STATE OF NEW HAMPSHIRE DEPARTMENT OF SAFETY
John J. Barthelmes, Commissioner

Division of Fire Safety
OFFICE OF THE STATE FIRE MARSHAL
J. William Degnan, State Fire Marshal

Office: 110 Smokey Bear Boulevard, Concord, NH
Mailing Address: 33 Hazen Drive, Concord, NH 03305
603-223-4289, FAX 603-223-4294

BULLETIN #	TITLE			DATE ISSUED
2015-05	Colored Powder Festivals/Events – Combustible Dust Hazards			July 20, 2015
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Informational Bulletin 2015-05
Colored Powder Festivals/Events – Combustible Dust Hazards

Purpose:

The purpose of this bulletin is to provide safety information relative to the potential combustibility associated with clouds of powders used for entertainment purposes at concerts, "color" marathons or fun-runs, festivals, and other public events.

Background:

On June 27, 2015 at *Formosa Fun Coast* in New Taipei City, Taiwan, approximately 500 people were injured and burned when a fireball engulfed a crowd of patrons. The sudden burst of flames was caused by the ignition of colored powders that were sprayed over the crowd.

Definitions:

Combustible Dust – is any fine material that has the ability to catch fire and explode when mixed with air.

Combustible dust can be:

- Organic materials (sugar, flour, wood, cornstarch, etc.)
- Some Metals
- Some non-metallic and inorganic materials

Many of these materials are not "normally" combustible, but they can burn or explode if the particles are the right size and in the right concentration in the presence of an ignition source.

Fire Dynamics:

There are four elements needed for a flash fire/dust explosion:

- Combustible Powder
- Oxygen (Air)
- Ignition Source
- Dispersion of dust into a cloud above the minimum explosion concentration (MEC)

Mitigation and Safety Recommendations:

These types of incidents are presently not very common, which means that one of the four elements is absent. Most of these events generate sufficient colored powder and cloud dispersion in the presence of air. The missing element is often the ignition source. The key to preventing these incidents relies on:

- Elimination ignition sources
- Reducing dust clouds to concentrations below the minimum explosive concentration (MEC)

Ignition sources include:

- Open flames and Sparks
- Electrical Equipment
- Hot Surfaces
- Static Electricity

Due to the large crowds and dynamic nature of these events, this makes elimination of ignition sources extremely difficult.

Anecdotal and theoretical evidence suggest that a concentration of powder required to fuel a flash fire could occur under conditions where you could not see your fully extended hand in front of you or a 25-watt light bulb 6 feet away.

As the frequency and popularity of these events continue to rise, so too will the number incidents without proper mitigation strategies. Based upon the potential for serious injury and due to the extreme variability of materials and changing conditions that comes with these events, we do not recommend this type of "colored powder" dispersion in any manner.

Sources:

NFPA 654: Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids, 2013 Edition

Combustibility Hazards of Colored Powders, Exponent Engineering and Scientific Consulting, July 1, 2015, Timothy J. Myers, Ph.D., P.E., CFEI, CFI