U.S. CHEMICAL SAFETY AND
HAZARD INVESTIGATION BOARD
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Kleen Energy Explosion

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Public Meeting
Portland, Connecticut
June 28, 2010
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6:30 p.m.

PRESENT FROM THE U.S. CSHIB:

DR. RAFAEL MOURE-ERASO, Chairman & CEO
DON HOLMSTROM, Investigations Supervisor
DAN TILLEMA, Investigator
LAUREN WILSON, Investigator
DISCUSSION PANEL I:

PROF. PAUL AMYOTTE, Dalhousie University (Canada)
ERVIN PATTERSON, Commissioning Management Services, Inc.
LARRY DANNER, GE Energy
DISCUSSION PANEL II:

REP. MATTHEW LESSER, Connecticut House of Representatives
PROF. GLENN CORBETT, John Jay College of Criminal Justice (New York)
MICHAEL ROSARIO, Local 777, United Association of Plumbers & Pipefitters
STEVEN SCHRAG, Connecticut Council on

Occupational Safety & Health

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(6:29 p.m.)

CHAIR MOURE-ERASO: Good evening, everyone. I would like to welcome residents of the community of Middletown and all participants of this U.S. Chemical Safety Board public meeting.

My name is Rafael Moure-Eraso, and I am the Chairman and Chief Executive Officer of the Chemical Safety Board.

Our first order of business is to inform everyone of the location of the safety exits in this room in case of an emergency. As you can see, there are two to the right, two to the left, and two in the back wall over there.

Tonight we will gather and present information here for members of the public, and then vote on urgent recommendations arising from the Chemical Safety Board investigation of the explosion at the Kleen Energy powerplant site in Middletown, Connecticut, that occurred in February 2010.

This is actually my first activity as the new Chairman of the Board. I was honored to be nominated by the President and confirmed recently by the Senate. My appointment became effective just three days ago. I still don't have business cards.

(Laughter.)

I, first of all, would like to thank my colleague John Bresland here to my left. He is a long-time -- I would like to say that he has a long-time commitment to the work of the Board for very many years, and he has been part of the leadership of the Board as the chairman.

I also would like to introduce in the panel here Mr. Mark Griffon, who, like myself, was just recently nominated and appointed to the Board, to the Chemical Safety Board. Mark is sitting to that side.

Also, I have only been on the job a few days. I am very familiar with the tragic accident that occurred at Kleen Energy here, and I am very concerned about it.

I have dedicated my professional life to the improvement of worker safety, which I view as a basic human right. My professional experience has included work in chemical facilities that manufactured and used toxic chemicals. I have been responsible for worker safety for 15 years, in two major organizations, representing workers in the United States. These include the United Auto Workers and the former Oil Chemical and Atomic Workers Union.

I have been an educator on issues of work environment for 22 years at the University of Massachusetts, Lowell.

I would like to say that my most rewarding experiences have been strategizing with workers, with managers, and with communities to prevent or substantially reduce the risk of disastrous chemical incidents. My commitment to worker safety will continue with the Chemical Safety Board.

I would like to begin by first remembering the victims, the six workers who were

killed as a result of the accident at Kleen Energy. I will ask for a moment of silence after I read the names of the workers killed. Ron Crabb, Peter Chepulis, Raymond Dobratz, Chris Walters, Roy Rushton, and Kenneth Haskell. May we have a moment of silence in memory of those workers.

(Whereupon, a moment of silence was observed.)

Thank you.

The accident at Kleen Energy in February is a reminder of what I believe is a safety crisis that we are living in the U.S. energy industry. Accidents in the gas, coal, and petroleum extraction and petroleum refineries during this last year have taken a staggering toll of human lives and unprecedented environmental damage.

Here in Middletown you have suffered the loss of human lives, grievous injuries to some people, grave distribution -- I'm sorry, grave disruption of family lives, and destruction

of production facilities and jobs, and also, of course, to the stopping of the opening of any important new source of electricity, that has been substantially delayed.

In coal, as you have heard in the news, we have 29 miners killed in Raleigh County, West Virginia, earlier this year. We all have heard and seen on television about the 11 workers killed and the massive destructive oil spill in the Gulf of Mexico.

In the refinery sector, we have seen all kinds of deaths and incidents. As a matter of fact, the 18 current major investigations of the Chemical Safety Board, seven of the 18 are in oil refineries, and they have produced very many dead and injured workers.

In my view, the energy industry in the United States is in dire need of an overall plan to prevent catastrophic accidents. It is my hope that our meeting here in Middletown will result in a first step toward that end. The results of the investigation of the Kleen Energy accident

will be presented here by our investigation team in the form of new, urgent safety recommendations calling, among others, for OSHA to enact new regulations to control this hazard and describing alternatives to gas blows where a huge volume of high-pressure natural gas is vented directly to the atmosphere.

We have found a gap in the regulations to control this practice and are committed to prevent the continuation of the practice of gas blows with natural gas that has impacted this community so greatly.

The Chemical Safety Board is more than an investigative responder after a chemical accident has afflicted a community. The Chemical Safety Board is the catalyst that will bring the changes that will prevent this tragedy in our community and in your community to be repeated. We will be an agent of change.

It is that important work that we conduct tonight. I wanted to let you know of my commitment to preventing chemical accidents,

saving the lives and well being of workers and the public, and working to greatly improve the reliability of the U.S. energy industry today.

Let me explain the agenda for tonight. We will first hear from the Chemical Safety Board investigation team led by Don Holmstrom, and following any questions that Board members in this panel may have to the investigation team.

The team will offer a series of urgent recommendations, as I noted a moment ago. We will then hear from two panels of experts that are sitting in front that will testify on issues brought up by the Kleen Energy accident.

Board members and our investigation team will question all panel members. We will invite the public for comment. Anyone may speak, but we ask that you please sign up in advance in the book at the door, and please see our representative at the table at the door. The comments of the people in the audience will be limited to three minutes.

After the public comment, the Board

will discuss the issues and recommendations that have been proposed, and then vote on them. A majority vote is required for the passage of the recommendations.

At this time, I would like to ask to any members of the Board that would like to have any particular comment, and I will start with Mr. Wright.

MEMBER WRIGHT: Thank you, Mr. Chairman. I would just like to convey my condolences to those families and workers that were killed in this tragic incident back in February. It is our goal to prevent these things in the future, and hopefully tonight we will understand in greater detail what happened and what occurred at this particular site, and also discuss some aspects of the ConAgra case.

