Evaluating Cancer Risk Reduction Curriculum at the Mississippi State Fire Academy

Robert M. Hinkle

Mississippi State Fire Academy

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Abstract

After the attacks on the World Trade Center in New York City firefighters became increasingly aware of exposures to harmful contaminants. This single event marks a turning point in the firefighting community. It paved the way for several research projects and even helped the United States Congress recognize the potential health effects in the form of the Zadroga Act.

The Mississippi State Fire Academy (MSFA) is officially designated as the agency to conduct training for fire personnel on a statewide basis to all duly constituted fire departments in the state of Mississippi. It is imperative that the MSFA continually evaluates its curriculum. The problem was the MSFA had not evaluated the presence of cancer risk reduction programs in its current curriculum. The purpose of this research was to determine the presence of cancer risk reduction programs in the MSFA curriculum. Descriptive research utilizing surveys and interviews were used to answer three research questions: (a) Which courses does the Mississippi State Fire Academy currently offer which provides students with information regarding the reduction of firefighter cancer risks? (b) To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses? (c) What percentage of students who attend the Mississippi State Fire Academy actively participate in firefighter cancer risk reduction programs or activities at their own departments?

The research discovered that instructors were providing students with cancer risk reduction information but primarily through informal discussions. The research also identified areas of improvement for the MSFA curriculum. This research also suggests that the MSFA uses a more in-depth analysis to understand the extent of which instructors are discussing firefighter cancer risk reduction practices.

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Firefighters are known for charging into dangerous environments to save others. On September 11, 2001 (9/11) at 8:26 am a commercial airliner crashed into the North Tower of the World Trade Center in New York, New York. Hundreds of firefighters from the Fire Department of New York (FDNY) responded to the incident and were actively involved in life-saving operations when a second plane struck the South Tower of the World Trade Center at 9:03 am (National Commission on Terrorist Attacks upon the United States, 2004). The attack on the World Trade Center killed 343 FDNY firefighters. Since the initial attack over 110 FDNY firefighters have reportedly died from their 9/11 related injuries (Never Forget Project).

The attacks on 9/11 spawned a discussion nationwide about the potential health dangers firefighters face. One of the most notable advocates for firefighters and their growing cancer risks was Raymond Pfeifer. Raymond Pfeifer, or Ray as many people called him, was an FDNY firefighter that worked at the World Trade Center on 9/11. Ray contracted Kidney Cancer and later became one of the prominent leaders in the passing of the James Zadroga 9/11 Health and Compensation Act (Zadroga Act). The Zadroga Act was introduced in 2009 by Congresswoman Carolyn Maloney and allowed individuals to file claims for compensation under the September 11th Victim Compensation Fund of 2001 (United States Congress, 2015). The Zadroga Act acknowledged the health risks firefighters faced on 9/11 and further educated members of the fire service about their increased risks associated with performing their jobs.

Since that fateful day, the fire service learned that many responders contracted illnesses directly related to their work at the site of the World Trade Center. This single incident has created a discussion about firefighter cancer risk reduction which most likely would have never gained the publicity truly needed to create change. Many additional studies have taken place

since 9/11. Most notably a study by the Center for Disease Control (CDC) provided further evidence that firefighters are at an increased risk of certain types of cancer as a result of occupational exposure (Center for Disease Control, 2016).

The problem is the Mississippi State Fire Academy (MSFA) has not evaluated the presence of cancer risk reduction programs in the current curriculum. Neglecting to assess curriculum at the MSFA can and will lead to gaps in the training of firefighters across Mississippi. The purpose of this research is to determine the presence, or lack thereof, of cancer risk reduction programs in current MSFA curriculum. The descriptive research method was used to efficiently measure the current status of MSFA curriculum and the inclusion or absence of cancer risk reduction programs. Surveys of students and staff members at the MSFA, as well as interviews of MSFA staff, would provide descriptive information regarding the MSFA's current curriculum.

To efficiently evaluate cancer risk reduction curriculum at the MSFA three research questions were used. The following questions were answered during this research: (a) Which courses does the Mississippi State Fire Academy currently offer which provides students with information regarding the reduction of firefighter cancer risks? (b) To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses? (c) What percentage of students who attend the Mississippi State Fire Academy actively participate in firefighter cancer risk reduction programs or activities at their own departments? These questions were asked to address several concerns at the MSFA. The first question was to determine the presence of actual written curriculum within MSFA courses. The second question was asked to discover if instructors on staff have created discussions about cancer risk reduction even if cancer risk reduction concepts were absent from the curriculum

they were using. The last question directed at students who attend the MSFA was whether or not they are actively involved in cancer risk reduction programs at their own departments.

Background and Significance

In 2010 the National Institute for Occupational Safety and Health (NIOSH) and the United States Fire Administration (USFA) announced the initiation of a study of cancer amongst firefighters in the United States. This study is still ongoing but has given us preliminary results of a staggering nature. What was supposed to begin with a survey of approximately 18,000 firefighters has already grown past 30,000 and continues to grow. The purpose of the study was to understand a potential link between cancer and firefighters. Overall NIOSH identified that firefighters are at a higher risk of contracting certain types of cancer than the general population (National Institute for Occupational Safety and Health, 2013). Given the initial findings, it is of great importance that the fire service looks for ways to reduce firefighter cancer risks. The MSFA is officially designated as the agency to conduct training for fire personnel on a statewide basis to all duly constituted fire departments in the state of Mississippi (MS Code Annotated Section 45-11-7, 1972). As changes occur in the fire service, the MSFA strives to improve its courses through research and changes in curriculum. This research is the beginning of a process to address firefighter cancer risk reduction within the curriculum of the MSFA.

The MSFA utilizes twenty-seven staff instructors assigned to four different bureaus to develop and deliver firefighter training courses on campus. In addition to the staff instructors the MSFA contracts forty-three adjunct instructors to deliver off-campus courses. Collectively the MSFA trains approximately 15,000 students each year (Mississippi State Fire Academy, 2018). The impact the MSFA has on the fire service in Mississippi is tremendous. With such a large student attendance the MSFA reaches thousands of firefighters every year. The large volume of

students provides many benefits to the firefighters across the state. The access to training, facilities, and knowledgeable instructors is abundant. To evaluate the MSFA curriculum, the research must first take a look at how courses are organized and managed both on and off campus within the state of Mississippi. The MSFA organizes the instructional staff into four bureaus. These bureaus are each assigned specific disciplines or functions to more efficiently manage courses and curriculum. To evaluate the delivery of cancer reduction programs, activities and curriculum we must first look at each bureau and their responsibilities.

