

**U.S. Chemical Safety and  
Hazard Investigation Board**

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Board Member



Eric S. Kaufman  
Manager, Product Safety Engineering  
GE Energy Infrastructure  
300 Garlington Road  
Greenville, SC 29615

SEP 22 2011

Dear Mr. Kaufman:

As you know, the U.S. Chemical Safety and Hazard Investigation Board (CSB) investigated a natural gas explosion at Kleen Energy, a natural gas combined-cycle power plant under construction in Middletown, CT. Immediately prior to the explosion, workers were conducting a "gas blow," a procedure that forced natural gas through newly-installed piping at high volume and pressure to remove debris. The natural gas and debris were vented to the atmosphere near the facility's power generation building. The gas accumulated, found an ignition source, and exploded, killing six contract workers and injuring at least fifty others.

Pursuant to its investigation of the Kleen Energy incident, the CSB issued a number of recommendations to gas turbine manufacturers to prevent future tragedies resulting from unsafe pipe cleaning practices. The following two recommendations were issued to GE:

**Recommendation no. 2010-01-I-CT-UR4:**

*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.*

**Recommendation no. 2010-01-I-CT-UR10:**

*Work with the Electric Power Research Institute to publish technical guidance addressing the safe cleaning of fuel gas piping supplying gas turbines. At minimum:*

- a. *For cleaning methodology, require the use of inherently safer alternatives such as air blows and pigging with air in lieu of flammable gas.*
- b. *Provide technical guidance for the safe and effective use of alternative methods for cleaning such as air and pigging with air.*

I am writing to inform you that the Board voted on September 8, 2011 to designate Recommendation no. 2010-01-I-CT-UR4 with the status "**Closed- Acceptable Action.**" This status reflects the Board's determination that GE has met the intent of the CSB's recommendation and that no additional action is necessary. The Board was pleased to learn that GE developed GEK 116771 to provide guidance to *all*

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GE turbine customers regarding the dangers of cleaning piping with flammable gas and the importance of using safer cleaning media, such as air or steam. We were also pleased to learn that GE revised commissioning documents provided to customers who contract with GE for partnership or turnkey installations, and that GE does not allow its own employees to remain on site in the event a client elects to conduct a gas blow. Thank you for your leadership on this important issue.

The Board also voted on September 8, 2011 to designate Recommendation no. 2010-01-I-CT-UR10 with the status "**Open- Acceptable Response.**" This status reflects the Board's determination that GE has outlined a plan of action that would likely fulfill the intent of the CSB's recommendation upon completion. The Board appreciates that GE is collaborating with the Electric Power Research Institute (EPRI) and other gas turbine manufacturers to produce a guidance document on air blows. We understand from EPRI that this document is scheduled for publication by the end of 2011. Before this recommendation may be closed, the CSB will need to review the completed publication and confirm that GE participated in its development.

Thank you again for GE's efforts to protect the safety and health of workers and the public at large. Please continue to keep us abreast of GE's efforts on this issue, and in particular, with regard to Recommendation no. 2010-01-I-CT-UR10. Please continue to copy Ms. Christina Morgan, Recommendations Specialist, in all future correspondence.

Sincerely,



Rafael Moure-Eraso, PhD, CIH  
Chairperson

CC: Larry Danner, Senior Professional Engineer/Principal Engineer for Product Safety, GE  
Energy Infrastructure

Don Holmstrom, Investigations Supervisor, CSB

Manuel R. Gomez, Director of Recommendations, CSB

Christina Morgan, Recommendations Specialist, CSB