Thank you, Mr. Chairman.

MEMBER BRESLAND: Mr. Chairman, welcome to the Chemical Safety Board. I have been on the Board since 2002, in the chair since 2008, and I have been intimately involved with

all of the investigations that have taken place since 2002, including the BP Texas City refinery accident, the Imperial sugar plant refinery accident, and now coming up the accident in the Gulf of Mexico that we are going to be starting an investigation on very shortly.

Our goal is to make a difference, and I believe over the years that we certainly have made a difference as a new agency that came into operation in 1998. And we have all worked hard, both the staff and the Board members, to make a difference.

I look forward to working with Dr. Moure, look forward to working with him over my additional three years on the Board, and I wish you the very best of luck in your new position.

CHAIR MOURE-ERASO: Thank you very much, John. I appreciate it.

MEMBER WARK: Yes, thank you, Mr. Chairman. First of all, I would like to add my condolences to what have been expressed here at the hearing this morning, and let you know that

we are committed to do whatever we can to make sure such an accident doesn't happen again.

I would also like to welcome you, Mr. Chairman, and you, Mr. Griffon, to the Board, and thank John Bresland for his outstanding service to the Board as Chairman up until just recently. And I would also like to -- which I have never done in public before, but thank Member Wright for serving as interim executive between chairmen. Thank you.

MEMBER GRIFFON: Thank you, Mr. Chairman. I would also like to add my condolences for all the families and friends of the victims of this tragic event at Kleen Energy.

As a new member of the Board, I think I do need to say that I am very honored to be -- to have been appointed to the Chemical Safety Board. Like Dr. Moure, I have worked most of my career in environmental and occupational health issues. I have had 20-plus years of advocating for worker health and safety, so I feel very strongly and committed to the mission of this

Board.

And I hope that my work with the Board can help to make a difference of preventing future accidents similar to the tragedy that happened here. So I look forward to my term.

Thank you.

CHAIR MOURE-ERASO: Thank you, members of the Board. And also, I would like to point out that sitting with us here at the table is Chris Warner, the General Counsel of the Board.

With that, I would like to move into the agenda. First, I would like to introduce our investigation team which is with us today, sitting at the table to my right. We have three investigators from the Denver regional office. The investigative supervisor is Mr. Don Holmstrom, and the other investigators that are sitting with him is Dan Tillema and Lauren Wilson.

Mr. Holmstrom, please proceed with your presentation.

INVESTIGATOR HOLMSTROM: Thank you,

Chairman Moure-Eraso. I would like to thank everyone for coming this evening. Tonight we will present a summary of the U.S. Chemical Safety Board's findings of the February 7, 2010, explosion at the Kleen Energy powerplant in Middletown, Connecticut.

In light of this tragedy, the investigation team has concluded that urgent recommendations are needed to be developed to develop national workplace safety regulations and standards which address the cleaning of fuel gas piping and the unsafe practice of releasing flammable natural gas to the atmosphere.

Three members of our team will be presenting this evening, including Lauren Wilson, Dan Tillema, and then I will conclude the presentation.

This evening's presentation will begin with a discussion of natural gas-fired powerplants, their components, and how they work. Then, we will describe the Kleen Energy incident, the consequences of the explosion, followed by a

review of the CSB's findings and conclusions.

We will tell you about other incidents similar to the Kleen explosion and what can be learned from these incidents. We will then discuss other methods which can be used to safely clean natural gas piping. We will review the existing codes, standards, and regulations pertaining to fuel gas safety, and we will identify where we have found gaps in these regulations and standards.

We will conclude our presentation to the Board by proposing a number of recommendations to improve federal regulations, safety codes, and industry guidance, in order to prevent similar catastrophic natural gas incidents from occurring in the future.

I would now like to welcome Investigator Lauren Wilson to discuss the Kleen incident. Lauren.

INVESTIGATOR WILSON: Thank you, Mr. Holmstrom.

This photo shows the Kleen Energy

powerplant in October of 2009. This is what is called a combined cycle natural gas plant. This means that electricity is generated through using a combination of methods. In the first step, natural gas is combusted or burned. The combustion gases travel through gas turbines housed here in this building to generate electricity.

In the second step, the heat from these gases is recovered to create steam in these heat recovery steam generators. The steam then travels through a steam turbine located here to generate additional electricity. The main building houses two natural gas turbines. A photo showing the inner blades of the gas turbine is shown here. The turbine blades are precisely constructed in order to generate electricity efficiently.

Therefore, turbine manufacturers typically require that the gas delivered to these turbines is free of damaging debris, so that no dust or particles can impact and potentially

damage these turbine blades.

Kleen chose to remove this debris using a method called a "gas blow." In a gas blow, natural gas, which is readily available at the sites, is used to force any turbine-damaging debris from the line. This is done by attaching a vent pipe or outlet pipe to the fuel gas piping. A valve is opened, allowing the high-pressure gas to exit the vent pipe at a very high velocity.

This photo on the right shows a gas blow performed at Kleen Energy a week before the explosion. One can see the dust and debris exiting the pipe, as well as the sheer height and extent of the gas cloud.

Like the week before, this method of using natural gas to blow debris from the piping was also conducted at the Kleen Energy site on February 7th. The natural gas blows released a very large quantity of natural gas, which is an extremely flammable material. It was this activity that led to the explosion.

Throughout the morning, prior to the explosion, a total of 15 natural gas blows were completely intermittently over approximately four hours through a number of open-ended pipes that were located less than 20 feet off the ground. Two of the gas blow locations are shown here, indicated by the yellow arrows. These vents were adjacent to the south wall of the main power generation building at the site.

Approximately 150 workers were at the construction site on Sunday, February 7th, the day of the explosion. During the natural gas blow activities, non-essential personnel working outside immediately south of the main power generation building were removed from the restricted area.

However, more than 50 individuals were working inside the power generation building, performing job functions such as welding, during the gas blows. Only about 15 of the 50 were actually involved in the natural gas blow activities.

Releasing large quantities of flammable natural gas is a dangerous activity, in that an explosive atmosphere can accumulate near workers. This photo shows a gas blow performed at Kleen Energy a week prior to the incident in which the vent pipe was angled vertically. Again, this photo captures the height and extent of the gas cloud created in the blow.

