



U. S. Chemical Safety and Hazard Investigation Board RECOMMENDATION STATUS CHANGE SUMMARY

Report:	Optima Belle LLC Explosion and Fire
Recommendation Number:	2021-02-I-WV-R13
Date Issued:	July 6, 2023
Recipient:	Occupational Safety and Health Administration (OSHA)
New Status:	Open – Awaiting Response or Evaluation/Approval of Response
Date of Status Change:	Not Applicable – Initial Status

Recommendation Text:

Amend the Process Safety Management (PSM) Standard, 29 CFR 1910.119, to achieve more comprehensive control of reactive hazards that could have catastrophic consequences.

- *Broaden the application to cover reactive hazards resulting from process-specific conditions and combinations of chemicals. Additionally, broaden coverage of hazards from self-reactive chemicals. In expanding PSM coverage, use objective criteria. Consider criteria such as the North American Industry Classification System (NAICS), a reactive hazard classification system (e.g., based on heat of reaction or hazardous gas evolution), incident history, or catastrophic potential.*
- *In the compilation of process safety information, require that multiple sources of information be sufficiently consulted to understand and control potential reactive hazards. Useful sources include but are not limited to:*
 - *Literature surveys (e.g., Bretherick's Handbook of Reactive Chemical Hazards, Sax's Dangerous Properties of Industrial Materials, CAS SciFinder).*
 - *Information developed from computerized tools (e.g., ASTM's CHETAH, CCPS's Chemical Reactivity Worksheet).*
 - *Chemical property data compiled in PubChem and the REACH (Registration, Evaluation, and Authorization of Chemicals) dossiers maintained by the European Chemicals Agency (ECHA).*
 - *Chemical reactivity test data produced by employers or obtained from other sources following established standards such as:*
 - *ASTM E537-20, Standard Test Method for Chemicals by Differential Scanning Calorimetry;*

- *ASTM E1981-22, Standard Guide for Assessing Thermal Stability of Materials by Methods of Accelerating Rate Calorimetry;*
 - *ASTM E2550-21, Standard Test Method for Thermal Stability by Thermogravimetry; and*
 - *ASTM E1231-19, Standard Practice for Calculation of Hazard Potential Figures of Merit for Thermally Unstable Materials.*
- *Relevant incident data from the plant, the corporation, industry, and government.*
- *Augment the process hazard analysis (PHA) element to explicitly require an evaluation of reactive hazards. In revising this element, evaluate the need to consider relevant factors, such as:*
 - *Rate and quantity of heat or gas generated.*
 - *Maximum operating temperature to avoid a runaway reaction from decomposition.*
 - *Time to Maximum Rate under Adiabatic Conditions (TMRad).*
 - *Thermal stability of reactants, reaction mixtures, byproducts, waste streams, and products. - Effect of variables such as charging rates, catalyst addition, and possible contaminants.*
 - *Understanding the consequences of runaway reactions or hazardous gas evolution.*

Board Status Change Decision:

A. Rationale for Recommendation

On December 8, 2020, a metal rotary cone double dryer containing a chlorinated isocyanurate compound (trade name CDB-56®) exploded following a decomposition reaction that resulted in a fire and toxic chlorine release at the Optima Belle LLC (Optima Belle) facility in Belle, West Virginia. The explosion occurred while Optima Belle, a toll manufacturer, was dehydrating CDB-56® on behalf of Clearon Corporation through a contractual agreement with Richman Chemical Inc.

One Optima Belle employee was fatally injured in the explosion, two others were evaluated for respiratory irritation, and one member of the public reported a minor leg injury. Debris from the explosion was found almost a half-mile from the incident. Local authorities issued a shelter-in-place order for a two-mile radius for over four hours. The facility experienced an estimated \$33.1 million in property damage.

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated the incident and found several safety issues including ineffective process knowledge management, a lack of thermal hazard assessment, ineffective selection of process equipment, shortcomings in industry

practices related to tolling hazardous materials, and a lack of regulatory coverage of reactive hazards under the Occupational Safety and Health Administration's (OSHA's) Process Safety Management standard (PSM) and the Environmental Protection Agency's (EPA's) Risk Management Program rule (RMP). As a result of these findings, the CSB issued three recommendations to the Occupational Safety and Health Administration (OSHA). This status change summary addresses **CSB Recommendation No. 2021-02-I-WV-R13**.