

Preliminary Findings Confirm Blast in NC Was a Dust Explosion Fueled by Plastic Powder

Investigators from the U.S. Chemical Safety Board (CSB) told a community audience in Kinston, NC on June 18, 2003, that last January's massive blast at medical device maker West Pharmaceutical Services, which killed six workers and injured dozens more, was in fact an explosion of fine plastic powder used in the manufacturing of rubber products.

The dust explosion occurred above an area where rubber strips were coated with moistened polyethylene powder, investigators told the audience at the Kinston High School Performing Arts Center auditorium. Although made from a plastic similar to that in milk jugs, the powder when dry is as fine as talcum and is capable of forming explosive mixtures in air, according to CSB test results made public.

"We held this meeting to brief the community on our findings to date and hear from members of the public who were affected," said CSB Chairman Carolyn Merritt, who presided at the session. "The full Board will convene here in Kinston when the staff investigation is concluded to issue our final safety recommendations in this case. The Board is deeply concerned by this event and the subsequent plant explosion in Corbin, Kentucky, which claimed seven lives. The dangers of explosive dust are not well known, and helping industry to understand this insidious hazard certainly will be a priority."

According to CSB lead investigator Stephen Selk "Our testing has now confirmed that actual polyethylene powder recovered from the plant ruins is explosive when mixed with air. The material contains enough energy to account for the level of destruction we observed," Selk continued. He also noted the heavy damage had thus far prevented his team from determining the source of the ignition that triggered the dust explosion.

"The polyethylene powder was used as a nonstick coating for rubber sheeting made at the plant," Selk added. "During the production process, the plant's ventilation system drew fine dust particles into the space above an unsealed, suspended ceiling, where the dust settled and built up."

CSB Investigator Angela Blair told the group that on January 29 the five conditions necessary for a dust explosion were all met at the West plant: fuel, oxygen, dispersion, confinement, and ignition. "The dust was the fuel. Dispersed in the air, it formed an explosive mixture," Blair said.

Blair explained that by installing a suspended or false ceiling years earlier, the company had inadvertently created an area where dust could accumulate out of view, and also created a space where a dust explosion could occur and spread. It is for these reasons, Blair added, that unsealed ceilings are not recommended where hazardous dusts may be present.

Blair said investigators had recovered numerous ceiling tiles that were scorched exclusively on the upper surface, confirming the origin of the dust explosion within the overhead space. "Eyewitnesses heard a sound like rolling thunder, as a rapidly expanding chain of explosions moved through the ceiling space and literally tore the building apart."

Blair and fellow investigator Lisa Long described the sequence of events that ultimately led to the accumulation of dust. Raw materials from a ground-level process area called the "kitchen" were conveyed to a large mixer on the upper floor, where the rubber was blended. The rubber mass was then dropped through a chute to a mill back on the lower level, where it was rolled into flat strips. The rubber strips were then fed through rollers and coated using a tank of polyethylene powder slurried in water.

Ms. Blair said, "Once the rubber was dry, what remained on the surface was a baby powder-like coating. But in the course of drying the rubber, fans blew some of the fine powder into the air. Much of the dust settled in the processing area, where the company had a regular program to clean the dust from equipment, walls, and floors. However, some dust also migrated through small openings in the suspended ceiling, drawn by air conditioning intakes located overhead. Over time the dust accumulated above the ceiling -- out of normal view -- on tiles, conduits, ducts, and light fixtures."

Lead investigator Selk pointed out that weeks prior to the explosion, maintenance workers had seen layers of dust coating surfaces above the suspended ceiling. "Tragically there was no recognition of the explosion hazard posed by this accumulated dust," Selk said.

The CSB is an independent federal agency that investigates chemical accidents, determines root causes, and issues findings and safety recommendations to prevent recurrence.