This photo was taken during a gas blow also on the day of the incident at the location indicated by the dotted lines. But the congestion and horizonal orientation of the piping were similar to the conditions present in the blow that caused the explosion.

Here you can see where the incident-causing blow took place. Natural gas was being blown from an open-ended pipe in an area immediately south of the power generation building. This location, while outdoors, was congested by the surrounding power generation equipment. The vent pipe itself was installed in a relatively horizontal orientation. Both the

congested area and the orientation of the vent pipe likely allowed a flammable vapor cloud to accumulate.

At approximately 11:15 a.m., the released natural gas found an ignition source and exploded. Six individuals were fatally injured. They were all within the power generation building at the time of the explosion. Five of them were involved with the natural gas blow activities, and one was not. This incident also resulted in many injuries due to the close proximity of the workers at the time of the explosion.

In addition, this approximately $1 billion facility experienced significant damage, as can be seen in the photos on the right.

This graph shows the characteristics of the 15 gas blows performed on the day of the incident. Each bar represents a single gas blow. Let me walk you through the graph.

The vertical axis indicates the volume of gas release, so this ranges from zero to

350,000 standard cubic feet. The horizontal axis indicates the time over the course of the morning on February 7th. The first bar represents the first blow performed at approximately 7:35 a.m., and the last bar indicates the blow that was performed just before the explosion.

I would also like to point out that the gas blow which actually released the largest amount of gas actually occurred about an hour before the explosion.

Our calculations indicate that in the final 10 minutes before the blast approximately 480,000 standard cubic feet of natural gas were released outdoors near the building. Just over two million standard cubic feet of natural gas were released in total over the course of the morning.

To put that into some perspective, that is more than two billion BTUs worth of gas. This is enough to fuel a typical American home every day for more than 25 years.

It is extremely important to realize

that ignition sources are quite challenging to determine and extremely difficult to eliminate. Therefore, the best way to remove any risk of an explosion is to avoid creating a flammable atmosphere in the first place. In the Kleen incident, the CSB did not determine which specific ignition source ignited the gas cloud. However, several possibilities existed.

The CSB identified ignition sources both outside and inside the main building. Workers made efforts to eliminate or control potential ignition sources outside of the power generation building, but some ignition sources were extremely difficult to eliminate or even impossible to eliminate.

One of these potential outdoor ignition sources could actually have been the gas blow itself. Yet another factor that makes gas blows a dangerous operation is that gas blows can be self-igniting. For instance, static electricity can accumulate due to the high velocity of gas exiting the piping. If a

flammable atmosphere is present, this can cause an explosion.

Also, metal debris exiting the piping during the gas blow can strike nearby metal structures causing a spark, which also can ignite flammable vapors.

Ignition sources were also present indoors. For instance, electrical power was on, welders were actively working, and diesel-fueled heaters were also running inside the building.

The CSB would like to note that other investigative agencies are looking at additional potential ignition sources. However, with the CSB's mission of accident prevention, we view that the formation of a flammable vapor cloud is the fundamental hazard.

I will now turn the presentation over to Investigator Dan Tillema, who will discuss two previous gas blow incidents and other key information in our investigation.

Thank you.

INVESTIGATOR TILLEMA: Thank you, Ms.

Wilson.

In the course of our investigation, the CSB has uncovered two other incidents which were caused by natural gas blows. These two incidents highlight the fact that gas blows can provide their own source of ignition.

The first natural gas blow incident we identified occurred in October of 2001 at a First Energy power station in Lorain, Ohio. This facility also used the gas blow method to clean fuel gas piping. Shortly after beginning the gas blow, the gas ignited, causing a flame to shoot approximately 30 to 40 feet into the air. There were no injuries, but the fire caused damage to nearby equipment.

Company investigators concluded that the gas blow was self-igniting. The natural gas was most likely ignited by metal debris exiting the piping during the blow, which impacted a nearby metal surface causing a spark.

The second gas blow incident we identified occurred in January 2003 at Calpine's

Wolfskill Energy Center, natural gas powerplant, in Fairfield, California, seen here in this photo. At this facility, high-pressure natural gas was blown directly to the atmosphere to remove any debris from the piping.

The natural gas released during this gas blow activity found an ignition source and exploded. In this case, Calpine determined that static electricity from the gas exiting the pipe likely ignited the flammable natural gas as it was released.

The explosion was powerful enough to shatter windows a quarter of a mile away and was heard up to 10 miles from the site. No one was injured as a result of this explosion.

Calpine's investigation report identifies other methods were available to clean the gas piping, such as using air blows.

The CSB has found that turbine manufacturers typically require powerplants to meet fuel piping cleanliness requirements as part of their turbine warranty. The cleanliness

criteria are usually met by placing a target at the pipe exit during a gas blow. These targets are often either pieces of plywood or metal strips, which show impact marks each time a piece of debris strikes it.

The picture on the right shows a target holder in use at the Kleen Energy -- at Kleen Energy on the morning of the explosion.

A representative of the turbine manufacturer is commonly present during the cleaning activities to inspect these targets. The representative ensures that the target impact marks fall below a predetermined limits in sizes, indicating that the gas line is sufficiently clean to meet the warranty requirements.

The CSB acquired information regarding the construction plans of powerplants to be built between 2010 and 2015. Of the companies who reported their turbine manufacturer plans, six turbine manufacturers -- General Electric, Siemens, Solar, Mitsubishi, Pratt & Whitney, and Rolls Royce -- are projected to supply 100

percent of the gas turbines that will be installed in powerplants coming online in the next five years.

Natural gas blows are not the only available method to clean fuel gas piping. In fact, companies use a variety of techniques. For example air blows and nitrogen blows are other methods used to clean gas piping. They perform exactly the same cleaning function as natural gas blows.

However, because there is no release of a flammable gas cloud, these methods eliminate the risk of fires and explosions. As nitrogen can present an asphyxiation hazard, additional precautions are warranted prior to conducting a nitrogen blow.

Another cleaning method used by industry is pigging. This animation demonstrates the pigging process. A piece of debris is forcefully pushed through the line and removed. A gas or liquid is used as the mode of force to propel the pig. When performed with air or

nitrogen, this method also eliminates the risk of producing a flammable gas cloud.

