

## Request for Comments

The CSB asks for comment from companies, regulators, inspectors, safety training providers, researchers, unions, and the workers of dust-producing operations themselves on some very fundamental questions. Please add to our understanding by answering any or all of the following questions:

- In real-world working conditions, where dust is an inherent aspect of the operation, can a workplace be both dusty and safe?
- In such working environments — where the amount of ambient/fugitive dust cannot be wholly eliminated 100 percent of the time — how does an individual or organization distinguish between an acceptable or safe dust level and one that has been exceeded? How often does judgment or experience play a role in such decisions? Should it?
- How are hazards associated with combustible dust communicated and taught to workers? What systems have organizations successfully used to help their employees recognize and address dust hazards?
- What are some of the challenges you face when implementing industry guidance or standards pertaining to dust control/management?
- If companies/facilities need to use separate or different approaches in order to comply with both sanitation standards for product quality or food safety and those associated with dust explosion prevention, then how do you determine what takes priority? Is the guidance clear?
- How should the effectiveness of housekeeping be measured? What methods work best (e.g., cleaning methods, staffing, schedules)?
- As equipment is used and ages, it requires mechanical integrity to maintain safe and efficient operability. How does inspection, maintenance, and overall mechanical integrity efforts play a role in dust accumulations, and how are organizations minimizing such contributions in the workplace?
- What are some of the challenges to maintaining effective dust collection systems?
- How common are dust fires in the workplace that do not result in an explosion? Does this create a false sense of security?
- Are workers empowered to report issues when they feel something needs to change with regard to dust accumulation? What processes are in place to make these concerns known?
- How can combustible dust operators, industry standard organizations, and regulators better share information to prevent future incidents?

The CSB will review all responses submitted by November 26, 2018, and use the information provided to explore the conditions that influence the control and management of combustible dust in order to seek out a deeper understanding of the real-world challenges to preventing dust explosions and, more importantly, new opportunities for safety improvements.

## Background

**To date, the CSB has issued four recommendations to OSHA** calling for the issuance of a comprehensive general industry standard for combustible dust, and combustible dust safety is on the agency's Drivers of Critical Chemical Safety Change list. Yet development of a general industry standard has not come to fruition. With this publication, the CSB aims to spearhead actionable dialogue between industry, regulator, workforce, and others to achieve safety improvements in the management

and control of combustible dust beyond regulatory promulgation.

In 2006, the CSB identified 281 combustible dust incidents between 1980 and 2005. One hundred and nineteen workers were fatally injured, 718 more were hurt, and industrial facilities were extensively damaged.<sup>1</sup> The incidents occurred

<sup>1</sup> Chemical Safety and Hazard Investigation Board, *Combustible Dust Hazard Study*, 2006-H-1, November 2006, p1, <http://www.csb.gov/file.aspx?DocumentId=482> (accessed January 24, 2018).

in 44 states, in many different industries, and involved a variety of different materials. Since the publication of the study in 2006, the CSB has confirmed an additional 105 combustible dust incidents,<sup>2</sup> with the CSB conducting in-depth investigations of five of them, including most recently the Didion Milling dust explosion in Cambria, Wisconsin. These five incidents alone have taken the lives of 27 workers and injured 61 others.<sup>3</sup>

In each investigation, one or more witnesses conveyed similar messages to CSB such as, their site was “the cleanest it has ever been,” that “people cleaned all the time,” or that “they never thought it [the incident] would happen here.”<sup>4</sup> Overall, workers and management personnel from the various CSB investigation sites had similar perceptions of their work environments: Dust was present, normal, and maintained at a “safe” or “manageable” level. These commonalities between companies, of which differ in their dust-producing operations and their industry (e.g., sugar, corn, automotive insulation), suggest similar real-world challenges exist for each of them regarding the safe identification and management of dust. There is value in unearthing these challenges and the extent to which they hinder dust-producing facilities from preventing the “next” dust explosion. As has been noted by others:

There is a deep need after any fatality event to understand what happened so that everything possible can be done to prevent another occurrence. Prevention is not as easy as learning what people should or should not have done at a specific incident. It requires a thorough examination of the system that put people in positions where they felt that their actions were the best option.<sup>5</sup>

As such, while the CSB continues its investigation of the Didion incident to understand the specifics leading up to the

tragic event, the agency aims to explore relevant topics with members of various combustible dust-producing industries, stakeholders, and technical experts to better understand the challenges to achieving a safe work environment amid processes that produce dust. This report is a springboard for those dialogues.