The Certification Bureau provides the majority of career path specific training. Certification Bureau's courses include: Firefighter 1001-I-II, Fire Officer 1021-I-II, Fire Service Instructor 1041-I-II-III, Fire Inspector 1031-I-II, Fire Investigator 1033, Fire Department Safety Officer 1521 and many more. The majority of Certification Bureau's courses are conducted on the campus of the MSFA.

The Special Industrial Bureau provides specialized training and industrial training. The Special Industrial Bureau delivers many specialized courses including Rope Rescue Level I-II, Confined Space Rescue Technician, Hazardous Materials Technician I-II, Swift Water and Surface Water Rescue Levels I-II, Trench Rescue and Emergency Shoring Levels I-II, Vehicle Extrication Levels I-II and many courses for industrial fire brigades. The majority of the Special Industrial Bureau's courses are delivered on the campus of the MSFA. However, through grant funding, the Special Industrial Bureau offers some specialized courses in a field delivery format which are given by adjunct instructors at a host location.

The Extension Services Bureau primarily provides training to firefighters off campus and in field delivery formats. The Extension Services Bureau manages many courses designed for volunteer and rural fire departments. The MSFA Regional Schools are managed by the Extension

Services Bureau which effectively delivers 164 courses in 82 counties across the state of Mississippi. These courses are offered by adjunct instructors and are coordinated by an instructor assigned to the Extension Services Bureau. The MSFA Regional Schools were built to provide rural fire departments with training who may not have the accessibility, scheduling or funding to attend courses on campus. The Extension Services Bureau also delivers several on-campus courses including Mississippi Certified Volunteer Firefighter Module 2, Driver Operator NFPA 1002, Fire and Life Safety Educator 1035-I-II-III, and Public Information Officer NFPA 1035.

The last bureau at the MSFA is the Curriculum Bureau. The Curriculum Bureau maintains course accreditation and testing. While not directly responsible for developing curriculum the Curriculum Bureau oversees the organization and accreditation of all courses delivered by the MSFA instructional staff. The Curriculum Bureau performs a significant amount of work regarding the correlation of applicable standards and the adherence to those standards within the MSFA courses.

Often the MSFA bureaus will duplicate effort by delivering the same course through each bureau. This is common with a course like Hazardous Materials Awareness and Operations. Certification Bureau will deliver the awareness course in its curriculum to recruits as a requirement within the NFPA 1001-I-II standard. Special Industrial Bureau will deliver the same course but targeted toward industrial fire brigades. Lastly, Extension Services Bureau will deliver the awareness course to volunteer and rural fire departments. This seems logical, but in certain situations, the overlapping curriculum can create gaps or inconsistencies which get lost in the curriculum delivery amongst the bureaus.

Each bureau has an Instructor Chief which oversees and manages all courses and instructors within their respective bureaus. With the large number of courses that are delivered at

the MSFA, certain topics, especially new topics, may become absent from curriculum because each Instructor Chief believes the other bureaus are delivering this new content. In 2017 the MSFA delivered nearly 250,000 hours of training. Each bureau delivered the following hours of training: Certification Bureau 77,633, Special Industrial Bureau 57,622, Extension Services Bureau 106,668 and Curriculum Bureau 3,417. Figure 1 provides a percentage breakdown of the hours of training delivered. A critical piece of this research was to determine if cancer risk reduction topics fell through the cracks and are absent from the curriculum.

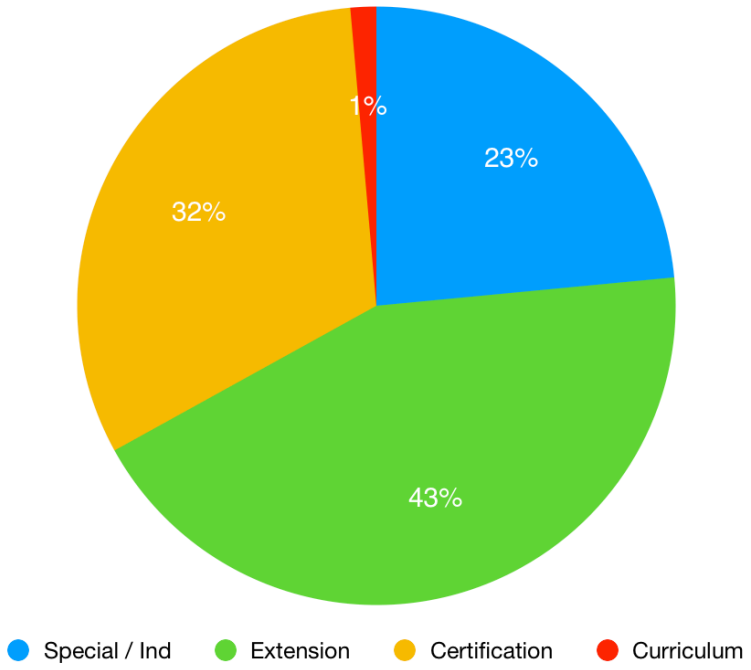

Figure 1. Student Hours Delivered by Bureau.

Given the significance and magnitude of the preliminary results found in the NIOSH firefighter cancer research, the MSFA must take this risk seriously. Neglecting to evaluate cancer risks among firefighters in Mississippi could have a major impact, both short term and long term, to the overall health and quality of life of firefighters within the state. As the leading training

organization in the state of Mississippi, the MSFA has the obligation of pursuing answers to the questions asked in this research.

This research aligns with the strategic framework of the United States Fire Administration by seeking to reduce fire and life safety risks through preparedness, prevention, and mitigation (U.S. Fire Administration). We often think of reduction of fire and life safety risks as immediate or directly related to civilian safety. However, firefighter cancer risks are potentially directly associated with firefighting activities, and instead of immediate outcomes, the fire service can expect to see long-term longitudinal outcomes.

Literature Review

This literature review focused on two primary types of information. The first type was any information regarding the increased risk of cancer among firefighters. It was important to understand the background and potential causes of firefighter cancer to evaluate the inclusion of firefighter cancer risk reduction practices in the curriculum at the MSFA. Instructors may be delivering content at the MSFA but an evaluation of content, both present and not present, in the curriculum must be considered. Another type of information evaluated was the physical text or curriculum given to students while attending courses at the MSFA. This would be specific curriculum delivered for MSFA classes and the inclusion of firefighter cancer risk reduction information.

Let us first look at research which has been conducted on the increased risk of firefighter cancer. The most extensive firefighter cancer research was conducted by NIOSH in it's Study of Cancer among U.S. Fire Fighters. This study began in 2010 and sampled a large population of firefighters. Over 30,000 subjects have participated in the study and are represented by

firefighters from Chicago, Philadelphia and San Francisco. These subjects worked at their respective departments between 1950 and 2010. In the research provided by NIOSH, we learned that firefighters showed higher rates of certain types of cancer than the general population. These were most commonly digestive, oral, respiratory and urinary cancers. The study also showed that firefighters were nearly twice as likely to contract malignant mesothelioma. Interestingly the study linked firefighters with increased fire runs to their increased chance of death from cancer such as leukemia. It was also noted that cases of certain cancers were found among younger firefighters (National Institute for Occupational Safety and Health, 2013).

