



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

Report:	Kleen Energy Natural Gas Explosion
Recommendation Number:	2010-07-I-CT-UR3
Date Issued:	June 28, 2010
Recipient:	American Society of Mechanical Engineers
New Status:	Open – Unacceptable Response
Date of Status Change:	March 31, 2015

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

Combined-cycle natural gas power plants generate electricity with combustion turbines fired by natural gas. When new fuel gas piping is installed, it must be cleaned of debris that may have been introduced into the piping during construction. 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 natural gas accumulated and found an ignition source. The resulting explosion killed six people and injured at least 50 others.

The CSB's 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 pigging or blowing with air or nitrogen, are readily available, feasible, and affordable to accomplish the same cleaning function.

The American Society of Mechanical Engineers (ASME) is a non-profit membership association with more than 140,000 members in over 150 countries worldwide.¹ ASME is also an American National Standards Institute (ANSI)-accredited Standards

¹ Quoted from ASME's "About ASME" webpage. Available at: <http://www.asme.org/about-asme>. (Accessed December 11, 2014).

Developing Organization² that produces and maintains several voluntary industry consensus standards³, 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.”⁴

As 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 offers 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 2010-07-I-CT-UR3 to ASME in June 2010.

B. Response to the Recommendation

ASME clarified in the 2012 and 2014 editions of the B31.1 standard 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 and not cleaning operations does not nullify the purpose of the recommendation, which is to make those using the code aware of safe cleaning practices, such as the safety provisions outlined in NFPA 56. The clarifying revisions therefore do not satisfy the intent of the recommendation, nor do they constitute a rationale for rendering the recommendation no longer applicable. To date, the B31.1 committee has an open item for considering adding a reference to NFPA 56, but it has not yet been decided.

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 (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 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. To date, ASME has declined to address this issue in an official interpretation.

² 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.

³ Quoted from ASME’s “Standards and Certification FAQ” webpage. Available at: <http://www.asme.org/kb/standards/about-codes---standards>. (Accessed December 11, 2014).

⁴ Quoted from <https://www.asme.org/products/codes-standards/b311-2012-power-piping>. (Accessed December 22, 2014).

In summary, the B31.1 code can still be construed as guidance for planned releases of flammable gas and does not reference provisions for safe cleaning or flushing methods.

C. Board Analysis and Decision

The CSB concluded that ASME's response to this urgent recommendation is unacceptable, as it was issued over four years ago without full resolution. Thus, the Board has voted to designate CSB Recommendation No. 2010-07-I-CT-UR3 as: "**Open – Unacceptable Response.**"