



RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

Occupational Exposure of Firefighters – A Literature Review

PROJECT SUMMARY

14 April 2020

Background: There is growing concern in the fire and life safety community that repeated exposures to contamination at the fire scene, combined with the subsequent post fire scene exposures to contaminated clothing, tools, apparatus, and stations are likely causing increased rates of cancer in firefighters. Moreover, contamination has broader negative effects on health than just cancer. A number of other chronic health disorders could be related to broad, continuing chemical exposures. While there have been studies on firefighter exposure, there is not yet a complete understanding of what firefighters are exposed to during firefighting and training as each of the existing studies focuses on a limited number of contaminants/toxicants and/or exposure scenarios.

A comprehensive compilation and review of global literature is needed to provide a focus on this topic in support of ongoing efforts to address firefighter health and safety. This recognizes that there are certain landmark previous works on this topic area that provide valuable information in support of the body of knowledge, though do not singularly provide the same comprehensive information. Examples of earlier works include:

- A meta-analysis of 32 studies of cancer in firefighters ranked elevated risks of testicular and prostate cancer, non-Hodgkin's lymphoma, and multiple myeloma in firefighters as "probable" [[LeMasters et al. \(2006\) J Occup. Environ. Med.](#)]
- The International Agency for Research on Cancer (IARC) monograph classifying the occupation of firefighting as possibly carcinogenic [IARC (2010) Monograph Eval Carcin Risks to Humans]
- A NIOSH study of firefighters in three large fire departments for a 50-year period indicating higher rate of cancers in respiratory, digestive and urinary systems [[R. D. Daniels et al. \(2015\) Occup. Env Med.](#)]

Research Goal: The goal of this project is to review existing research into firefighter exposure and identify all the potential contaminants that firefighters can be exposed, depending on the type of fire attended.

Project Tasks: This project involves the following tasks:

Task 1: Framework: Establish a logical framework to address the contaminants to which fire service personnel are exposed. This should consider an assessment of factors that influence the contaminants such as types of fires, occupation of fire service personnel, geographical factors, etc. For example, types of fires to be considered in the framework include: Traditional structural (residential) fires, Industrial fires including HAZMAT, Wildland fires (forest, grass and brush fires), Vehicle fires, Training fires, and others. Continue to update and realign the framework based on the tasks that follow. Provide an interim progress update to the project advisory panel.

Task 2: Literature Review: Review the existing list of literature pertaining to the research on firefighter occupational exposure. Literature sources should include but not limited to the studies mentioned above, Appendix A of [Campaign for Fire Service Contamination Control](#) 2017 report, and [PPE Cleaning Validation](#), complete a curated literature review of existing research into firefighter exposure. This review should consider research from around the globe.

- **Task 2.1: Contaminant Summary:** Based on the literature review, identify and summarize the target contaminants to which fire service personnel are exposed during firefighting and

emergency response operations. This summary should address the elements and characteristics associated with contaminants to prioritize the contaminants. This may include contaminant toxicity, persistence of contaminants in the gear, magnitude and commonality etc.

Provide an interim progress update to the project advisory panel.

Task 3: Gap Analysis & Future Research: Conduct a gap analysis to identify the knowledge gaps and needs for future research.

Task 4: Final Report: Prepare a draft final report summarizing the above tasks to establish (1) sub-lists of targeted contaminants, and (2) supported by the literature summary, all of which is based on firefighter application (type of exposure). Review draft final report with the project advisory panel and submit the final report.

Implementation: This research program will be conducted under the auspices of the Research Foundation in accordance with Foundation Policies and will be guided by a Project Technical Panel who will provide input to the project, recommend contractor selection, review periodic progress reports, research results, and the final project report.

This project is funded by the National Fire Protection Association. The project is scheduled to be completed by October 2020.

Intellectual Property: The Research Foundation will retain rights to the project deliverables including the final report which will be published on the Foundation website.

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