One of the most challenging aspects of studying firefighter cancer is the ability to identify links which prove firefighters and the jobs they do increase their risk of cancer. One of the most notable studies in this area was published in the Journal of American Medical Association and conducted by the New York City Health Department. The purpose of their research was to evaluate cancer incidence among those enrolled in the World Trade Center Health Registry. This study utilized 55,778 New York State residents. This included some subjects which were rescue or recovery workers. The researchers noted 33,928 subjects were not involved in rescue or recovery efforts and 21,850 were involved in rescue and recovery efforts. In this study, researchers reported that civilians not participating in rescue or recovery efforts did not have an increased incidence of cancer even though they discovered subjects were developing prostate, thyroid and myeloma cancers more prevalently than that of the general population of New York residents. The researchers cited their findings were based on small comparisons and that they could not show significant associations to World Trade Center exposures (Le, Cone, & Kahn, 2012). This research was concluded around ten years after the attacks on the World Trade

Center. It is difficult to say that these results are conclusive at this time. Researchers were only viewing a 10-year sample of possible exposure.

In an article discussing the research conducted by the New York City Health Department, Aria Bendix cited one of the largest caveats to their research was the difficulty to determine latency periods for certain types of cancer. Bendix further explained that strains of cancer like thyroid cancer have about a 2.5-year minimum latency period. This is the time that it would take for a patient to begin showing symptoms. Bendix also explained that the latency period for cancer like mesothelioma, whose main cause is asbestos exposure, can have an 11-year latency period (Bendix, 2015). This is significant considering firefighters working the rescue and recovery efforts were likely exposed to asbestos. The World Trade Center attacks also occurred in 2001 which means certain types of cancer may not show any symptoms until 2012. This also provides information which should encourage the MSFA to strengthen its cancer risk reduction curriculum because increased exposures could be occurring right now but not noticed for years to come.

The incidence of cancer at 9/11 has been a hot topic for some time now. In a comparative study, William Moir and others, looked at firefighter cancer incidences from 9/11 responders as they compared to the results of the NIOSH Study of Cancer among U.S. Fire Fighters. This study aimed to discover if firefighters that worked the rescue and recovery efforts at the World Trade Center had a higher incidence of cancer compared to fellow firefighters studied in Chicago, Philadelphia and San Francisco. The study compared 11,457 World Trade Center exposed firefighters to 8,220 urban non-World Trade Center exposed firefighters. Researchers noted the difficulty in providing enough information to assess the relationship between World Trade Center Exposure and non-World Trade Center Exposure. Research findings discovered no

difference in the relative rates of cancer among the two groups. However, researchers did note elevated thyroid cancer and prostate cancer during their study (Moir, et al., 2016).

It is important to look at reports of cancer incidence among firefighter at the World Trade Center because their exposures led to a much more focused look into the higher incidences of cancer among responders. Large studies are limited regarding cancer research in the firefighter population largely because cancer among firefighters is a relatively new discussion. Reviewing literature from these studies reveals that we are only at the beginning of understanding the risks of cancer among firefighters. Many studies are still relatively new and lack longitudinal comparisons to clearly define the increased incidences of cancer among the firefighting population.

This research not only looked at studies detailing the incidence of cancer among firefighters but also the specific curriculum which was delivered at the MSFA. It was important for the researcher to identify curriculum which specifically addressed firefighter cancer risks. It was also imperative that the researcher evaluates curriculum to find the inclusion, or lack thereof, of material which provided students with information regarding cancer risks.

Students who attend the MSFA are often given a textbook which corresponds to their course. In the NFPA 1001-I-II course, students use the Jones and Bartlett Fundamentals of Fire Fighter Skills Enhanced Third Edition. This text covers NFPA 1001 Level I and Level II skills as well as Hazardous Materials Awareness and Operations. Throughout the entire text, there are only two distinct places where firefighter cancer risk reduction information is provided. The first is found in the care of personal protective clothing when discussing cleaning and inspecting equipment and the second place is in the hazardous materials properties and effects chapter when discussing absorption of chemicals as a route of entry into the body. Surprisingly there is no

information about firefighter cancer risks in the Firefighter Safety chapter of the text (Fundamentals of Fire Fighter Skills, 2014).

Due to the limited information provided in the NFPA 1001-I-II textbook a supplemental fact sheet has been used during the NFPA 1001-I-II course. The Firefighter Cancer Fact Check sheet was provided to students attending the NFPA 1001-I-II course. In this fact sheet, students learn about the increased risk of cancer among firefighters as compared to the general population. Dr. Robert D. Daniels led the largest U.S. firefighter cancer study and provided information on the fact sheet to clarify statistics and also to stop the proliferation of inaccurate results. The fact sheet explains that firefighters have a 9% higher risk of being diagnosed with cancer and a 14% higher risk of dying of cancer compared to the general population. This fact sheet also provides the types of cancer most commonly found among firefighters. The fact sheet lists several cancers which were found at higher incidences including: testicular cancer (2.2 times greater risk), mesothelioma (2.0 times greater risk), multiple myeloma (1.53 times greater risk), non-Hodgkin's lymphoma (1.51 times greater risk), skin cancer (1.39 times greater risk), malignant melanoma (1.31 times greater risk), brain cancer (1.31 greater risk), prostate cancer (1.28 greater risk), colon cancer (1.21 times greater risk) and leukemia (1.14 times greater risk (Firefighter Cancer Support Network, 2013). This information is brief but provides a good foundation for new students learning about firefighter cancer risks.

Another text book used at the MSFA is the Hazardous Materials Technician book by IFSTA. This book is used in the Hazardous Materials Technician course at the MSFA. Although the text does not specifically discuss firefighter increased cancer risks it does describe the role of carcinogens and the potential to be exposed to a hazardous material. This text paints a broad picture of potential exposures to carcinogens. It does not provide detailed information about

structural firefighting and firefighter cancer risk reduction practices. It does, however, explain proper decontamination procedures, proper personal protective equipment selection, air monitoring and the use of respiratory protection for several different incident types. This text does not provide any information about increased cancer incidences within the firefighting population but rather provides some examples where firefighters may become exposed to a carcinogen (IFSTA, 2013).

Overall firefighter cancer risk reduction literature is still fairly new and incomplete. There is an abundance of articles and reports, but most of them share the same information provided by the major studies which have been cited. It is difficult to identify key areas which should be included in the curriculum at this time.

