

Case Study 20:

Double Cone Dryer Explosion at Optima Belle LLC

At approximately 10:00 p.m. on December 8th 2020 a double cone dryer at Optima Belle exploded and fatally injured an operator and propelled metal debris and dryer fragments off-site and within the facility. The explosion occurred while dehydrating sodium dichloroisocyanurate (NaDCC) dihydrate or chlorinated dry bleach (CDB-56[®]) to produce anhydrous sodium dichloroisocyanurate. During the process NaDCC underwent an unexpected decomposition releasing gases that increased the internal pressure of the dryer to above its design pressure.

DSC and ARC measurements were performed to understand the decomposition and the accident. The methodology shown in this class (Criticality classes) is cited several times as a tool to recognize chemical hazards.

Key Lessons drawn from the investigation:

- Effective risk management hinges upon thorough understanding and documentation of the hazards of a process and the chemicals being processed.
- When using multipurpose equipment, ensure that it is adequate for the considered process
- Tolling of Hazardous Materials: industry guidance exists and could have prevented this accident
- Safety Data Sheet (SDS): hazard information can vary substantially between suppliers. Chemical tollers and other end users should not rely solely on hazard information contained in the SDS. Additional hazard analyses may be needed to avoid process safety incidents.
- Thermal hazard assessments need to be considered (search for publicly available literature, internal literature, perform reactive hazard screening assessments). There are many tools available to identify whether a chemical has thermal or reactive hazards that could lead to a process safety incident.
- Knowledge Management and Sharing: companies must ensure that chemical hazard information identified from previous incidents, studies, and laboratory tests are maintained and organized in a manner that will allow employees to be aware of the information's existence and to use it appropriately for future applications.
- To ensure the hazards associated with new processes are identified and controlled, facilities should (1) evaluate process safety information to determine if the chemicals can be safely used at the laboratory scale, (2) examine the process at the laboratory and pilot scales to determine whether the process will be safe at production scale, (3) involve site safety and process engineering personnel to determine whether the process can be conducted safely at full production scale with the existing equipment
- Outsourcing the production or processing of a hazardous material does not outsource the responsibility for process safety

References:

CSB Investigation report: "Fatal chemical Decomposition reaction and explosion at Optima Belle LLC" published July 6 2023

CSB Investigation Update: "Double Cone Dryer Explosion at Optima Belle LLC" published September 2022