



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

Report:	DuPont Yerkes Fatal Hot Work Explosion
Recommendation Number:	2011-1-I-NY-R1 through R4
Date Issued:	April 19, 2012
Recipient:	E.I. duPont de Nemours & Company, Inc.
New Status:	R1 through R4: Closed- Acceptable Action
Date of Status Change:	June 17, 2013

Recommendation Text:

R1: *Develop and enforce corporate-directed policies and procedures which will require all DuPont facilities to audit their hot work permitting systems prior to initiating hot work to ensure that:*

- *All potential explosion hazards associated with hot work activities are identified and mitigated*
- *All relevant forms required for permits are completed in accordance with corporate policies and industry standards (including NFPA 326 and NFPA 51B)*
- *Appropriate DuPont personnel officially approve hot work permits, by signature or equivalent, consistent with DuPont policies*

R2: *Revise corporate policies and procedures to require that all process piping, or similar connections to tanks or vessels be positively isolated, (using closed valves, blind flanges or pancake blanks) and the equipment appropriately vented before authorizing any hot work.*

R3: *Revise corporate policies and procedures to require that the atmosphere inside the container be monitored for flammable vapor prior to performing any welding, cutting, or grinding on the container surface.*

R4: *Revise corporate policies and procedures to require air monitoring for flammable vapor inside the container for the duration of the hot work consistent with industry standards (NFPA 326, NFPA 51B). Create a policy for determining criteria for requiring continuous or periodic testing for the duration of hot work.*

Board Status Change Decision:

A. Rationale for Recommendation

On November 9, 2010, one contract worker was killed and another was injured in an explosion at the E.I. DuPont de Nemours and Co. (DuPont) Yerkes facility in Buffalo, New York. At the time of the incident, contractors were welding atop a 10,000 gallon slurry tank in a process area when hot sparks ignited flammable vinyl fluoride vapor that had accumulated inside the tank, triggering an explosion.

The CSB's investigation found a number of deficiencies in the Yerkes facility's hot work permitting process and procedures that contributed to this accident. Notably:

- The DuPont employee who signed the hot work permit had no knowledge of the process to which the tank was connected or of its associated hazards.

- DuPont employees did not verify that contractors understood the potential hazards of the hot work to be conducted.
- The section of the permit which asked if flammable material would be present was not completed.
- The permit indicated that the tank to be welded on had been "locked out"; however, an overflow line between the tank and adjacent in-service tanks had not been disconnected, which allowed flammable vapor to accumulate inside the container at dangerous levels.

The CSB also concluded that contrary to best industry practices established by NFPA 51 B: *Standard for Fire Prevention during Welding, Cutting, and Other Hot Work*, and NFPA 326: *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair*, the hot work permit procedure did not require testing the atmosphere inside the slurry tank for flammable vapor prior to initiating hot work, even though the work required welding directly on the tank. The procedure also did not require that continuous or periodic monitoring be conducted inside the tank for the duration of the hot work. The CSB accordingly recommended that DuPont issue comprehensive corporate-level policy governing the safe conduct of hot work at all DuPont facilities.

B. Response to the Recommendation

In response to the CSB's recommendation, DuPont developed and issued a new corporate standard, S31F: Hot Work, which "provides requirements and guidance to prevent injuries, loss of life, and property from fire or explosion as a result of hot work." The new standard requires all DuPont facilities to develop a hot work program consistent with its requirements, which include:

- Ensuring hot work permits are initiated and approved by individuals familiar with the scope of the work and hazards of the hot work and area
- Conducting a field audit in the area where the hot work is to be conducted to identify flammability and combustibility hazards, prior to authorizing hot work
- Conducting a job safety analysis prior to hot work to address potential hazards and communicate job requirements and approvals
- Isolating and removing energy sources (via methods to close and secure valves, install blind flanges, or pancake blanks, or equivalent means)
- Criteria for requiring either continuous or periodic monitoring for flammable gases in the vapor spaces of all process equipment or other containers within 11 m (35 ft) of hot work

DuPont also indicated that the standard was provided to all U.S. sites in August 2012 along with a "comprehensive roll-out package" which included guidance documents to assist with local implementation. The company also conducted a series of training sessions between August and December 2012 and plans to provide refresher training to its employees as required by the standard.

C. Board Analysis and Decision

As the actions reported by DuPont appear to meet the intent of CSB Recommendation Nos. 2011-1-I-NY-R1 through R4, the status of these recommendations were changed to: "Closed – Acceptable Action."