



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

Report:	Kleen Energy Natural Gas Explosion
Recommendation Number(s):	2010-07-01-UR3
Date Issued:	June 28, 2010
Recipient:	American Society of Mechanical Engineers
New Status:	Closed-Acceptable Action
Date of Status Change:	October 26,2020

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 that was 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 resulting, in an explosion. The explosion resulted in six fatalities and injured at least 50 other personnel.

The U.S. Chemical Safety and Hazard Investigation Board's (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 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 100,000 members in over 140 countries worldwide.¹ ASME is also an American

¹ <https://www.asme.org/about-asme> (accessed March 30, 2020).

National Standards Institute (ANSI)-accredited Standards Developing Organization² that produces and maintains several voluntary industry consensus standards, including B31.1, *Power Piping*. B31.1 addresses the “design, materials, fabrication, erection, test, inspection, operation, and maintenance of piping systems typically found in electric power generating stations, industrial and institutional plants, geothermal heating systems, and central and district heating and cooling systems.”³

As a part of its investigation, the CSB reviewed B31.1 (2007 edition) and identified Paragraph 122.10 as problematic. Before listing requirements for the design and construction of temporary piping systems, the paragraph indicated that the cleaning of piping “may be accomplished by blowing out with steam or air, by hot oil circulation of oil systems, by acid or caustic fluid circulation, or by other flushing or cleaning methods.” It was silent, however, 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 2010-7-I-CT-UR3 to ASME on June 28, 2010.

B. Response to the Recommendation

There were many communications between CSB staff and ASME staff and committee members. The CSB informed the ASME that in order to fully satisfy the intent of the recommendation, B31.1 would need to incorporate reference to NFPA 56, *Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems*, which provides guidance on procedures and safety requirements for pipe cleaning and purging operations consistent with the CSB’s recommendation.

ASME approved the requested change which is reflected in the 2018 Edition of B31.1. Section 100.1.4 now states, “This Code does not provide procedures for flushing, cleaning, start-up, operating, or maintenance. Code users are advised, however, that the cleaning and purging of flammable gas systems may be subject to the requirements of NFPA Standard 56.”

C. Board Analysis and Decision

The CSB concluded that ASME’s response to this urgent recommendation is consistent with the intent of the recommendation, and thus the Board voted to designate CSB Recommendation No. 2010-07-I-CT-UR3 as: “**Closed-Acceptable Action.**”

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 March 30, 2020). 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 <https://www.asme.org/codes-standards/find-codes-standards/b31-1-power-piping?productKey=A0581W:A0581W> (accessed March 30, 2020).