Explosion at Illinois silicone manufacturing facility entirely preventable

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The Occupational Safety and Health Administration (OSHA) has issued 12 willful violations and a total of $1,591,176 in fines to AB Specialty Silicones after a plant explosion killed four workers at its manufacturing plant north of Chicago in Waukegan, Illinois, on May 3.

According to OSHA, a willful violation is one in which "the employer either knowingly failed to comply with a legal requirement (purposeful disregard) or acted with plain indifference to employee safety."

The total fines levied against AB Specialty Silicones by OSHA are a mere slap on the wrist for the suffering that the workers and their families faced as a result of the company's cost-cutting measures that led to the deadly explosion.

AB Specialty Silicones formed out of a merger between Anderson and Associates and BRB USA in 2012. The company employed just 88 people at the time of the explosion, running the facility 24 hours per day on a regular basis to turn out silicone products for personal care, roof coatings, chemical manufacturing, adhesives, sealants, and coatings.

AB Specialty Silicones completed a plant expansion in 2018 to meet increased global demand. The Waukegan facility added a new reactor to increase the company's annual specialty fluid production capabilities and tripled its capacity to make room for increased output and the storage of raw materials and finished products.

Recently the US Chemical Safety Hazard Investigation Board (CSB) released a factual update on the circumstances surrounding the May 3 explosion and its causes which makes clear that AB Specialty Silicones is responsible for the deaths of the four workers by willful negligence. However, since the CSB is a scientific investigation organization and not an enforcement agency their findings will have no legal consequences for management.

Due to regulations which favor businesses the amount of chemical products stored on-site by AB Specialty Silicones did not meet the threshold for regulation under the Environmental Protection Agency's (EPA) Risk Management Plan (RMP) program or OSHA's Process Safety Management (PSM) standard.

The report revealed that the layout of the plant itself played a role in the explosion. The plant was divided into a high bay and low bay with different chemicals being produced in the two sections which shared a ventilation system with each other.

Ventilation of outside air was provided mainly through vents in the low bay, and the high bay had two exhaust fans that did not run continuously and which instead had to be manually activated by switch in the maintenance area. The plant also had no functioning hydrogen gas or flammable gas detection systems in place at the time of the explosion.

One of the products that AB Specialty was making in the emulsions area at the time of the incident was a silicon hydride (SiH) emulsion named EM 652. One of the raw materials used to make EM 652 is a methylhydrogen polysiloxane copolymer, called XL10, which is another type of SiH compound. Under the right conditions both XL10 and the EM 652 can produce "explosive amounts of hydrogen gas."

XL10 can generate hydrogen gas which can lead to an explosion under the right temperature conditions if it is in the presence of acids or bases, a case higher in likelihood if storage tanks are not properly rinsed.

The manufacturing process of the EM 652 product did not have any dedicated equipment, that is equipment for the specific use of making the emulsion. The CSB report specifically cited AB Silicone's failure

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to equip the vessels used for its manufacture to mitigate potential hazards, for example, production of flammable gas.

Investigators found other major problems with the tanks used in the production of the emulsion. The tanks were not completely sealable, putting the emulsification at constant risk for contamination, and the tanks themselves had no system to ventilate the flammable hydrogen gas being used in the process.

Conditions in the emulsions area of the plant were such that vapors released from unsealed tanks were more likely to interact and react with one another. The CSB report noted that "[b]ecause the tanks were not completely sealed, these tanks could not hold pressure and any gases generated during a process could have vented into the production building" and "because the main air mover was located in the emulsions area and provided approximately 86 percent of the makeup air, any gases generated could become a well-mixed cloud in the production building."

Workers in the plant, especially those who regularly took the tops of the tanks on and off during the manufacturing process to perform visual inspections, were at great risk of harm from flammable gases because of the company's blatant disregard for established safety measures documented for the production of silicones.

The report cites Dow Chemical, a leading manufacturer of silicones, on its documented procedures for the maintenance of reactors and storage tanks for silicon hydride-containing polysiloxanes such as XL 10 and EM 652: "[they] should be provided with vent systems to release any hydrogen generated and other gases during normal process operations. Great care should be exercised to prevent unintended contamination of storage tanks or process vessels with alkalis [bases]/acids, for example by back flow from caustic vent scrubbing systems. This could result in excessive rapid pressure generation through hydrogen evolution which is considered to be impractical to vent through standard relief systems."

Lead investigator Tamara Quareshi noted that some chemicals had fallen through "regulatory gaps." Both the Obama and Trump administrations relaxed environmental regulations and regulations on chemicals for businesses, in addition to stripping funding from OSHA and other workplace health and safety programs in the US.

The conclusions of the CSB report highlights the stark and often deadly realities of the capitalist profit system. Workers' safety and ultimately their lives are subordinated to the capitalists' profit interests through cutting costs on equipment, maintenance, and refusing to implement safety measures which would protect workers from hazards on the job.

Regulating bodies such as OSHA and the EPA consistently favor businesses, aiding and abetting the creation of conditions which are dangerous for workers. These are exacerbated by subsequent funding cuts to these organizations, with any protections that they do provide dwindling year after year.

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