



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

Report:	Carbide Industries Electric Arc Furnace Explosion
Recommendation Number(s):	2011-5-I-KY-R02
Date Issued:	February 7, 2013
Recipient:	Carbide Industries LLC
New Status:	Closed-No Longer Applicable
Date of Status Change:	June 4, 2018

Recommendation Text(s):

Modify the design and procedures for the electric arc furnace and related structures including the control room to comply with the NFPA standard developed per R1¹ of this case study.

Board Status Change Decision:

A. Rationale for Recommendation

On March 21, 2011, the electric arc furnace exploded at Carbide Industries, LLC (Carbide) in Louisville, Kentucky. Two workers sustained fatal injuries after hot gases and debris blown from the furnace broke through the double-pane reinforced glass window of the control room, which was located only 12 feet from the furnace. A third worker also sustained injuries. The U.S. Chemical Safety and Hazard Investigation Board's (CSB) investigation found that furnace overpressure events, or "blows," occurred at the facility a few times a year, but found no evidence that these incidents were investigated to determine their root cause or to prevent their occurrence. The CSB also concluded that water leaks into the furnace could contribute to overpressure events; however, Carbide did not have a robust inspection and mechanical integrity program. Moreover, Carbide failed to address the close proximity of the control room to the furnace, despite the fact that previous overpressure events broke control room windows.

As a part of its investigation, the CSB reviewed National Fire Protection Association (NFPA) 86, *Standard for Ovens and Furnaces*, and found that it does not address the type of furnace in operation at Carbide. NFPA 86 addresses electric arc furnaces only in the context of "Class B" furnaces, which do not contain flammables or combustibles. In contrast, Carbide had an electric arc furnace that appeared consistent with the definition of a "Class A" furnace, as it contained a

¹ Recommendation No. 2011-5-I-KY-R1, issued to NFPA, reads as follows: *Establish a committee to evaluate and develop a standard that defines the safety requirements for electric arc furnaces operated with flammable materials and low oxygen atmospheres. At a minimum, establish requirements that electric arc furnaces containing flammables have;*

- *Adequate safety instrumentation and controls to prevent explosions and overpressure events;*
- *Mechanical integrity and inspection programs;*
- *A documented siting analysis to ensure that control rooms and other occupied areas are adequately protected.*

low oxygen atmosphere that collected flammable gases created as by-products of the chemical reactions that produce calcium carbide.

Based on these findings, the CSB issued a recommendation to the NFPA to create a new standard that governs “Class A” furnaces and a recommendation to Carbide to implement the standard once it is adopted.

B. Response to the Recommendation

Carbide stated to the CSB that it had participated in a number of conference calls with NFPA representatives and asked to participate on the yet-to-be-formed committee. In its most recent response Carbide stated that it had not heard from NFPA in a long time.

The NFPA informed the CSB that its staff and Technical Committee on Ovens and Furnaces concluded that the requisite technical expertise to address the subject of electric arc furnaces in an NFPA document does not exist within the current committee volunteers in order to develop and maintain effective and accurate safety requirements applicable to this specific furnace technology.

C. Board Analysis and Decision

As the necessary technical resources were not, are not, and mostly likely will not be available to create a new standard, and this recommendation is contingent upon action by the NFPA to create a new standard, the Board voted to change the status of CSB Recommendation No. 2011-5-I-KY-R02 to: **“Closed-No Longer Applicable.”**