

# **Hoeganaes Corporation: Metal Dust Flash Fires and Hydrogen Explosion**

**Gallatin, TN, January 31, March 29 and May 27, 2011**

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## Facilitator Resources

See the overall CSB Facilitator Guide here: <https://mwc.umn.edu/>

Link to 2006 Combustible Dust Study by CSB:

[https://www.csb.gov/assets/1/20/dust\\_final\\_report\\_website\\_11-17-06.pdf?13862](https://www.csb.gov/assets/1/20/dust_final_report_website_11-17-06.pdf?13862)

Link to the CSB report: <https://www.csb.gov/hoeganaes-corporation-fatal-flash-fires/>. Review the final report; as it is 31 pages in length it may be feasible to have a copy for each table. There is no 2-page summary. If copies are not feasible, it is recommended that the following pages be copied for review (at a minimum):

- cover sheet,
- 2-7 (Introduction, Process, Incidents—all three dates),
- 13 (Hazard Recognition)
- 34-17 (Engineering Controls, Administrative Controls, PPE),
- 24 (Milestones in Combustible Metal Dust Control),
- 26-27 (Key findings, Recommendations)

Sections 4.4 and 4.5 provide important regulatory context.

Key Points and Discussion Questions and Answers follow on the next pages.

## **Key Points**

- Five killed, three injured as a result of an explosion in a facility where atomized steel and iron powers were manufactured.
- The first explosion occurred when vibration from a motor during restart sparked dispersed dust in sufficient concentration that resulted in flames that engulfed two workers who both died later.
- The second event involved an engineer and contractor replacing igniters on a band furnace when dispersed dust engulfed one of them in flames resulting in first- and second-degree burns.
- The third explosion resulted in three fatalities and two injuries when friction created while uncovering a trench sparked hydrogen explosion that ignited iron flash fires.
- Two years before the first event, iron dust from the plant had been tested for explosivity to respond to an insurance audit.
- The Gallatin Fire Department inspected the plant after the first two events but did not cite or address the combustible dust hazard.
- Flame resistant clothing was not sufficient for the hazard.
- Corporate oversight was not provided.

**Questions**

1. What would have helped the workers prior to the first explosion?
2. What management decisions/omissions contributed to this situation?
3. What OSHA regulations could be applied in this facility?
4. What can be done to help assure that there is not another occurrence?

## **Representative Answers**

1. The workers were not trained in the hazard of iron dust and the work practices needed to avoid flammable gases and ignition sources. Maintenance workers did not conduct combustible gas testing (did they have the equipment and training?).
2. Actions were not sufficient after the company knew of the explosion hazard. There was no preventative maintenance and gas detection system in place. Although Gallatin fire Department adopted the Combustible Dusts, 2006 International Fire Code Chapter 13, these criteria do not require jurisdictions to enforce the more comprehensive NFPA standard; the Tennessee Fire Code and City of Gallatin do not enforce 'optional' standards/recommendations, so there was no local oversight of management. Corporate oversight was lacking.
3. There is no OSHA combustible dust standard. Housekeeping and the General Duty Clause are generally used when a combustible dust hazard is identified. PPE and electrical standards may also apply. Tennessee, a state-plan State could adopt a separate standard, but none was in place.
4. Training is needed for employees and contractors to recognize the hazards and implement safe work practices to eliminate ignition sources and assure that dust is routinely removed from surfaces and other reservoirs. Management and supervisors must provide appropriate equipment and the time for these efforts. Routine audits of compliance with good work practices are essential, with prompt follow up as needed.

## **CSB Investigation Exercises, combustible dust Tennessee- Facilitator Guide**

See the listing of recommendations here, [https://www.csb.gov/recommendations/?F\\_InvestigationId=3499](https://www.csb.gov/recommendations/?F_InvestigationId=3499) that required actions from the following:

City of Gallatin, TN (1 Recommendations)

City of Gallatin, TN Fire Department (2 Recommendations)

Hoeganaes Corporation (4 Recommendations)

International Code Council (ICC) (1 Recommendations)

Metal Powders Producers Association (MPPA) (1 Recommendations)

Occupational Safety and Health Administration (OSHA) (3 Recommendations) Note: at the time of the investigation report, there was a draft OSHA Combustible Dust Standard, but it has not been released.

Tennessee Division of Occupational Safety & Health (TOSHA) (1 Recommendations)

### Acknowledgement

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