### Perceptions About Dust Vary

As discussed in the *Didion Factual Investigative Update*,<sup>6</sup> Didion employees had varying perceptions of dust accumulations within the facility. They also expressed varying sentiments regarding what they considered “clean” versus “dusty” with respect to dust accumulation. Some employees characterized the plant as “spic and span,” while others reported that dust was constantly present in the work area. And the perceived level of safety they each had, as it relates to the dust within their work environment, also varied.

Interestingly, the CSB found strikingly similar variations in the levels of hazard awareness (Figure 1) and dust level perceptions (Figure 2) between those working at Didion and at incident sites of previous CSB combustible dust investigations. The wide spectrum of perceptions that can be seen in individuals’ statements regarding combustible dust call into question: (1) industry’s collective understanding of the risks of combustible dust; (2) the adequacy of current efforts to manage the hazard; and (3) the effectiveness of current inspection methods for the proactive identification of “unsafe” levels of dust.

### Factors Influencing Dust Hazard Perceptions

From an examination of statements made by workers and management, a number of factors appear to influence these varying perceptions of dust hazard risks and one’s personal sense of safety. They include but are not limited to:

- Hazard awareness: the degree to which workers and management have practical real-world understanding of combustible dust hazards will impact how they react to their environment when they observe dust. For example, do workers know how much dust is too much?
- Previous incidents and fires: observing fires or hot work activities in a combustible dust environment that did not result in an explosion could create a false sense of security.

2 CSB incident database, as of 4/23/2018.

3 There were 14 fatalities and 36 injured at Imperial Sugar (2009), three fatalities and one injured at AL Solutions (2014), five fatalities and three injured at Hoeganaes (2012), seven injured at US Ink (2012), and five fatalities and 14 injured at Didion Milling (2017). The CSB also investigated West Pharmaceutical Services (2004), CTA Acoustics (2005), and Hayes Lemmerz (2005). In total, these eight incidents cost the lives of 41 individuals and injured 142 others.

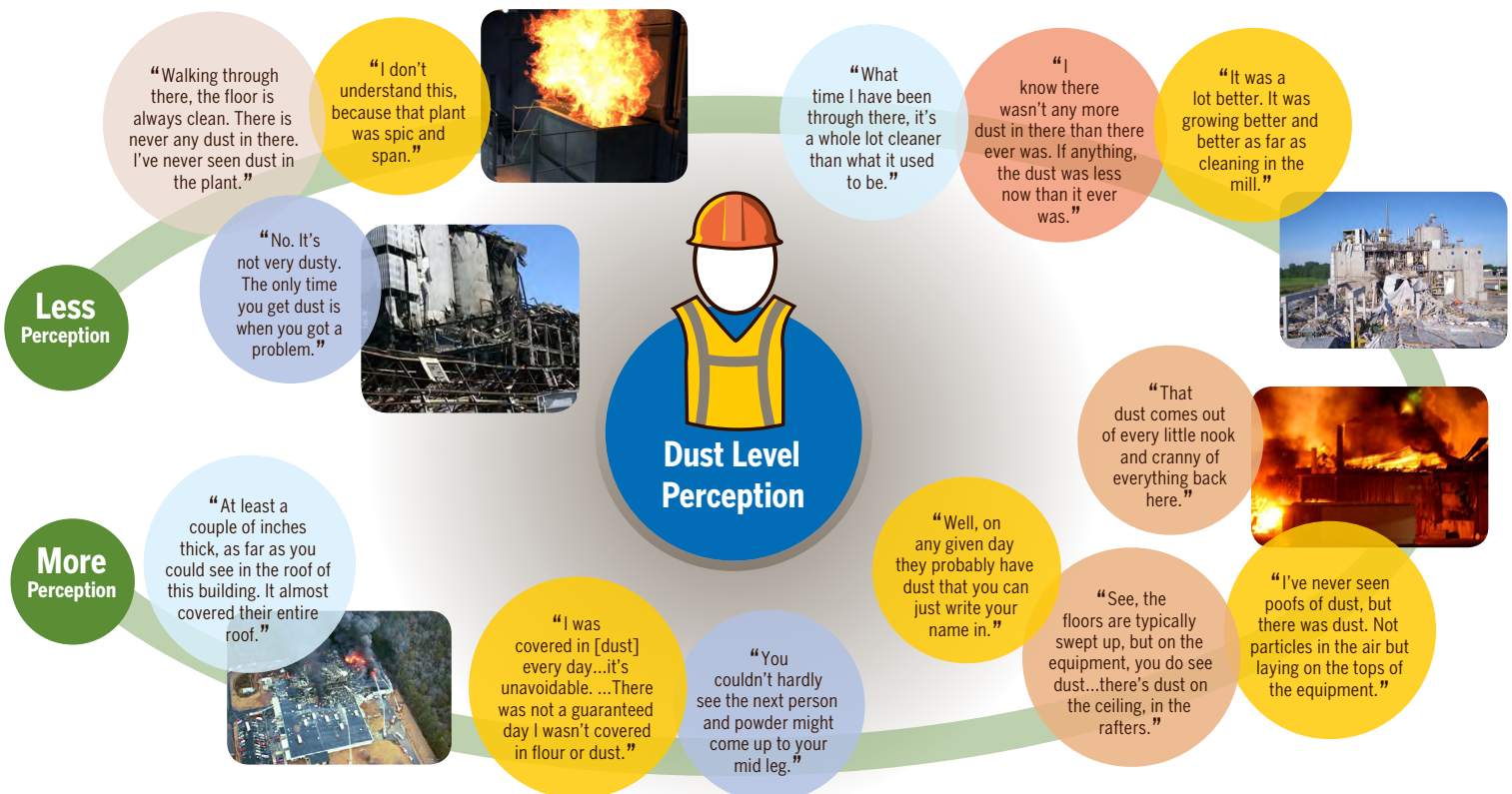
4 See Figures 2 and 3 for more statements.

