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Messages for Manufacturing Personnel

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Dust Explosions - Clean up this Hazard!

October 2014

In August 2014 the United States Chemical Safety Board (CSB) reported the results of an investigation of a December 2010 explosion in a titanium and zirconium scrap metal processing facility in West Virginia. The explosion resulted in three fatalities and one injury. Here is a brief summary of what is believed to have happened:

1. A blender was being used to process zirconium powder. Employees had observed mechanical problems before the explosion. Blender paddles were striking the sidewall of the blender causing damage. Adjustments and repairs were made but problems continued.
2. It is believed that sparks or heat from metal-to-metal contact between the blender blades and the blender side ignited the zirconium powder.
3. The burning zirconium dust resulted in a deflagration - hot gases expanded, producing a "wind" observed by two witnesses. The burning zirconium dust ignited open drums of titanium and zirconium stored nearby, propagating the fire.
4. The initial explosion lofted other dust in the plant into the air causing a secondary dust explosion and fire.

Note: All pictures are screen captures from the US Chemical Safety Board video describing the incident http://www.csb.gov/al-solutions-fatal-dust-explosion/

Did you know?

- The CSB has investigated 9 serious combustible dust incidents in the USA since 2003. These explosions and fires caused a total of 36 fatalities and 128 injuries. Five of these explosions involved metal dusts, and three occurred in the same plant.
- On August 2, 2014 an explosion in a plant in Kunshan, China that manufactures aluminum automobile wheels caused at least 75 fatalities and 180 injuries. Initial reports indicate that the incident was an aluminum dust explosion.
- Most solid organic materials, as well as plastic powders and many metals, can create an explosive cloud if the particles are small enough and dispersed in the air at a sufficiently high concentration.
- More information about dust explosions can be found in the following *Beacons*: 9/2003, 5/2006, and 5/2008. You can view these at www.sache.org.

What can you do?

The CSB report identified many contributing causes for this incident. Most were related to facility design, failure to comply with dust explosion protection standards, and management systems. But there are things that you can do as a plant worker to prevent dust explosions.

- Know whether or not you have any dust explosion hazards in your plant, and what you must do to ensure proper operation of your plant's protective systems. US OSHA has a useful poster with guidance on what kinds of materials might be dust explosion hazards: https://www.osha.gov/Publications/combustibledustposter.pdf
- Recognize that good housekeeping is critically important for dust explosion safety. Accumulated dust on equipment, floors, and elevated surfaces such as lighting fixtures and ceiling support beams can contribute to secondary dust explosions.
- Report any maintenance issues which could result in sparking or overheating in any dust handling equipment, and do not operate the equipment until it is repaired.

Do you have dust explosion hazards in your plant?

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