Steam blows, or cleaning with water or chemicals, is also sometimes used to remove rust or debris from piping. GE and Siemens, the two turbine manufacturers who currently supply the largest number of gas turbines to powerplants, each promote the use of air blows. They support the fact that air blows are just as effective as natural gas for cleaning fuel gas piping. The CSB has not identified a scenario where natural gas blows are necessary to clean fuel gas piping.

The CSB recently conducted an industry survey with the assistance of the Combined Cycle Users Group in April of 2010. The CSB received 62 responses to the survey. Of the respondents, 63 percent indicated that they have used natural gas blows to clean their facility's gas piping. Only one of these respondents indicated that the natural gas was safety destroyed through use of a flare.

The CSB also asked these members to

indicate what cleaning methods are being practiced within their company or facility. This pie chart portrays the various methods that the respondents indicated they have used to clean their fuel gas piping. The large blue portion indicates that 37 percent of the respondents have used gas blows.

The remaining segments indicate other methods used, such as pigging and air blows. These data indicate that the most common method to clean piping amongst the respondents is the use of gas blows. Although no method is completely free of risk, safer methods, such as air blows, eliminate the fire hazards associated with natural gas.

Approximately half of the survey respondents did not have a technical basis for determining the natural gas blow needed to adequately clean the piping when conducting natural gas blows. The lack of a thorough technical evaluation can result in the release of substantially greater quantities of natural gas

than what is actually needed. This creates an unnecessary risk to nearby workers.

Companies that do perform a technical evaluation prior to cleaning newly installed fuel gas piping commonly refer to a technical criterion called the cleaning force ratio, or CFR. This ratio provides the minimum flow conditions needed to successfully clean gas piping.

Siemens, the turbine manufacturer at Kleen, provided a CFR target of two, but did not specify an upper limit. Data from the day of the incident indicates that in the blows prior to the explosion the CFR of two was greatly exceeded. Therefore, significantly more natural gas was released than was actually needed to remove debris from the piping.

Another issue to consider when cleaning fuel gas piping is that in any natural gas blow flammable mixtures will unavoidably occur downstream of the vent outlet. To minimize the extent of the flammable gas cloud, a complex

technical evaluation of various factors is necessary, including height, location, and orientation of the vent pipe, velocity and density of the discharging gas, potential sources of ignition, personnel location, wind speed, and a dispersion analysis to verify that the natural gas will readily dissipate.

These complex requirements for discharge design are either not necessary or are greatly simplified for other cleaning methods such as air blows. Thus, these are compelling reasons to implement safer alternatives to flammable gas releases.

I will now turn the presentation over to investigations supervisor Don Holmstrom.

INVESTIGATOR HOLMSTROM: The CSB has studied the current codes and standards relating to the electric power generation sector and natural gas-fired powerplants. We have found that the current NFPA codes provide limited to no guidance on how to clean fuel gas piping safely. Specifically, NFPA 54, the National Fuel Gas

Code, broadly addresses fuel gas piping safety, but does not address safe practices for fuel gas pipe cleaning.

It also explicitly exempts fuel gas piping in powerplants. NFPA 37, standards for installation and use of stationary combustion engines, and gas turbines, provides criteria to minimize fire hazards during installation and operation of gas turbines. But it provides no guidance on how to clean gas piping without creating a fire and explosion hazard.

NFPA 850, a recommended practice for fire protection for electric generating plants, provides fire hazard control recommendations for the safety of the construction project and personnel. But it does not address safe practices for cleaning fuel gas piping.

In addition, ASME B31-1 provides guidance for cleaning fuel gas piping, but does not prohibit natural gas blows. And FM Global, their document "Natural Gas and Gas Piping," calls for the use of air or inert gas to clean

piping, but allows for the use of fuel gas when pressure is a half a pound per square inch or less.

In summary, there are currently no standards on fuel gas pipe cleaning, and extremely limited industry guidance is available in regards to cleaning fuel gas piping.

This graph shows that the consumption of natural gas as a fuel in the U.S. far exceeds its consumption or production of flammable gases. Natural gas usage exceeds that of propane. Propane is the small red bar, and natural gas is the large tall blue bar there, the second most utilized flammable gas, 15 times over.

While natural gas is by far the most used flammable gas, it is one of only two not regulated by OSHA. The CSB would also like to note that natural gas is regulated by the Department of Transportation's Pipeline and Hazardous Material Safety Administration, before entering a company's property. After that point, natural gas is unregulated.

OSHA's regulatory scheme provides requirements for controlling ignition sources in locations that may have a flammable atmosphere. However, these requirements do not expressly prohibit the planned release of flammable gas in the vicinity of workers. Also, OSHA's process safety management standard, or PSM standard, addresses requirements for preventing consequences of a catastrophic release of flammable materials.

However, the PSM standard exempts flammable liquids or gases that are used solely for workplace fuel consumption. In addition, OSHA currently has no regulatory requirements for workers to participate in developing procedures or training related to fuel gas safety.

The electric power generation sector and related industry associations do not currently operate a safety standards development program or publish industry-recognized safety standards. There are no recognized good practice safety standards or technical guidelines that

address the cleaning of powerplant fuel gas piping.

Approximately 125 powerplants will commission new natural gas-fired combustion turbines between the years 2010 and 2015. This graphic indicates the location density of the various plants across the United States. And, as you can see, the green plants and the plants -- or the states in green, and also in yellow, have the highest density of powerplants, with Connecticut up here showing six to eight plants in the next five years.

Companies continue to conduct natural gas blows, even after the Kleen Energy explosion. After contacting 33 natural gas powerplants currently under or near construction, the CSB has learned of two plants that have conducted a natural gas blow since the Kleen incident, and several others are actively planning natural gas blows.

The CSB reasserts that the intentional release of natural gas presents many significant

safety risks. Incidents caused by the release of natural gas do not only occur at powerplants. For example, an explosion at ConAgra Foods in 2009, which is also being investigated by the CSB, was caused by the release of natural -- excuse me, of natural gas near workers. Four people were killed in this explosion.

The CSB also found many other incidents caused as a result of releasing natural gas into work areas. These incidents are identified in the Safety Bulletin "Dangers of Purging Natural Gas into Buildings." To prevent future natural gas-related incidents, the CSB investigation team proposes several urgent recommendations.

Before delivering these recommendations, we would first like to take some questions from the Board.

Thank you.

