

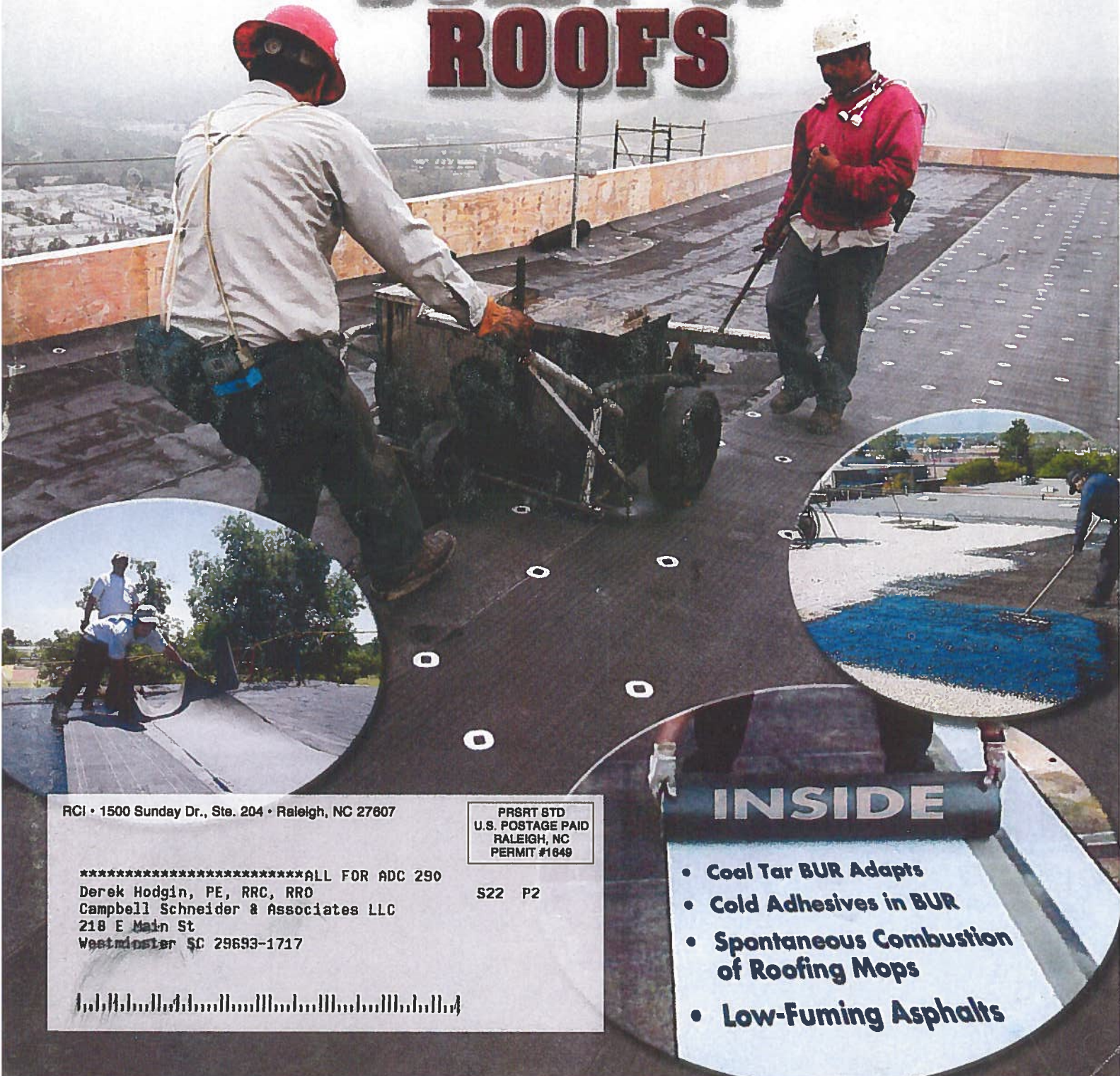


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BUILT-UP ROOFS



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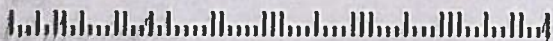
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SPONTANEOUS COMBUSTION OF ROOFERS' MOPS

— A REVIEW

BY DEREK A. HODGIN,
P.E., RRO, RRC, CDT

Conventional built-up roof (BUR) assemblies have lost market share in recent decades to other roofing options. While BUR can provide years of dependable service at a competitive price, concerns regarding the use of hot asphalt have been expressed by building owners and insurance companies with primary concerns regarding fumes and fire. One particular cause of fire is the spontaneous combustion of roofers' mops. A recent case involving this phenomenon revealed the absence of readily available information. This article is intended to provide a summary of the basics that are important to understanding this phenomenon, the information available, and recommended steps to avoid such an incident.



This fire at a large mall in the Southeast started as the result of spontaneous combustion of a roofing mop used earlier in the day.

