. Personal protective equipment (PPE) including SCBA shall be field decontaminated after each and every occurrence where they are exposed to products of combustion.
 - c. Members should make every effort to assure that PPE is donned completely, including all straps, buckles, hook and loop closures, etc. so that no skin is exposed to hazardous atmospheres.
 - d. Turnout gear shall be routinely cleaned according to guidelines found in SOP TSD 2 - PPE Cleaning, to remove any accumulated contaminants, which may have gathered on garments.

3. Emergency Medical Operations

- a. SOP OPS H&S 2 - Guidelines for Infection Control at Scene provides direction and guidance for exposure control during emergency medical incidents.
- b. SOP OPS H&S 3 - Medical Waste Management provides direction and guidance to protect members and the public from contaminants found on medical waste.
- c. SOP OPS H&S 4 - Post-response Cleanup (medical) provides direction and guidance to protect members from exposure to contaminants while performing decontamination after an emergency medical incident.

Fire Stations - Work Sites

- a. Personal Protective Equipment (PPE)
 - i. After returning to quarters from an incident requiring field decontamination, complete decontamination of all affected PPE shall be performed.
 - ii. PPE shall not be allowed into any living area of a fire station. Doors and passageways shall be marked accordingly.
- b. Engine Exhaust
 - i. No vehicle shall be brought into a fire station unless it can be connected to the *Plymovent* Engine Exhaust Removal System installed in each station.
 - ii. Vehicles entering fire stations shall be connected to the *Plymovent* system prior to entering the station and shall remain connected to it until it exits the station.
 - iii. All vehicles, regardless of fuel type (diesel or gasoline) shall use the *Plymovent* system while inside a fire station.
- c. Uniforms
 - i. Contaminated boots will be brush scrubbed with a solution of hot, soapy water, rinsed with clean water, and allowed to air dry.
 - ii. Contaminated work clothing will be removed and replaced with clean clothes. Personnel will shower if body fluids were in contact with skin under work clothing. Each individual shall keep a minimum of one clean, complete work uniform available at the station.
 - iii. Contaminated work clothing will be laundered at the station using hot water and soap. Contaminated work clothing is NOT to be laundered at home.

E. PROGRAM MANAGEMENT

The Technical Services Division in general, and the Health, Wellness and Safety Officer in particular, is responsible for this program.

END