CHAIR MOURE-ERASO: Thank you for a detailed presentation, Mr. Holmstrom. It is obvious that your team has put a considerable

amount of time and effort into your findings, and I would like to ask for any questions of members of the Board of the -- to the investigation team.

So please state your name and ask your question, starting this side.

MEMBER GRIFFON: Mark Griffon. Yes, I have just one question on the -- I forget who presented on this, but it was the survey results for -- of the different manufacturers. And you indicated that 63 percent indicated the use of gas blows. I was wondering if you have any information on how many of those consider these other alternatives. Did they do any assessment of whether and why -- if they did that, then why did they end up continuing with this practice?

INVESTIGATOR TILLEMA: Actually, no. No. The survey questions were not written in a way that would allow us to extract that data. We wrote these survey questions with the Combined Cycles Users Group very early in March, and the questions probably would be written better and differently had we done them later, but we were

trying to get as much information as quickly as possible about the existing industry practices. So, no, I don't have that information.

INVESTIGATOR HOLMSTROM: Mr. Griffon, I would add that, although natural gas was the single most commonly used method for cleaning fuel gas piping, that the safer alternatives amounted to about half of the overall responses, which indicated that safer alternatives are being utilized out there and are certainly considered practical and feasible by a number of those that are cleaning fuel gas piping.

MEMBER GRIFFON: Thank you.

CHAIR MOURE-ERASO: Any other questions from the Board?

MEMBER WARK: I --

CHAIR MOURE-ERASO: Go ahead.

MEMBER WARK: Yes. Something of a recurring theme that we see in our investigations, and have seen in our investigations such as BP Texas City and others, suggest that fatigue, excessive overtime, was a

contributing factor to some of the accidents that we have looked at. And my question to you is: did you -- did the team look at the possibility of fatigue and maybe mistakes being made as a result of it?

INVESTIGATOR HOLMSTROM: Yes. To answer your question, Mr. Wark, the team looked at issues related to fatigue. However, fatigue is only relevant in relationship to what would be identified as a human performance issue. If there was something that -- a switch that wasn't pulled or a valve that wasn't closed or some error in the procedure, typically we would look to see if fatigue might have played a role in that activity.

At this incident, however, our team determined that the result -- what led to this accident was actually largely following the procedure and the guideline, that it not only was utilized in this particular site, but utilized in a number of sites throughout the country, and that it is precisely a lack of guidance, a lack

of standards, and a lack of regulations that would prohibit this type of inherently unsafe activity of blowing extremely large amounts of gas, in this case releasing about the same amount of gas that would fill a professional sports arena with a flammable mixture, was released in the last 10 minutes before this accident.

And we consider that activity to be the focus of our investigation that led to the explosion.

MEMBER WARK: That's all I have. Thank you.

CHAIR MOURE-ERASO: Mr. Bresland.

MEMBER BRESLAND: Mr. Holmstrom, to have an explosion, you need three items -- air, an ignition source, and flammables. And, normally, when those three items are present, you would be doing some testing, or the company would be doing some testing to see if the atmosphere in the area was dangerous. Was any testing done during these blows?

INVESTIGATOR HOLMSTROM: There was the

use of a combustible gas detector that was being used inside the powerplant building. The CSB, in conjunction with a number of other investigative agencies, examined that combustible gas detector recently, and we are correlating the results from that testing with other factors related to the incident.

But I can report that witnesses who were inside the powerplant building reported that there were alarms that went off, at least on two occasions, related to the combustible gas detector. And so we are looking at the actual results we got with -- that has a different date and time stamp related to it, and comparing that to the data that we know from other circumstances and facts related to the combustible gas detector readings.

MEMBER BRESLAND: And another question, I wonder if -- you know, the issue that has puzzled me about this particular incident since I heard about it, and not knowing very much about this type of operation before we heard

about this explosion, it has always puzzled me that a company would be spending a billion dollars building a facility, and you would be within three months of starting it up. And then, they do this inherently dangerous process of venting natural gas into the atmosphere in the middle of the facility, and, unfortunately, in this case it caused this terrible explosion and the impact on -- terrible impact on the people involved.

Did you have any opportunity to ask the companies kind of, you know, why do you do this?

INVESTIGATOR HOLMSTROM: I think that question could best be answered by saying that this is a long-standing practice in the industry, that there is a history of this type of activity. And I think often also our understanding of looking at this industry is there is not a body -- we mentioned earlier there wasn't a body that developed safety codes.

There wasn't a code developing council

within this body, and I think it makes it more difficult to spread safety lessons learned from, for example, these previous incidents that occurred. And so, as a result, I think that there was a lack of communication of some of the previous incidents as well as a lack of appreciation of some of the hazards by some in industry.

I think others appreciate the hazards and have developed procedures and techniques to avoid them. But I think that one of the things that can lull organizations into thinking something is safe is that they didn't have a previous explosion. But we know that these catastrophic incidents are low-probability, high-consequence events, that it takes a number of factors and a number of causes to line up, which are often very unlikely to occur in order for this accident to happen.

And in the case of a gas blow, you have to have a source of ignition in just the right location, whether it is a flammable

atmosphere on a day where it -- things happen to line up and that explosion occurs. So that is not to say that just because a gas blow happens that that gas blow was safe and another gas blow, because there was an explosion that was hazardous, they are all hazardous. It just happens that one happened to find a source of ignition, which led to an explosion.

And I think that that type of activity, where there isn't an explosion every time this activity occurs, is going to lull companies into thinking that somehow there is -- this activity is safer than it really is.

MEMBER BRESLAND: Okay. Thank you.

MEMBER WRIGHT: Bill Wright. First of all, let me thank the team for deploying from Denver to respond to this incident in Connecticut, as Washington, D.C., was under a storm which prevented any teams from flying up here. So thank you for that. And I know you undertook this particular case on top of a heavy workload that you have going out in the Denver

office.

Earlier you mentioned that there was no safety briefing prior to the gas blow on that particular day, Superbowl -- or on Sunday. My question is: do you think that had they had a safety briefing that this would have been prevented?

INVESTIGATOR HOLMSTROM: One of the things we noted during the course of the release of gas is that some workers were concerned about it, some workers left the building, sort of took action by walking out of the building, and I think there was a perception amongst some workers that there was a hazard present from the facts of the incident.

Safety meetings and briefings and opportunities to go over procedures and ask questions and raise issues and concerns are opportunities for the workforce as a whole -- workers, managers, safety professionals, and others -- to discuss the details and the safety aspects of any proposed activity that has a lot

of dangers to it.

