



# U. S. Chemical Safety and Hazard Investigation Board

## RECOMMENDATIONS STATUS CHANGE

### SUMMARY

<b>Report:</b>	Kleen Energy Natural Gas Explosion
<b>Recommendation Number:</b>	2010-01-I-CT-UR9
<b>Date Issued:</b>	June 28, 2010
<b>Recipient:</b>	Rolls-Royce
<b>New Status:</b>	Closed – Acceptable Action
<b>Date of Status Change:</b>	March 31, 2015

#### Recommendation Text:

Provide to your customers:

- a) *Comprehensive technical guidance on inherently safer methods for cleaning fuel gas piping, such as the use of air or pigging with air.*
- b) *Comprehensive Cleaning Force Ratio (CFR) guidelines, specifying both the upper and lower limits required to obtain satisfactory cleaning for the fuel gas piping for purposes of the warranties of the turbines.*
- c) *Warnings against the use of fuel gas to clean pipes.*

#### 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. 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 area where the natural gas accumulated and found an ignition source. The resulting explosion killed six people and injured at least 50.

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, are available and feasible to accomplish the same cleaning function. The CSB issued recommendations to six turbine manufacturers, including Rolls-Royce, to (1) warn their customers of the dangers of fuel gas to clean piping and provide guidance on safer, alternative cleaning methodologies, and (2) collaborate with the Electric Power Research Institute (EPRI) to publish technical guidance on safe pipe cleaning methodologies.

##### B. Response to the Recommendation

Rolls-Royce has met the intent of the CSB recommendation by issuing a safety bulletin to present and future customers that references the comprehensive EPRI guidelines for fuel gas line cleaning. In addition, the company indicated that it has instituted a policy that prohibits the use of flammable gas for pipe purging and cleaning where it is contractually responsible for achieving cleanliness requirements. As the actions taken by the recipient meet the intent of CSB

Recommendation No. 2010-01-I-CT-UR9, CSB staff recommends that its status be changed to:  
**“Closed-Acceptable Action.”**

C. Board Analysis and Decision

The CSB concluded that the recipient’s response to this meet the intent of the recommendation, and the Board has voted to designate CSB Recommendation No. 2010-01-I-CT-UR9 as:  
**“Closed – Acceptable Action.”**