



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

Report:	Kleen Energy Natural Gas Explosion
Recommendation Number:	2010-01-I-CT-UR3
Date Issued:	June 28, 2010
Recipient:	American Society of Mechanical Engineers
New Status:	Open – Acceptable Response or Alternate Response
Date of Status Change:	September 25, 2017

Recommendation Text:

Make appropriate changes to the 2010 version of Power Piping, ASME B31.1, to require the inherently safer fuel gas piping cleaning methodologies in favor of gas blows. At a minimum, for the cleaning or flushing methods discussed in B31.1 paragraph 122.10, require the use of inherently safer alternatives such as air blows and pigging with air as the motive force 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 new piping at Kleen Energy, a combined-cycle natural gas-fueled power plant then under construction in Middletown, Connecticut. Immediately prior to the explosion, workers were conducting a "gas blow," whereby natural gas is forced through the piping at a high volume and pressure to remove debris. The natural gas and debris were subsequently vented into a congested outdoor area where the gas accumulated and found an ignition source. The resulting explosion killed six people and injured at least 50 others. (Note: The Kleen Energy Investigation resulted in 18 Urgent Recommendations with detailed background and findings; otherwise, the CSB issued no Final Report, as such, for that investigation.)

The U.S. Chemical Safety and Hazard Investigation Board (CSB) investigation concluded that the venting of natural gas in this manner is inherently unsafe because of the intrinsic fire and explosion hazards. The CSB also concluded that alternative pipe-cleaning methods, such as pigging¹, or blowing with air or nitrogen, are readily available, feasible, and affordable to accomplish the same cleaning function.

¹ From the Kleen Urgent Recommendations documentation:

Pigging is a process where a device is propelled through a pipeline. The propelled device is commonly referred to as a "pig," and the propellant is typically a gas or liquid. When the pig is used to mechanically scrape and clean the inside of the pipe, it is sometimes called a "cleaning pig."

The American Society of Mechanical Engineers (ASME) is a non-profit membership association with more than 140,000 members in over 150 countries worldwide.² ASME is also an American National Standards Institute (ANSI)-accredited Standards Developing Organization³ that produces and maintains several voluntary industry consensus standards⁴, including B31.1, *Power Piping*, a design standard for “piping systems typically found in electric power generating stations, industrial and institutional plants, geothermal heating systems, and central and district heating and cooling systems.”⁵

As a part of its investigation, the CSB found that the ASME B31.1 standard (2007 edition) was silent on the use of flammable gas for cleaning purposes and offered no guidance about the technical or safety aspects of pipe cleaning procedures or operations. As a result of this finding, the CSB issued Urgent Recommendation Number 2010-01-I-CT-UR3 to ASME in June 2010.

B. Response to the Recommendation

In the 2012 and 2014 editions of the B31.1 standard ASME clarified that the code is not intended to address flushing or cleaning operations (see Paragraphs 100.1.4 and 122.10). However, clarifying that the standard is intended to focus on piping design, versus cleaning operations, does not nullify the purpose of the recommendation, which is to make those who use the code aware of safe cleaning practices, such as the safety provisions outlined in NFPA 56.

The CSB notified ASME that, in order to satisfy the intent of the recommendation, ASME B31.1 would need to incorporate NFPA 56 by reference. ASME informed the CSB on July 28, 2017, that the ASME B31.1 Section Committee and ASME B31 Standards Committee both approved Item 12-900, which adds a reference to NFPA 56 in B31.1. The item is now pending approval by the ASME Board on Pressure Technology Codes & Standards. This incorporation of NFPA 56 by reference is expected to be published in the 2018 Edition of ASME B31.1.

In addition, CSB staff identified an addition to the 2012 and 2014 editions of the B31.1 standard that appears to conflict with ASME’s stated intention *not* to provide guidance for pipe cleaning operations (see Paragraph 122.8.1). Code users might construe this as applicable to planned releases of flammable gases, as is done during gas blow operations (and as was done at Kleen Energy) and purging operations. Interpreted in this way, such language would not only conflict with the intent of the CSB’s recommendation, but would also conflict with NFPA 54 and 56, which provide important safety requirements for pipe cleaning and purging operations. CSB staff

² Quoted from ASME’s “About ASME” webpage. Available at: <http://www.asme.org/about-asme>. (Accessed December 11, 2014).

³ ANSI-accredited Standards Developing Organizations develop voluntary consensus standards according to the requirements and procedures enumerated in *ANSI Essential Requirements: Due process requirements for American National Standards*. (Available at: <http://www.ansi.org/essentialrequirements>. Accessed December 22, 2014). The hallmarks of the due process requirements are: ensuring consensus from affected/interested parties; obtaining and responding to public review/comment; and ensuring right to appeal by any participant who feels the due process principles were not sufficiently respected during a standards development process.

⁴ Quoted from ASME’s “Standards and Certification FAQ” webpage. Available at: <http://www.asme.org/kb/standards/about-codes---standards>. (Accessed December 11, 2014).

⁵ Quoted from <https://www.asme.org/products/codes-standards/b311-2012-power-piping>. (Accessed December 22, 2014).

has twice requested an official interpretation of Paragraph 122.8.1 to clarify whether its requirements would apply to intentional venting of flammable gases for pipe cleaning purposes.

In January 2013, ASME responded that Paragraph 122.8.1 (A.1 through A.7) “cover items to be addressed in a hazard analysis for vent lines on permanent piping used for safety operations, such as venting gases from pressure relieving devices to prevent over-pressurization of permanent piping, and do not address flushing or cleaning operations.” ASME also stated that while this response was not an “official interpretation”, “ASME does not act as a consultant on specific engineering problems or on the general application of understanding of the Code rules...” and that an official interpretation “would be inappropriate as ASME cannot act as a consultant on specific engineering problems or application of Code rules.”

C. Board Analysis and Decision

Based on ASME’s efforts to incorporate NFPA 56 by reference in B31.1, and their previous assurance to the CSB, although not via an official interpretation, that Paragraph 122.8.1 does not apply to flushing or cleaning operations, the CSB concluded that ASME’s response to this urgent recommendation is now acceptable. The Board appreciates and commends ASME’s efforts to satisfy this recommendation, and looks forward to reviewing the 2018 edition of the B31.1 standard to hopefully close the recommendation. Based upon the information above, the Board voted to redesignate CSB Recommendation No. 2010-01-I-CT-UR3 as: **“Open – Acceptable Response or Alternate Response.”**