Procedures

This study sought out to find answers to three research questions. These questions primarily utilized descriptive research to determine the current status of the MSFA programs. It was determined by the researcher to primarily conduct surveys to students and staff instructors. Conducting surveys would provide more consistent feedback that would be measurable and provide statistics to compare for potential future program implementation. Two surveys were constructed for this research. The first survey was designed to ask students who attend the MSFA questions regarding their awareness of cancer risks, knowledge of known policies and procedures and active participation in cancer risk reduction programs. The second survey was specifically constructed to gather feedback from instructional staff who actively deliver courses on the campus of the MSFA. It was important to focus on staff instructors on the campus due to their roll in the design of all courses at the MSFA and their high level of student contact hours.

a) Which courses does the Mississippi State Fire Academy currently offer which provide students with information regarding the reduction of firefighter cancer risks? This question will be answered by both students and staff through surveys. During a course of study, students will receive their curriculum often through lectures from instructors. Therefore, what they hear may become part of their course even though the content was not specifically listed in the curriculum of their course. Instructors, on the other hand, are more in tune with what the curriculum states for a given course and they choose to add content which they believe may be important for their students. It was important for this study to utilize surveys to determine if students were learning about the increased risks of cancer in the fire service and how they were learning about this information. It was also important for this research to determine if instructors were delivering content which discussed cancer risk reduction practices or programs.

b) To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses? This question was answered by surveying staff instructors on the main campus of the MSFA. The purpose of this question was to determine if instructors were delivering cancer risk reduction messages even though the curriculum did not specifically address the topic. This question was also answered by conducting interviews with instructors to gather more information about the information provided during courses.

c) What percentage of students who attend the Mississippi State Fire Academy actively participate in firefighter risk reduction programs or activities at their own departments? This question was answered by surveying students who attended the MSFA. If students were receiving cancer risk reduction information, this research question sought to discover if the

students were actively applying cancer risk reduction practices because of the awareness they gained through courses at the MSFA.

The student survey asked many questions beginning with a basic background on their department type, size and the number of years they had been in the fire service. The student's years of service was important to monitor several different levels of classes and when they may or may not have learned about cancer risks in the fire service. The student survey then asked seven questions. These questions were asked in different series. The first series of questions were focused on the student's general knowledge about the increased risk in firefighter cancer. These questions were: *Did you know firefighters are at a greater risk of contracting cancer than the general population? Does your department have any policies or procedures in place to reduce the cancer risks for firefighters?* The next phase of questions on the student survey was constructed to identify the student's active participation in cancer risk reduction practices. These questions were: *If you do not have a fire or emergency where your gear is obviously contaminated how often do you wash your gear? If you do have a fire or emergency where your gear is obviously contaminated what do you do to clean your gear? Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a fire? How soon do you shower after working a fire where you and your gear are contaminated by smoke or by-products of combustion?* The last question was asked to determine if the students had received information about firefighter cancer risk reduction directly from the MSFA. The question asked was: *Has the Mississippi State Fire Academy provided you with any material or courses which discussed the risks associated with cancer in the fire service?* Responses were compiled into a spreadsheet which was used to generated tables and figures.

The research also utilized a survey delivered to instructional staff members at the MSFA. The instructor survey was focused on three main areas of interest. The first area of interest was to determine the instructor's awareness about the increased risk of cancer in the fire service. The first question asked: *Did you know firefighters are at a greater risk of contracting cancer than the general population*? The second area of interest was regarding curriculum and their actual delivery of cancer risk reduction content to students at the MSFA. These questions were: *Do you coordinate any courses in which the curriculum specifically addresses firefighter cancer risks? If you answered yes to the above question, please write the course(s) which have curriculum addressing firefighter cancer risks. Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?* The next series of questions given to instructors in the survey was to evaluate their participation in cancer risk reduction practices. These questions were: *If you do work in a training environment where your gear is obviously contaminated what do you do to clean your gear? How often do you wash your gear under normal working conditions? Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke? How soon do you shower after working in a training environment where you were exposed to smoke or by-products of combustion?* Responses were compiled into a spreadsheet which was used to generated tables and figures.

To survey a range of students the researcher chose to deliver surveys to several classes. The research surveyed two NFPA 1001-I-II courses to gather information from recruits at the MSFA. The researcher surveyed a Confined Space Rescue course to gather information from firefighters engaged in technical rescue programs. The confined space rescue program has two required prerequisite courses which are Rope Rescue Level I and Hazardous Materials

Awareness and Operations. The confined space course students would, therefore, represent a firefighter who has received multiple courses at this point in their career with several courses in the specialized disciplines. The last class surveyed was the Fireground Leadership course. This course is primarily composed of fire officers and was selected for surveying due to their representation of upper-level fire officers and managers.

To effectively survey staff members of the MSFA the researcher surveyed three of the four bureaus. These bureaus were: Certification Bureau, Special Industrial Bureau, and the Extension Services Bureau. Each of these bureaus represents a range of courses which covers a wide variety of disciplines, career levels, fire service tenure, and all-hazard approach disciplines. The researcher also found that limited information was provided to answer the second research question. This question was: *To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses?* To more effectively answer this question, the researcher needed to find out to what "extent" did instructors provide information regarding cancer risk reduction. Surveys only provided information for the researcher to determine if the instructors were providing information not particularly what information they were providing. In an interview with Instructor Barry Burnside, the researcher learned that he was providing students with additional content not listed in the curriculum. Specifically, Instructor Burnside discussed the potential exposure of contaminants through skin absorption and how important it was to clean your skin after a fire. He further explains to students the importance of not creating cross-contamination problems with your family when returning home after a fire. He explained to students that they need to wash their gear regularly and that they needed to clean their skin with baby wipes after exposure at a fire. Instructor Burnside shares an example of departmental cancer risk reduction by telling a story about saunas

installed in firehouses. He explains to students how firefighters use these saunas to aid in reducing their cancer risks. This communication is listed in Appendix H.

An interview was also conducted with Instructor Advanced Marcus Collier. Instructor Collier explained during the interview that he provides students with a cancer fact sheet during the NFPA 1001-I-II course. He stated he used this sheet to generate discussions about cancer risk reduction practices. Instructor Collier covers this material during his lecture on Chapter 3 Personal Protective Equipment and Self-Contained Breathing Apparatus in the Fundamental of Fire Fighter Skills text book. Instructor Collier explained that he discusses the increased risk of firefighter cancer and also some methods of reducing your risk. Instructor Collier explains the importance of keeping your gear clean and also shows new equipment which is designed to help reduce exposure to harmful contaminants. In particular, he shows students a new firefighter hood manufactured by Majestic Fire Apparel which includes a particulate blocking layer. He explains to students the new design and how it may help reduce the student's risk of cancer among firefighters. This communication is listed in Appendix I.