And oftentimes when those opportunities are allowed to take place, there are activities and understandings that are reached that in fact avoid the dangerous result, and help prevent and possibly lead to other safer ways of conducting those activities. And so we think it is important that workers, contractors, and others be involved in developing procedures, and in the training, and in the development of the activities themselves, so that all of those points of view can be brought to bear, and hopefully a safer result will come out in the end.

MEMBER WRIGHT: And I think you would agree that in this particular case they failed to safely control all of those factors that you described on page 23 of your presentation -- height, location, and orientation of the vent pipe, velocity and density of discharging gas, potential ignition sources, personnel locations, wind directions and speed, and dispersion

analysis that they probably failed to do in this particular case.

INVESTIGATOR HOLMSTROM: Well, I think there was a few that they did well that were in their procedures, and I think there were a number of others that weren't in their procedures but would be important to undertake.

And I think the point that we are making here is that, given the fact that there are catastrophic consequences that can result from a release of gas, the fact that there is a difficult technical evaluation, and the fact that there are readily available alternatives that are just as feasible and practical as using gas, there is nothing inherent in flammable gas that makes it any better as a motor force for moving -- removing debris than nitrogen or air, that that all lends itself to supporting safer alternatives as opposed to the riskier proposition of doing that technical evaluation and complex analysis, and having one of the complex items fail and lead to a catastrophe.

MEMBER WRIGHT: And just as a followup, what particular items did they not have in place that may have prevented this? And, by the way, I'm not advocating the use of gas in these things.

INVESTIGATOR HOLMSTROM: Right.

MEMBER WRIGHT: Having visited the site today, and seeing where that particular vent pipe was in relation to the buildings and the surrounding area, it seems obvious that that is sort of inviting a catastrophic event, particularly at those pressures and volumes.

But can you conceive of a way of safely doing it if they still elected to use gas as that medium?

INVESTIGATOR HOLMSTROM: Mr. Wright, the reason that the team didn't go down the road of analyzing those alternatives is because we firmly believe that the safer alternatives are so much more practical and feasible as an alternative. It is not an onerous choice. It is a fairly easy choice.

And we have not been able to determine any scenario that gas would be required, or where something other than gas would not be feasible. Anywhere you could utilize gas as the motor force for moving debris out of piping, you could also use nitrogen or air.

So that is our conclusion, and we think that by informing others of that choice, who might not currently be aware that that is an easy thing to do, and I think some of our panelists hopefully will opine on that later in our program, I think that we can educate the public that releasing all of this hazardous material to the environment is really not the best choice.

MEMBER WRIGHT: Thank you very much.

INVESTIGATOR HOLMSTROM: Thank you.

MEMBER WRIGHT: Appreciate it.

CHAIR MOURE-ERASO: I have the opportunity to ask a question, too. I will ask the panel in general that if, in the course of your investigation, you have an opportunity to

evaluate the place and quality of safety services that existed inside your operation, I -- my question refers -- you have mentioned issues that it was -- fatigue might be a factor, and the absence of safety meetings previously to the day of the explosion.

And, you know, my concerns is the way that work is organized, you know, where was the place of safety in the way the work is organized? You know, I mean, how it was valued within the organization or the production during the construction time? And you were able to evaluate that?

INVESTIGATOR HOLMSTROM: I think that in this particular case they had safety professionals onsite. They had had safety meetings and instruction to a larger group of people in the gas blows that occurred the Saturday before the Sunday of the explosion, so that there wasn't a lack of that activity.

I think there was thinking that it wasn't perhaps needed on this particular day,

because of the instructions that had occurred the week before. I think ultimately it wasn't the lack -- we mentioned the procedures weren't shared with the workforce, which we think is important to do, which can give the workforce an opportunity to weigh in on the overall safety of the activity.

But that being said, it is the actual procedure and the activity itself that presents the inherent safety hazards. So I think that is why we believe it is more -- in this case we believe the focus is more important to be placed on the broader systems of safety -- of safety standards, regulations -- that can be used and guide companies across the country who are considering things like these natural gas blows, and they can understand the hazards and the alternatives that are available.

CHAIR MOURE-ERASO: Thank you, Don.

INVESTIGATOR HOLMSTROM: Yes.

CHAIR MOURE-ERASO: Any more questions from the Board?

MEMBER GRIFFON: Mr. Chairman, if I could, just one followup question to -- actually, to Mr. Bresland's question and your response, Don. You indicated that alarms went off on prior runs or prior days, I'm not sure exactly the timing on those. But I guess my -- you know, the obvious question there was, did -- were there any followups on those? Were those viewed as near-misses? Did the company investigate those? And any actions that came out of those alarms?

INVESTIGATOR HOLMSTROM: Yes. The ones I'm referring to were on the day of the incident itself. One was approximately 10:45, and the other was just maybe a minute and a half before the explosion. And I think in this particular case what is important to point out, while in some OSHA regulations -- for example, in the confined space standards -- there are some specific provisions such as requiring that the confined space permit program be triggered at 10 percent of the LEL.

And some safety standards have

provisions for hot work, that you can't conduct hot work if you are above a certain percent -- low percentage of the LEL, such as 10 percent. There is no general provision in the United States that protects workers in the general work environment at a particular LEL, or would require that workers evacuate a building if there is a certain percentage of an LEL, other than a confined space, or hot work.

And I think other jurisdictions, as we note in our document, in California and in Canada, do have those protections for workers, and that is part of our recommendation to OSHA is those protections be provided, so that it is very clear and it is not in dispute that if you have a percentage of LEL, such as 12, which we think perhaps occurred on the day of the question, or even higher, such as 19, that those would trigger an immediate evacuation of the area and potentially protect workers from that flammable environment.

MEMBER GRIFFON: Thank you, Mr.

Holmstrom.

INVESTIGATOR HOLMSTROM: Yes.

CHAIR MOURE-ERASO: If there are no more questions from the Board, I would like to continue with the presentation of the investigation team on the proposed urgent safety recommendations. So please proceed, Mr. Holmstrom.

INVESTIGATOR HOLMSTROM: We will start out with the first recommendation is -- set of recommendations is to the Occupational Safety and Health Administration, OSHA.