Summary of the Basics

Spontaneous combustion of roofing mops can occur when oxygen from the air slowly unites with the flammable asphalt. As oxidation takes place, heat accumulates in the mop. The solidified asphalt on the exterior of the mop head retains the heat inside of

the mop, and smoking of the mop begins. Under the right circumstances (mop head material, the mass of asphalt available, ambient air temperature, etc.), the mop will eventually catch on fire. If the mop remains on the roof or is adjacent to other flammable building components, this process can be disastrous.

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Available Information

There is a fair amount of information available on the Internet related to this type of spontaneous combustion. However, much of this information is in the form of incident reports, newspaper articles, and technical bulletins that are not common to the library of the typical roofing contractor and/or consultant. A little more research revealed the information summarized below.

NRCA

- In the January 1971 issue of *Professional Roofing*, NRCA printed an October 15, 1970, Eastman Kodak Company memorandum that discussed "Self-Heating of Asphalt Saturated Roofers' Mops." This memo indicated that spontaneous combustion of cotton mops had occurred when mops that were saturated with asphalt were set aside. Testing of both cotton mops and fiberglass mops was performed by Kodak and summarized by this memo. The tests were able to produce spontaneous combustion of the cotton mops and were not able to produce spontaneous combustion of the fiberglass mops.

The memo also indicated that cotton is degraded when exposed to elevated temperatures. This degradation increases the tendency of self-heating. Additionally, the tests revealed that the cotton mop exposed to a breeze ignited in a shorter amount of time than the cotton mop that was in a protected environment. This condition suggests that the breeze increased the rate at which the asphalt was oxidized and thereby increased the rate of temperature gain.

The memo concludes by recommending that "fiberglass mops should be substituted for the cotton mops in any roofing operations in the future."

- Page 23 of NRCA's student manual, "Introduction to Built-up and Modified Bitumen Roof Membranes," (developed in July 2000) states, "When you are done with a mop, do not leave it sitting on a roof. Hot mop heads stay hot for a long time. When they are left bunched up, they can burst into flames. Allow mop heads to sit out in an open area before you throw them away. At the end of a day, spin mop heads out and set them on something that is not combustible, such as a piece of plywood. Do not leave them on the roof."

It should be noted that there may be better choices of "non-combustible" material than plywood.

OSHA

While no information was found specifically concerning spontaneous combustion, the following relevant excerpts were found in the 2001 Code of Federal Regulations, Title 29, Part 1926, Labor (OSHA):

- 1926.24-Fire Protection and Prevention: "The employer shall be responsible for the development and maintenance of an effective fire protection and prevention program..."

- 1926.25–Housekeeping: “Containers shall be provided for the collection and separation of waste, trash, oily and used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, harmful dusts, etc., shall be equipped with covers. Garbage and other waste shall be disposed of at frequent and regular intervals.”

- 1926.150–Fire Protection: “Access to all available firefighting equipment shall be maintained at all times.”

- 1926.252–Disposal of Waste Materials: “All solvent waste, oily rags, and flammable liquids shall be kept in fire resistant covered containers until removed from worksite.”



HVAC equipment on the roof of the mall destroyed by the fire.

Recommendations

Based on the information presented above, the following steps are recommended for avoiding spontaneous combustion of roofers' mops:

1. Consider the mop head material (fiberglass vs. cotton);
2. Remove excess asphalt from roofing mops at the conclusion of use;
3. Consider quenching the mop head in a bucket of water;
4. Store used mops in sealed metal containers;
5. Keep used mops off of the roof and away from combustible materials; and,
6. Comply with all applicable standards and/or ordinances regarding worksite safety and fire protection. ■

References

- NRCA, “Spontaneous Heating of Roofers’ Mops,” *Professional Roofing*, January 1971.
- NRCA, “Introduction to Built-up and Modified Bitumen Roof Membranes” Student Manual, July 2000.
- Code of Federal Regulations, Title 29, Part 1926, Labor, July 1, 2001.

ABOUT THE AUTHOR

Derek A. Hodgin, PE, RRO, RRC, CDT, is a forensic engineer employed by Campbell, Schneider and Associates, LLC (CSA), an A/E consulting firm based in Charleston, SC. Hodgin is licensed as a Professional Engineer in 14 states, registered as a Roof Observer and Roof Consultant with the Roof Consultants Institute, is certified as a Third Party EIFS



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Inspector and Moisture Analyst with the Exterior Design Institute (EDI), and as a Construction Document Technologist with the Construction Specification Institute (CSI). Derek currently manages a branch office for CSA in Westminster, SC (near Clemson). Hodgin specializes in failure investigations of all types of building envelopes and roof systems. He has investigated numerous types of residential and commercial building failures related to hurricanes, tornadoes, hail, fire, ice, and deficient construction. He has also designed high wind resistant roof assemblies for projects in the southeastern U.S. and Caribbean. His technical articles have appeared in numerous trade publications and symposia proceedings.

Drug Abuse & Construction Workers

Construction workers with drug problems have twice the rate of hospitalization for injury care as non-drug users, according to a pair of studies by a Duke University researcher. The study was recently published in the *American Journal of Industrial Medicine* and may be obtained by calling Health Matrix at 703-918-4930.

— *Construction Executive*