Limitations of the procedures were primarily the ability to capture the representative data. The MSFA delivers training programs to such a large audience it was difficult to gather surveys which represent the entire demographic. The Mississippi State Fire Academy 2017 Annual Report shows 13,473 students attended courses (Mississippi State Fire Academy, 2018). However, these are not unique individuals. These students could take more than one class each year, and there is no data reported which explains this number. Also, several courses are delivered in a modular format where multiple modules of a course are delivered over time to complete the entire course. This is common in some of the larger field delivery programs. These students were counted on each module even though the modules combine to show the

completion of a single class. The research was also limited in the way it could answer the second research question. This question asked: *To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses?* Surveys provided information about if instructors provided material about reducing cancer risks, but it was difficult to determine to what extent they provided this material. Interviews provided additional information, but there was no consistent measurement device utilized which would define to what extent instructors provided cancer risk reduction material.

Results

Surveying multiple courses and instructional bureaus provided a clear picture of the MSFA's curriculum as it relates to cancer risk reduction programs and practices. The student's surveys utilized in this research provided a diverse sample to interpret. Surveying two NFPA 1001-I-II courses provided the researcher with a snapshot of what information recruit firefighters receive about firefighter cancer risk reduction programs. The surveys provided by the Confined Space Rescue class provided the researcher with an idea of what information about firefighter cancer risk reduction was being communicated through technical rescue and specialized programs. The Fireground Leadership class surveys showed the mindset of senior members of the Mississippi fire service as well as the perception of curriculum for fire officers. Figure 2 depicts the percentage represented by each course surveyed.

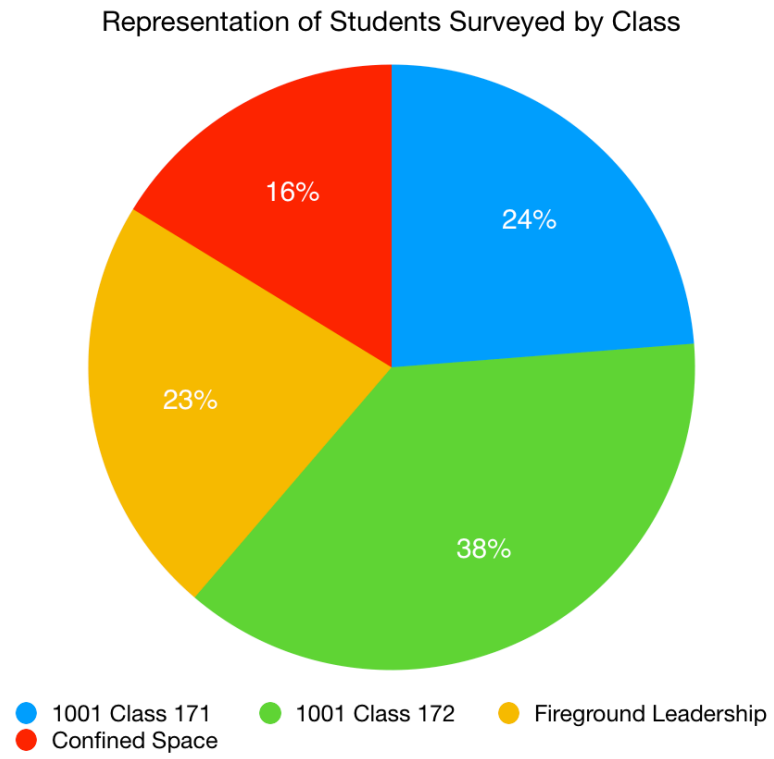

Figure 2. Percentage Representation of Classes Surveyed.

The first research question asked: *Which courses does the Mississippi State Fire Academy currently offer which provide students with information regarding the reduction of firefighter cancer risks?* This question was answered by evaluating surveys from both students and staff instructors. Instructors provided useful information regarding specific courses they knew included firefighter cancer risk reduction curriculum. Of the 14 instructors surveyed, 6 instructors identified curriculum within their courses which included firefighter cancer risk reduction information. However, these responses were duplicated among several instructors and showed that only two courses are known to include firefighter cancer risk reduction information. Those two courses were the NFPA 1001-I-II course and the Hazardous Materials Technician course. Student surveys also helped to identify which courses they attended when they heard about firefighter cancer risk reduction. Out of 49 students in the NFPA 1001-I-II course, 47

students stated they did know about the increased risk of firefighter cancer. This is significant because many of these students are new to the fire service. This is the first course required in the state of Mississippi to become a career firefighter. Of the NFPA 1001-I-II students surveyed, 26 students had less than 1 year in the fire service. This information proved that the students in the NFPA 1001-I-II course most likely received information about firefighter cancer risk reduction within the NFPA 1001-I-II course. Students in the Confined Space Rescue course also had a large percentage of firefighters state they did know about the increased risk of firefighter cancer. Of the students surveyed, 11 out of 13 Confined Space Rescue students answered "Yes" when asked if they knew about the increased risk of firefighter cancer. The Fireground Leadership class, which represents a large number of fire officers and also firefighters with more years of service, also had a high percentage of students answer "Yes" when asked if they knew about the higher risk of firefighter cancer. Of the students attending Fireground Leadership, 17 out of 18 students knew of the increased risk of firefighter cancer. Another question within the survey asked if students received material from the MSFA regarding firefighter cancer risk reduction. In total 94% of all students surveyed stated they did know that firefighters were at an increased risk of cancer as depicted in figure 3. Of the 80 students surveyed, 55 said they had received information regarding cancer risk reduction as depicted in figure 4.

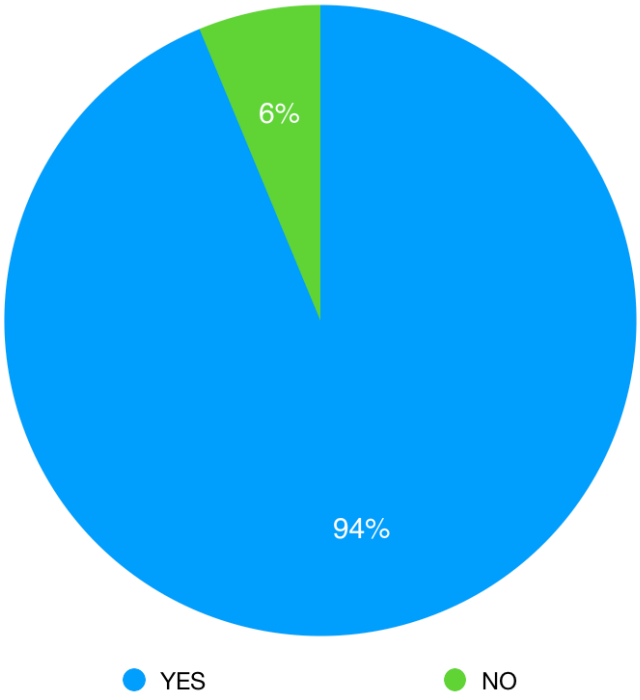

Figure 3. Percentage of Students Aware of Increased Cancer Risks.