To the Occupational Safety and Health Administration, promulgate regulations that address fuel gas safety for both construction and general industry. At a minimum, prohibit the release of flammable gas to the atmosphere for the purpose of cleaning fuel gas piping.

Next, prohibit flammable gas venting or purging indoors. Prohibit venting or purging outdoors where fuel gas may form a flammable atmosphere in the vicinity of workers and/or

ignition sources.

In addition, prohibit any work activities in areas where the concentration of flammable gas exceeds a fixed low percentage of the lower explosive limit determined by appropriate combustible gas monitoring. And require that companies develop flammable gas safety procedures and training that involves contractors, workers, and their representatives in decisionmaking.

The next set of recommendations is addressed -- that are proposed is addressed to the National Fire Protection Association, NFPA. Enact a tentative interim amendment, as well as permanent changes to the National Fuel Gas Code, that address the safe conduct of fuel gas piping cleaning operations. At a minimum, remove the existing NFPA 54 fuel gas piping exemptions for powerplants and systems with an operating pressure of 125 pounds per square inch gauge or more.

For cleaning methodology, require the

use of inherently safer alternatives, such as air blows or pigging with air, in lieu of the use of flammable gas.

A recommendation to the American Society of Mechanical Engineer, ASME. Make appropriate changes to the 2012 version of Power Piping, ASME B31-1, to require the inherently safer fuel gas piping cleaning methodologies rather than natural gas blows. At a minimum, for 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 motor force in lieu of the use of flammable gas.

The next set of recommendations that are proposed is to the following turbine manufacturers -- General Electric, Siemens, Solar, Mitsubishi Power Systems, Pratt & Whitney, and Rolls Royce. Provide to your customers comprehensive technical guidance on inherently safer methods for cleaning fuel gas piping, such as the use of air or pigging with air.

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 warranty of the turbines, and provide warnings against the use of fuel gas to clean pipes.

Also, to the same six gas turbine manufacturers, work with the Electric Power Research Institute to publish technical guidance addressing the safe cleaning of fuel gas piping supplying gas turbines. At a minimum, for cleaning methodology require the use of inherently safer alternatives such as air blows and pigging with air in lieu of flammable gas.

Also, provide technical guidance for the safe and effective use of alternative methods for cleaning, such as air and pigging with air.

The next recommendation is to the governor and legislature of the state of Connecticut. Enact legislation applicable to powerplants in the state that prohibits the use

of flammable gas that is released to the atmosphere to clean fuel gas piping.

Also, adopt the current version of NFPA 54, as amended, pursuant to our previous recommendation related to NFPA 54.

The Board further authorizes and directs the chairperson to send correspondence to the governors of the other 49 states urging them to review the Board's findings concerning the explosion at Kleen Energy, the Board's recommendations to Connecticut, existing state regulations concerning natural gas safety, and to enact any necessary changes to state regulations and codes to prohibit the release of natural gas to the atmosphere during pipe cleaning operations at powerplants and other similar facilities.

And, finally, the last set of recommendations, to the Electric Power Research Institute, EPRI. Work with the six turbine manufacturers we have identified to publish technical guidance addressing the safe cleaning of fuel gas piping supplying gas turbines. At a

minimum, for the cleaning methodology, require the use of inherently safer alternatives, such as air blows and pigging with air, in lieu of flammable gas.

Also, provide comprehensive technical guidance on inherently safer methods for cleaning fuel gas piping such as the use of air or pigging with air.

In summary, the CSB staff concludes that these recommendations are necessary on an urgent basis due to the fact there will be 125 powerplants commissioned before 2015. Each of these plants will perform some type of fuel gas piping cleaning activity. There is currently limited safety guidance on pipe cleaning methodologies, and the CSB does not want any of these facilities to experience the same catastrophic event that occurred at the Kleen Energy facility in February.

We have learned that several powerplants are still planning to perform, or have already performed, natural gas blows

following the Kleen Energy explosion. The release of such a large quantity of natural gas is extremely hazardous, in that it presents the potential for an explosion in a work area.

This practice introduces an unnecessary risk to workers when others -- when other inherently safe pipe cleaning methods are available, such as performing air blows. The venting of large quantities of air does not create a fire or explosion hazard.

I want to thank the investigation team here at the table, and also investigators back in Denver and in Washington, D.C., who have been extremely helpful, the rest of the staff at the Chemical Safety Board, and the Board itself, and we will now take questions from the Board on the recommendations.

Thank you.

CHAIR MOURE-ERASO: Are there any questions from members of the Board on the recommendations? I remind the Board also that when we have our discussion on the vote that

there will be an opportunity to discuss, again, questions and recommendations. So, please go ahead.

MEMBER GRIFFON: Yes. Just one question, Don. And, actually, it kind of comes off your summary that air blows would not prevent a flammable environment. I'm looking at the recommendation for OSHA Part A. It says, "Prohibit the release of flammable gas," and I'm wondering why not prohibit the use of flammable gas.

And if you actually had that as Recommendation A, Recommendation C would go away. You wouldn't have to worry about working with CGI, combustible gas indicators, to measure your LELs and evacuate, and etcetera. So 'm just curious, why not use there?

INVESTIGATOR HOLMSTROM: To explain the nuances there, first of all, the intent of that recommendation, the first one about release to the atmosphere, is the recognition that some companies use flammable gas but do not release it

into the atmosphere. They use it in a closed system where flammable gas is recirculated with, say, the use of a pig and the debris is captured and flammable gas is not released to the atmosphere.

Obviously, flammable gas is flowing in these pipes during the operation of the powerplant. So the existence of flammable gas in the pipes is not the hazard that we are seeking to address. The hazard we are seeking to address is the release to the atmosphere where a large amount of gas can be present and cause an explosion.

Another alternative would be use of a flare. We are aware of at least one company that uses a flare to safely combust the gas prior to the release to the atmosphere, so there is no release of gas to the atmosphere, but, rather, release of products of combustion, if you will, from the flare, and flares have been used -- in use for some time in a number of industries.

As to the issue about the percentage

of the LEL, one of the differences between the purging situation in ConAgra where gas was purged indoors in the vicinity of workers and ignition sources, and there was a horrible explosion, killed four people and injured a large number of others, is that compared to Kleen -- in Kleen, there was a planned activity where you had your choice of medium to move to clean the pipe with. Before you engaged in the activity, you could choose gas, you could choose air, you could choose nitrogen. You didn't have to use one or the other; you had a choice.

