CCPS Pharma, Food, & Fine Chemicals Subcommittee

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An AIChE Technology Alliance
CCPS Center for Chemical Process Safety

"Manage Change or Change will manage you!"

PFFC Process Safety Moment

Process Change

Management of Change work processes are required to reduce risk.

On December 8, 2020, an explosion occurred in a rotary double cone dryer at a contract manufacturing facility in Belle, West Virginia, USA. The incident resulted in one fatality and two injuries, as well as a shelter-in-place for community members within a 2-mile radius of the facility.

The Client company had specified a fluid bed dryer during their initial manufacturing inquiry, but a change was made to use a rotary double cone dryer at this Contract manufacturing site. No thermal hazard studies were done to assess the potential hazards and consequences of this change. The explosion was caused by the self-accelerating decomposition reaction of NADCC dihydrate when the material was heated during troubleshooting operations.

Figure 1: Image from https://www.csb.gov/optima-belle-explosion-and-fire/

Key Lessons

- ❑ A process change was made without the appropriate evaluation by an expert in thermal hazards and without the appropriate hazard information.
- ❑ The Client company had information about the chemical reaction hazards but failed to communicate it clearly between the experts that had the information and the contract manufacturing personnel.
- ❑ The Contract Manufacturing site failed to ask for additional thermal hazard data from tests or literature.
- ❑ Even dryers can be involved in thermal decomposition reactions! The heat and mass transfer dynamics of different technologies can impact the potential for decomposition chemical reaction hazards.

What can you do?

- Confirm that your organization has a robust management of change process, including instances where parties are involved in outsourced manufacturing partnerships.
- Involve thermal hazard laboratory experts when a technology change is made at scale. They may recommend more thermal hazard testing or pilot plant studies.
- Review test data with thermal hazard experts to assure the test data reflects what may happen in process equipment.