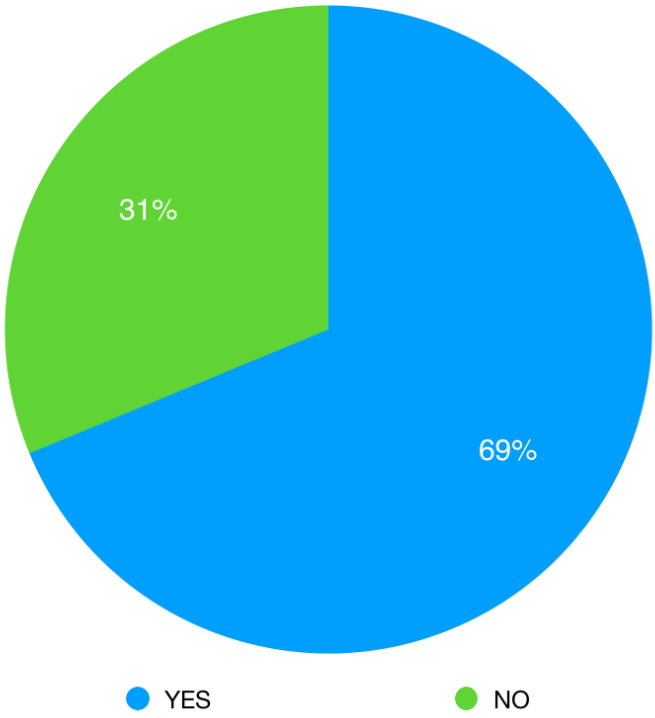

Figure 4. Percentage of Students Provided Cancer Risk Reduction Material by the MSFA.

The second research question asked: *To what extent do Instructors at the Mississippi State Fire Academy discuss firefighter cancer risks either formally or informally during courses?* Analyzing the instructor surveys revealed that instructors at the MSFA only deliver written curriculum about firefighter cancer risk reduction in two courses. Those two courses were the NFPA 1001-I-II course and the Hazardous Materials Technician course. However, 13 out of 14 instructors surveyed said they had discussed firefighter cancer risk reduction in courses which did not have curriculum regarding this topic. Interviews helped to provide more information about the extent instructors provided material. Instructors Burnside and Collier explained the addition of a fact sheet and discussion of multiple cancer risk reduction practices. They provided information regarding the cleaning of personal protective equipment and cleaning of a firefighter's skin after possible exposure to contaminants. This information was primarily delivered in the NFPA 1001-I-II course. The communication with Instructors Burnside and Collier are listed in Appendices H and I.

The third research question asked: *What percentage of students who attend the Mississippi State Fire Academy actively participate in firefighter cancer risk reduction programs or activities at their own departments?* Utilizing the surveys from four different courses at the MSFA this research concludes that only 3 out of 80 students reported not doing anything after known contaminations at a fire or emergency. The surveys also showed that 21 out of 80 students had used cleaning wipes, such as baby wipes, to clean their skin after a fire. This demonstrates that 21 students actively participated in proactive cancer risk reduction practices. The survey results of this question are depicted in Figure 5.

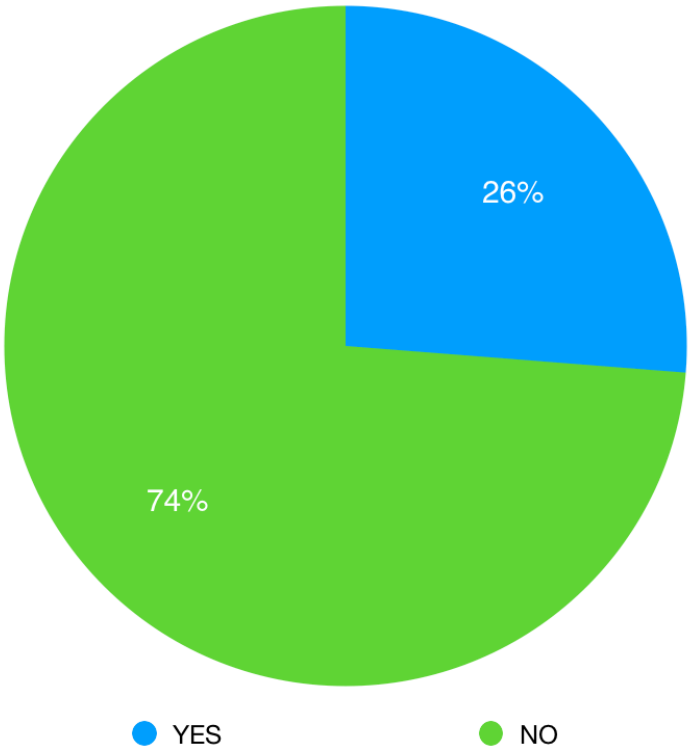

Figure 5. Percentage of Students Using Cleaning Wipes.

Knowledge gained through surveys of both instructors and students revealed that the majority of instructors and students surveyed knew that firefighters were at an increased risk of contracting certain types of cancer. Of the instructional staff members, 100% surveyed reported they knew of the increased risks of cancer among firefighters. Of the students surveyed, nearly 94% reported they did know of the increased risks of cancer among firefighters. The surveys also showed that nearly 93% of instructors spoke to their classes about cancer risks, either formally or informally. Approximately 69% of students surveyed said the MSFA did provide them with course material regarding cancer risk reduction for firefighters. The survey instruments utilized for this research can be found in Appendices A and B. The results of each survey can be found in Appendices C, D, E, F, and G.

Discussion

The primary goal of conducting this research was to determine if the MSFA was providing anything to students regarding firefighter cancer risks. Furthermore, this research sought out to discover if curriculum formally addressed firefighter cancer risks or if instructors were taking it upon themselves to have informal discussions about the risks of cancer to firefighters. To do this surveys were used to poll both instructors and students. These surveys provided information about course curriculum and instructor conversations in MSFA courses. Solely providing content or curriculum to students does not mean this translates to effective cancer risk reduction practices.

Many firefighters surveyed were aware of an increased risk of firefighter cancer. In total 94% of students surveyed stated they were aware of the increased risk of firefighter cancer. It is unknown as to when firefighters became aware of the increased risk, but 69% of the students surveyed stated they did receive information about cancer risk reduction programs from the MSFA. The information provided by the MSFA was largely from the NIOSH Study of Cancer Amongst Firefighters in the United States (National Institute for Occupational Safety and Health, 2013).

