



# U. S. Chemical Safety and Hazard Investigation Board

## RECOMMENDATIONS STATUS CHANGE

### SUMMARY

<b>Report:</b>	Technic Vent Collection System Explosion
<b>Recommendation Number:</b>	2003-08-I-RI-R5
<b>Date Issued:</b>	August 20, 2004
<b>Recipient:</b>	National Fire Protection Association (NFPA)
<b>New Status:</b>	R5: Closed – Acceptable Action
<b>Date of Status Change:</b>	March 31, 2015

#### Recommendation Text:

*Revise the appendix of NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids, emphasizing the need to evaluate potential incompatibilities when dusts, fumes, or vapors are intermixed in vent collection systems to ensure that they do not result in fire or explosion hazards, or destructive corrosion. Reference appropriate methods for such evaluations, such as the ASTM E 2012-00 standard.*

#### Board Status Change Decision:

##### A. Rationale for Recommendation

On February 7, 2003, an explosion and fire occurred inside a vent collection system at the Technic plating chemicals manufacturing and research facility in Cranston, Rhode Island. One employee was critically injured and eighteen others were sent to the hospital for medical evaluations. The surrounding community was evacuated and facility operations were interrupted for several weeks.

The CSB concluded that the explosion was the result of a violent chemical reaction inside the vent collection system (VCS), which was likely initiated when an employee tapped a small hammer against a duct that sounded blocked. Technic did not evaluate the potential hazards of exhausts from multiple processes interacting in the VCS during its design, nor did they evaluate the potential impact of a number of significant changes made to the VCS over several years which diminished transport velocity and allowed substances from a variety of different processes to accumulate inside the system. The CSB concluded that the incident was likely caused by either a violent reaction between two incompatible materials, or a violent reaction of a shock-sensitive material.

As part of its investigation, the CSB reviewed standards and guidelines applicable to the design and operation of industrial ventilation systems, including the 1999 edition of NFPA 91<sup>1</sup>, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids*. At that time, NFPA 91 applied to all exhaust systems – except those designated for combustible particulates – and was intended to provide life and property protection against fires and explosions. While this standard specifically prohibited incompatible materials from being mixed in exhaust ducts (see Section 4.2.2), it did not reference appropriate

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<sup>1</sup> At the time of the incident, Rhode Island had adopted the *Uniform Fire Code* (NFPA 1) which incorporated NFPA 91 by reference.

methods for evaluating chemical compatibility, such as ASTM International's<sup>2</sup> *Standard Guide for the Preparation of a Binary Chemical Compatibility Chart* (E2012), which provides a systematic method for identifying incompatibility hazards during ventilation system planning and design. Consequently, the CSB recommended that NFPA incorporate this reference into NFPA 91.

#### B. Response to the Recommendation

In December of 2014, the NFPA published the 2015 edition of NFPA 91. NFPA broadened the scope of the standard to apply to combustible particulates by removing the word "Noncombustible" before "Particulate Solids" in the title of the standard. In addition, annex section A4.2.2 of this standard was revised to include a warning that mixed materials should not create fire, explosion or health hazard and a reference to the ASTM E2012 standard was added.

#### C. Board Analysis and Decision

As NFPA's actions, with the publication of the 2015 edition of NFPA 91, are consistent with the intent of CSB Recommendation No. 2003-08-I-RI-R5, the Board voted to change its status to: **"Closed-Acceptable Action."**

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<sup>2</sup> ASTM International, formerly known as the American Society for Testing and Materials, is a voluntary consensus standards developer.