



U. S. Chemical Safety and Hazard Investigation Board

RECOMMENDATIONS STATUS CHANGE

SUMMARY

Report:	Kleen Energy Natural Gas Explosion
Recommendation Number:	2010-7-I-CT-UR2
Date Issued:	June 28, 2010
Recipient:	National Fire Protection Association
New Status:	Closed- Exceeds Recommended Action
Date of Status Change:	September 30, 2013

Recommendation Text:

Enact a Tentative Interim Amendment as well as permanent changes to the National Fuel Gas Code (NFPA 54/ANSI Z223.1) that addresses the safe conduct of fuel gas piping cleaning operations. At a minimum: a. Remove the existing Code fuel gas piping exemptions for power plants and systems with an operating pressure of 125 pounds per square inch gauge (psig) or more. b. For the cleaning methodology, require the use of inherently safer alternatives such as air blows or pigging with air in lieu of the use of flammable gas.

Board Status Change Decision:

A. Rationale for Recommendation

On February 7, 2010, an explosion occurred during the planned cleaning of fuel gas piping at Kleen Energy, a combined-cycle natural gas fueled power plant under construction in Middletown, Connecticut. To remove debris from the newly-installed piping, workers were conducting a "gas blow," whereby natural gas is forced through the piping at a high volume and pressure (approximately 650 pounds per square inch gauge). The natural gas and debris were subsequently vented to the atmosphere in a congested area near the facility's power generation building. The accumulated natural gas found an ignition source and the resulting explosion killed six and injured at least fifty.

CSB's investigation concluded that the venting of natural gas in this manner is inherently unsafe because of the intrinsic fire and explosion hazards. Alternative methods, such as pigging or blowing with air, are available and feasible to accomplish the same objectives. As part of its investigation, CSB reviewed the National Fire Protection Association's (NFPA's) National Fuel Gas Code, NFPA 54/ANSI Z223.1, a voluntary consensus standard that provides requirements for fuel gas piping system safety. The CSB found that this standard did not apply to fuel gas piping systems like the one at Kleen because its scope exempted power plants and piping systems with operating pressures greater than 125 pounds per square inch gauge (psig). The standard also did not contain any safety requirements for pipe cleaning operations. The CSB therefore recommended that NFPA revise the scope of the standard to ensure coverage of piping systems such as that in place at Kleen, and incorporate language requiring the use of non-flammable media for pipe cleaning operations.

B. Response to the Recommendation

In response to this recommendation, NFPA proposed developing and issuing a new gas process safety standard using an ANSI-approved expedited rulemaking process. NFPA put forth a number of reasons for this alternative approach, which the Board found compelling. NFPA explained that revision of the scope of an existing standard would be a lengthy and complicated process that would

prevent a timely response to the CSB's urgent safety recommendation and the hazards it sought to address. NFPA also raised concern that revising NFPA 54 alone would not sufficiently address gas processing hazards outside of the utilities sector, and posited that a more comprehensive standard was needed.

In pursuing this alternative action, the NFPA acted promptly and decisively, commensurate with the "urgent" designation of the CSB's recommendation. Produced via an expedited rulemaking process never before used by NFPA, NFPA 56 PS: *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems* was developed and approved in less than 24 weeks, which contrasts significantly with NFPA's regular code development process, which typically lasts 104 weeks. The non-provisional, 2014 edition of the standard was approved in July 2013.

Consistent with the intent of the Board's recommendation, NFPA 56 prohibits the use of flammable gas to clean piping and provides guidance for the use of non-flammable alternatives. NFPA 56 also contains other important safety requirements (e.g., requirements for written cleaning and purging procedures, and worker training) that go beyond the scope of the Board's recommendation.

C. Board Analysis and Decision

NFPA's expedited development and issuance of a comprehensive fuel gas safety standard, NFPA 56: *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, is not only consistent with, but exceeded the expectations envisioned by the Board's Recommendation No. 2010-07-I-CT-UR2. Therefore, the Board voted to designate this recommendation with the status "Closed- Exceeds Recommended Action."