



Controlling Exposure to Spray Polyurethane Foam in a Healthcare Setting

A Successful Collaboration Between Researchers and Industry

The Challenge

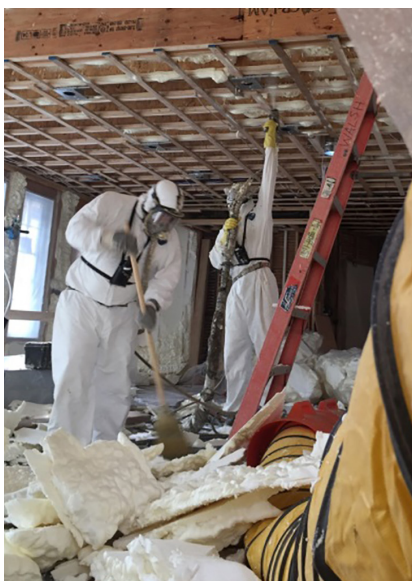
Spray polyurethane foam (SPF) is used to insulate buildings. It contains highly reactive chemicals called isocyanates that can irritate the eyes, nose, throat, lungs, and skin. They can also cause asthma and sensitization, which means a person can develop an allergy to isocyanates after being exposed to them. Another group of chemicals found in SPF are flame retardants, such as TCPP (tris (1-chloro-2-propyl) phosphate). Studies have found that exposure to these chemicals can have adverse health effects, such as endocrine and thyroid disruption, immune and nervous systems issues, reproductive toxicity, delayed fetal and child development, and cancer. Individuals are at risk when these chemicals are breathed in or come in contact with their skin.

In 2016, a contractor was asked to install SPF in the roof rafters of a nursing home's attic. Since the nursing home planned to continue operating while the work was underway, steps needed to be taken to protect the residents and staff as well as the contractor's employees performing the work.

The Response

The contractor reached out to Dr. Dhimiter Bello at the University of Massachusetts, Lowell, for help because he was conducting research on the health risks associated with SPF and the best methods to prevent exposures. He was aware of this CPWR funded study and Dr. Bello's research team because he had provided critical industry support for their research in the past. Through close coordination between the contractor, researchers, and nursing home staff, a plan was developed and implemented to ensure the safety of the residents, staff, and contractor's employees.

The Results



As part of the safety plan, nursing home staff moved residents out of the facility after their breakfast and kept them away from the work area until 5 p.m. for the duration of the project. The contractor provided his employees with safety training and the personal protective equipment recommended by the SPF manufacturer, such as supplied air respirators, polypropylene coveralls, and nitrile gloves. Ventilation was used to minimize airborne chemicals and particulates during and after spraying. Forty-two inch (42") drum fans rated at 13,300 cubic feet per minute were used to pull air in and to push air out. These fans allowed the contractor to maintain a minimum of 40 air changes per hour as required by the SPF manufacturer to ensure a re-occupancy rate of 2 hours. Negative pressure was also maintained at all times inside the attic. The contractor's employees stopped spraying by 3 p.m. each day to provide a 2-hour window before the residents returned to the facility to ensure they were not at risk for exposure.

The researchers monitored emissions from the SPF application periodically to ensure the residents' living space was hazard free. Between July and August 2016, they collected baseline air samples prior to the SPF application, samples during SPF application, and samples the day after application. These samples were tested for several isocyanates, the flame retardant TCPP, and the amine catalyst BDMAPA. The researchers did not find detectable levels of isocyanates and amine catalysts in the samples, indicating the safety plan was working. The exposure data collected and the lessons learned also contributed to the researchers' ongoing CPWR study.

The CPWR IMPACT

Close coordination between the contractor, nursing home staff, and research team allowed the work to be safely executed without exposing those involved to hazardous levels of SPF chemicals. The researchers' existing research project and preliminary findings positioned them to:

- Respond to the contractor's needs and assist in identifying viable work practices that protected the contractor's employees and the facility's residents and staff.
- Demonstrate that you can successfully control exposure during an SPF installation in a complex setting (healthcare facility).
- Develop a sustainable partnership with the contractor that was, and will continue to be, used to support future research initiatives.
- Contribute to the content of a toolbox talk and a hazard alert card, designed to educate construction workers about the potential health risks associated with isocyanates and what needs to be done to prevent exposure.



What made it a success?

This owner-industry-researcher partnership resulted in a safety plan that protected the workers as well as the residents and employees of the nursing home.

The project was a success because of the:

- Researchers' extensive work on the subject, which meant they knew the risks and could offer solutions.
- Contractor's prior positive experience with the research team.
- Close working relationship between the researchers, the contractor, and the project owner.

"Our relationship allows us to be responsible stewards of the industry"

— Quote from contractor about his experience working with the researchers on this project