Understanding the increased risk of firefighter cancer is only the first step. We must then evaluate the student's participation in cancer risk reduction programs. The vast majority of students surveyed reported taking part in some cancer risk reduction activity like cleaning their gear or showering after a fire. However, only 26% of students surveyed reported using cleaning wipes after a fire. These students represent progressive fire departments which have proactively conducted cancer risk reduction practices. Students were also asked if their departments had policies or procedures for reducing cancer risks. Of the students surveyed only 29% reported that

their department had policies in place to help reduce the risk of firefighter cancer. This information proves interesting because when evaluating curriculum at the MSFA we find that only courses typically taught to newer firefighters included curriculum discussing cancer risk reduction practices.

There were several courses which completely neglected to deliver any cancer risk reduction information to higher level officers and decision makers. These courses include the Mississippi Executive Fire Officer course, the Safety Officer course, the Fire Officer I-II course and the Fire and Life Safety Educator course. These courses are primarily delivered to officers in the departments and upper-level management. It should be a priority for the MSFA to include cancer risk reduction curriculum into these courses.

Implications of this research prove that in many ways the MSFA has neglected to provide more detailed information about cancer risk reduction programs. This is especially true for upper-level courses targeting officers and administrative positions. This research also showed that even with the material being delivered to students many were not participating in cancer risk reduction practices. The MSFA should make a better effort to teach firefighters not only about the increased risks but things they can do to reduce their risk of cancer.

Recommendations

Throughout this research, we find that overall firefighters are aware of higher risks of cancer. It was clear that instructors at the MSFA were continually providing information to students both formally and informally about their potential risks of contracting certain types of cancer. However, even though the research showed an awareness and inclusion of cancer risk reduction practices we are unaware of the depth of these discussions.

This research found that the 93% of the instructors surveyed had discussed cancer risk reduction practices with their students. However, this research did not fully identify the breadth of curriculum or topics which were discussed. This only provides us with a limited amount of information to evaluate needed curriculum changes. We learned that instructors primarily were delivering this content on their own without the curriculum specifically addressing firefighter cancer risks. With only two courses at the MSFA formally addressing cancer risks in the curriculum, it would stand to reason additional courses need to include cancer risk reduction practices in the curriculum.

It is important for the MSFA to continue evaluating their effectiveness of delivering cancer risk reduction curriculum. The MSFA should not only evaluate curriculum and the inclusion of cancer risk reduction topics but also the effectiveness of the curriculum. It is great for firefighters in the state of Mississippi to have a good awareness level of knowledge when it comes to cancer risks but knowing does not mean the students are actively trying to change their cancer risk reduction practices.

The MSFA needs to gather information on current risk reduction practices. These practices should be evaluated through national recommendations but also through common local practices to find strong support in local departments. Local department success stories would aid the MSFA in delivering a clear message of support and the importance of issues relating to firefighter cancer risks. The research showed that many firefighters clean their gear after fires in some form or fashion, but far fewer took aggressive measures to reduce their cancer risks. Of the 80 students surveyed only 21 reported they had used cleaning wipes after a fire. Cleaning wipes, or baby wipes, is an aggressive method of reducing cancer risks by specifically cleaning the skin of the firefighter.

The problem which initiated this research was that the MSFA had not evaluated the presence of risk reduction programs in the current curriculum. We now know that only two courses at the MSFA specifically address firefighter cancer research in the curriculum. The purpose of this research was to evaluate the curriculum but also to look for ways to improve the MSFA message as it relates to cancer risk reduction programs.

The MSFA remains at the forefront of critical issues within the fire service in the state of Mississippi. With such a large reach and potential impact, it is extremely important for the MSFA to lead the education and implementation of programs to help reduce the risk of cancer in the fire service. Many firefighters look to the MSFA for solutions and training when it comes to solving problems at the local and state level. The MSFA should increase its frequency of delivering cancer risk reduction messages by including discussions in more courses.

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Appendix A

Student Survey Instrument

National Fire Academy EFO Survey

Mississippi Fire Service Cancer Awareness

PLEASE CIRCLE ONE OPTION BELOW					
DEPARTMENT TYPE	VOLUNTEER	CAREER	COMBINATION		
DEPARTMENT SIZE	< 50	51-99	> 100		
YEARS IN THE FIRE SERVICE	< 1	1-5	5-10	10-20	> 20

1.) Did you know firefighters are at a greater risk to contracting cancer than the general population?

YES NO

2.) Does your department have any policies or procedures in place to reduce the cancer risks for firefighters?

YES NO

3.) If you DO NOT have a fire or emergency where your gear is obviously contaminated how often do you wash your gear?

Monthly Quarterly Annually Never

4.) If you DO have a fire or emergency where your gear is obviously contaminated what do you do to clean your gear? (Circle any and all that apply)

Nothing Brush Debris Hose Off Wash in Machine

5.) Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a fire?

YES NO

6.) How soon do you shower after working a fire where you and your gear are contaminated by smoke or by products of combustion?

Immediately The Day Of The Next Morning No Particular Time

7.) Has the Mississippi State Fire Academy provided you with any material or courses which discussed the risks associated with cancer in the fire service?

YES NO

Appendix B

Instructor Survey Instrument

National Fire Academy EFO Survey
Mississippi Fire Service Cancer Awareness

PLEASE CIRCLE ONE OPTION BELOW

1.) Which bureau are you currently assigned to?

CERTIFICATION SPECIAL INDUSTRIAL EXTENSION SERVICES

2.) Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?

YES NO

3.) Do you coordinate any courses in which the curriculum specifically addresses firefighter cancer risks?

YES NO

4.) If you answered YES to the above question please write the courses which have curriculum addressing firefighter cancer risks.

5.) Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?

YES NO

6.) If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)

Nothing Brush Debris Hose Off Wash in Machine

7.) How often do you wash your turnout gear under normal working conditions?

Monthly Quarterly Annually Unknown

8.) Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?

YES NO

9.) How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?