5 The Forest Service and Washington State Department of Natural Resources; *Twisp River Fire Fatalities and Entrapments: Interagency Learn Review Status Report*, 2015, p 3. <https://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=77159beb-18bd-bdbc-57ad-12fe1d38cd2&forceDialog=0> (accessed January 18, 2018).

6 CSB, *Factual Investigative Update: Didion Milling*, April 20, 2018, <https://www.csb.gov/didion-milling-company-explosion-and-fire/>.



**Figure 1.** Interview excerpts of employee perceptions of dust hazards from Didion and prior CSB combustible dust investigations. Each quote bubble color represents a separate incident.



**Figure 2.** Interview excerpts of employee perceptions of dust levels at Didion and other dust producing facilities investigated by the CSB. Each quote bubble color represents a separate incident.

- Regulatory oversight: regulatory requirements do not reinforce one another. For example, sanitation requirements under the Food and Drug Administration (FDA) may meet food quality concerns, but not be sufficient to prevent a dust explosion.
- Sanitation: management and workers focus on cleaning all the time, providing a sense of vigilance; however, hazardous dust accumulation rates may exceed cleaning efforts.
- Ability to recycle material: in facilities where material can be recycled or reprocessed, there may be a greater tolerance for spills or leaks.
- Perceived difficulty in housekeeping efforts: as dust accumulates on hard-to-reach and overhead surfaces workers perceive that those surfaces are too hard, or too dangerous, to reach for cleaning.

Further exploration of these factors may yield new opportunities for accident prevention.

On the subject of disasters, it is very common for [...] managers to say 'this won't happen.' I have sympathy with this. What they really mean is, it's highly improbable...This creates a kind of vacuum in terms of what to focus on so it's easier to say, either out loud or in your private thoughts, 'this won't happen'. The way to avoid this trap is to say, yes, it will happen. It will happen to somebody, somewhere, at some point in time. That's all but guaranteed. Now, what are we going to do to make sure it doesn't happen to us? It's a subtle but profound shift in thinking.<sup>7</sup>

<sup>7</sup> Lacy, K.; *The Road to High Reliability*, Distributed by Decomworld, p 4, <http://drillscience.com/DPS/KevinLacey-TheRoadToHighReliability.pdf> (accessed May 30, 2018).