Immediately The Day Of The Next Morning No Particular Time

Appendix C

Detailed Survey Response Spreadsheet - Instructors

Instructor Survey Responses

What bureau are you currently assigned to?	Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?	Do you coordinate any courses in which the curriculum specifically address firefighter cancer risks?	If you answered yes to the above question please write the courses which have a curriculum addressing firefighter cancer risks.	Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?	If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)	How often do you wash your turnout gear under normal working conditions?	Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?	How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?
CERTIFICATION	YES	NO		YES	HOSE OFF	ANNUALLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
CERTIFICATION	YES	NO		NO	MACHINE	QUARTERLY	YES	DAY OF
CERTIFICATION	YES	YES	1001	YES	MACHINE	QUARTERLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
EXTENSION	YES	NO		YES	BRUSH DEBRIS	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	ANNUALLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	BRUSH DEBRIS	UNKNOWN	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	NOTHING	ANNUALLY	NO	DAY OF

Appendix D

Detailed Survey Response Spreadsheet – 1001-I-II Class 171

Instructor Survey Responses

What bureau are you currently assigned to?	Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?	Do you coordinate any courses in which the curriculum specifically address firefighter cancer risks?	If you answered yes to the above question please write the courses which have a curriculum addressing firefighter cancer risks.	Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?	If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)	How often do you wash your turnout gear under normal working conditions?	Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?	How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?
CERTIFICATION	YES	NO		YES	HOSE OFF	ANNUALLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
CERTIFICATION	YES	NO		NO	MACHINE	QUARTERLY	YES	DAY OF
CERTIFICATION	YES	YES	1001	YES	MACHINE	QUARTERLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
EXTENSION	YES	NO		YES	BRUSH DEBRIS	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	ANNUALLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	BRUSH DEBRIS	UNKNOWN	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	NOTHING	ANNUALLY	NO	DAY OF

Appendix E

Detailed Survey Response Spreadsheet – 1001-I-II Class 172

Instructor Survey Responses

What bureau are you currently assigned to?	Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?	Do you coordinate any courses in which the curriculum specifically address firefighter cancer risks?	If you answered yes to the above question please write the courses which have a curriculum addressing firefighter cancer risks.	Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?	If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)	How often do you wash your turnout gear under normal working conditions?	Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?	How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?
CERTIFICATION	YES	NO		YES	HOSE OFF	ANNUALLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
CERTIFICATION	YES	NO		NO	MACHINE	QUARTERLY	YES	DAY OF
CERTIFICATION	YES	YES	1001	YES	MACHINE	QUARTERLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
EXTENSION	YES	NO		YES	BRUSH DEBRIS	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	ANNUALLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	BRUSH DEBRIS	UNKNOWN	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	NOTHING	ANNUALLY	NO	DAY OF

Appendix F

Detailed Survey Response Spreadsheet – Fireground Leadership

Instructor Survey Responses

What bureau are you currently assigned to?	Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?	Do you coordinate any courses in which the curriculum specifically address firefighter cancer risks?	If you answered yes to the above question please write the courses which have a curriculum addressing firefighter cancer risks.	Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?	If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)	How often do you wash your turnout gear under normal working conditions?	Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?	How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?
CERTIFICATION	YES	NO		YES	HOSE OFF	ANNUALLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
CERTIFICATION	YES	NO		NO	MACHINE	QUARTERLY	YES	DAY OF
CERTIFICATION	YES	YES	1001	YES	MACHINE	QUARTERLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
EXTENSION	YES	NO		YES	BRUSH DEBRIS	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	ANNUALLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	BRUSH DEBRIS	UNKNOWN	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	NOTHING	ANNUALLY	NO	DAY OF

Appendix G

Detailed Survey Response Spreadsheet – Confined Space Rescue

Instructor Survey Responses

What bureau are you currently assigned to?	Did you know firefighters are at a greater risk of contracting certain types of cancer than the general population?	Do you coordinate any courses in which the curriculum specifically address firefighter cancer risks?	If you answered yes to the above question please write the courses which have a curriculum addressing firefighter cancer risks.	Have you ever discussed the increased risks of firefighter cancer with a class even though the curriculum did not specifically address this topic?	If you DO work in a training environment where your gear is obviously contaminated what do you do to clean your gear? *For example having fuel or residue saturate your gear on a live fire pad.* (Circle any and all that apply)	How often do you wash your turnout gear under normal working conditions?	Have you ever used cleansing wipes, such as baby wipes, to clean your skin after a training evolution where you were exposed to smoke?	How soon do you shower after working in a training environment where you were exposed to smoke or byproducts of combustion?
CERTIFICATION	YES	NO		YES	HOSE OFF	ANNUALLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
CERTIFICATION	YES	NO		NO	MACHINE	QUARTERLY	YES	DAY OF
CERTIFICATION	YES	YES	1001	YES	MACHINE	QUARTERLY	NO	DAY OF
CERTIFICATION	YES	NO		YES	MACHINE	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
EXTENSION	YES	NO		YES	BRUSH DEBRIS	ANNUALLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	MONTHLY	NO	DAY OF
EXTENSION	YES	NO		YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	QUARTERLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	MACHINE	ANNUALLY	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	BRUSH DEBRIS	UNKNOWN	NO	DAY OF
SPECIAL INDUSTRIAL	YES	YES	HAZ-MAT	YES	NOTHING	ANNUALLY	NO	DAY OF

Appendix H

Interview Notes with Mississippi State Fire Academy Instructor Barry Burnside

Barry Burnside:

Phone Call at 4:59 pm January 20, 2018.

Instructor Burnside stated he provides additional information to students in the NFPA 1001-I-II course that is not in the formal curriculum. During the Safety lecture in the class Instructor Burnside discussed post-fire scenarios to the students. He asks the students if they smell smoke after showering a day or two later after a fire. He then explains this is the dilation of skin pores which have absorbed those potential carcinogens. He goes on to provide students with a story of how a fire chief has implemented sauna treatment for firefighters after a fire. The firefighters "sweat out" potentially harmful contaminants which may be absorbed through the skin.

Instructor Burnside also explains to students that certain cancers are more prevalent amongst firefighters. He explains that many of these cancers are from filtering organs in the body. He explains to students that they need to keep their gear clean and away from innocent civilians. He tells students to make sure they gross decontaminate their gear as soon as possible and that they should wash their gear in a dedicated washing machine. Instructor Burnside stresses the importance of not exposing your family to these carcinogens when you return home from work.

Instructor Burnside explained he provides students with some cancer risk reduction practices. These practices include: washing your gear, using baby wipes to clean your skin, taking a shower immediately after a fire and to limit exposure to others.

Appendix I

Interview Notes with Mississippi State Fire Academy Instructor Advanced Marcus Collier

Marcus Collier:

Phone Call at 5:18 pm January 20, 2018

Instructor Collier explained that he provides additional information to students in the NFPA 1001-I-II course. During Chapter 3, which is "Personal Protective Equipment and Breathing Apparatus", he provides a firefighter cancer fact sheet to students. He explains the importance of cleaning gear and how contaminants can be absorbed through your skin if you continually wear dirty gear. Instructor Collier reviews the handout with the students and discusses the increased risk of cancer for firefighters. He then provides students with some examples of cancer risk reduction practices. He explains to students that they need to keep their gear clean, wash their gear in the same washer and not to take their gear home.

Instructor Collier also provides students with a demonstration of a new firefighting hood. This hood is the Majestic Fire Apparel Gore Particulate Blocking Hood. He shows how several hood manufacturers are manufacturing new hood designs to include a particulate blocking layer and how this can help reduce risks of firefighter cancer.