Unlike Kleen, when you are purging lines, if you have, let's say, a natural gas line in a facility that goes to an appliance that is already filled with gas, and a purging is typically where you replace one gas with another -- for example, you replace flammable gas and release it -- and replace it with nitrogen, because you are trying to remove the hazardous material prior to opening the piping or the equipment.

In that case, you have to get rid of the gas, and in the ConAgra situation, where our recommendation said, "Don't do it indoors where you can -- it can lead to horrible explosion," and there is a proximity in that case of 300 workers that were in the building, there was serious structural collapse that actually resulted in three of the four fatalities, and most of the injuries.

And so, in that case, we think it is very much important to not expose workers to a flammable atmosphere, send it to the outside, and any time you are releasing gas to the outside do it to a safe location away from workers. In that case, you have to do -- you have to release the flammable gas, and you can release it to a flare. That's another alternative.

But if you release it to the atmosphere, use combustible gas detectors. Do not subject workers to flammable atmospheres. So I hope that distinction helps.

MEMBER GRIFFON: Thank you.

CHAIR MOURE-ERASO: Any other observations or comments to --

MEMBER WRIGHT: Yes, Mr. Chair. I have a couple of questions, and you may or may not be able to answer these. And I appreciate that, because they focus on NFPA. But you may have some knowledge and be able to enlighten me.

Do you have any idea why they exempted the power industry from NFPA 54 in the first place?

INVESTIGATOR HOLMSTROM: We have met with NFPA, the senior staff of NFPA, on several occasions, and we have asked that question. I don't think they are quite clear themselves on why that exists. There certainly is not a commonly understood and accepted rationale within the NFPA why the exception exists that is currently defended. We did not hear that.

We heard, "Well, it has been in existence since I think the period of the 1970s," and we are not quite clear how that got into our standard, but they did indicate there is likely

resistance to eliminate it.

MEMBER WRIGHT: Also, I believe the exemption addresses the psig, pounds per square inch gauge of the material that NFPA 54 addresses. Is that correct? Less than or equal to 125 psig?

INVESTIGATOR HOLMSTROM: Right. There is -- for systems that are I think 125 pounds or greater, there is an exemption in NFPA 54.

MEMBER WRIGHT: And I suspect they did that because they don't have the expertise maybe for 650 pounds of psig? I'm just guessing, because I don't know. I'm curious.

INVESTIGATOR HOLMSTROM: I think that's a good question. I think certainly within NFPA as a whole, as you are probably aware, they have many, many standards, probably several hundred standards. Many of them have representatives from large-scale industries and powerplants who are on those committees who I do think have that expertise. And whether or not that particular committee would have that

expertise I think would be a question for further research, but I think it's a good one.

MEMBER WRIGHT: Well, I guess I would preface that by wondering why we were so specific in telling them which publication to insert this language in. And as you know from the ConAgra case, I am against very prescriptive recommendations to people, and I think it is very presumptuous of us to say that this really needs to be addressed in that particular publication.

My druthers are that I would rather see us identify a gap in their coverage for recommended practices, and that is basically what they published in the NFPA, and say, "Hey, nowhere do you really address the need for purging of gas lines for these particular types of facilities. Recommend that you address those to prevent future incidents, such as those that we have observed at Calpine and Kleen Energy." And let them, as the expertise in this area, decide where that best fits in terms of what publication they need to address that at. And so

my position hasn't changed there.

And I guess one of my questions -- did we focus on NFPA 54 because of the ConAgra case?

INVESTIGATOR HOLMSTROM: That is a good question. We met with NFPA initially, and we were in inquiry mode. You have several standards here. You have NFPA 54 that deals with the Fuel Gas Code and fuel gas piping safety, you have NFPA 37 that addresses gas turbines, and you have NFPA 850 that addresses electric power generation facilities. And we walked through each one of those standards.

In the initial meeting we had, which lasted a good, long while, a couple of hours, going through all of the standards and questioning them, we learned the following. We learned that they believed at that point in time that NFPA 54 would be the likely home of a recommendation that results from Kleen. They had appointed a task force to look into the issue, and that was their initial take, because NFPA 54 deals with fuel gas piping to an appliance. And,

in this case, there was an appliance, a gas turbine, and fuel gas piping was going to the appliance. And while it didn't address using natural gas or gas blows to clean fuel gas piping, it seemed to be the logical home.

The biggest problem that they later, I think, learned and developed an understanding about was potential resistance within their own committee in 54 to the scoping issues, the scoping issues being the power plant exemption, and also the exemption for systems above 125 pounds PSIG.

They had other reasons why the other standards were not particularly useful either, one of which rated 50, although it's only a recommended practice and not mandatory in any jurisdiction, when they talked about fuel gas piping it referenced 54, even though 54 exempts power plants, so that was hard to understand. They admitted that was a contradiction, and was a significant issue.

Finally, I think the other very

compelling issue is that NFPA 54, which they believed, at least initially, was the likely home for such a recommendation, has been adopted by 35 states. Now, not all of those states have adopted the current version of NFPA 54, and it doesn't mean that if we make recommendations or changes to the current version that it will automatically translate into changes to all of the states codes, building and fire codes, but it has a lot more traction. It will create significant, if it's adopted in that particular standard, it will create a lot more immediate change, which we, obviously -- all of us think is important to change these practices.

MEMBER WRIGHT: And, finally, I'd just like to applaud you for your recommendation to the manufacturers of turbines, because from my perspective, that is really where we get to the issue of trying to get immediate results for our recommendations. Apprizing them, and making them aware of the issue here, and influencing them to influence the builders of these facilities not to

use natural gas in this particular way. And I think that is an excellent recommendation, and I think it is also echoing the comments made this morning at the Subcommittee hearing from Education and Labor, where the judge who was in charge of the Connecticut Commission said that he could get immediate results based upon some of the recommendations he had proffered. And I think we're going to get more bang for our buck not only there, but also in providing letters to the other states that are going to implement these things.

The reason I say that over, say, a federal regulation, is that the majority of these plants are going to be constructed in the next five years, and if I'm not mistaken, it's certainly going to take OSHA well over five years to develop a standard to address this, or least it's taken them a while to address other standards that we've requested of them. But I applaud you for that, and I think that's a very well sounded and based recommendation. Thank

you.

INVESTIGATOR HOLMSTROM: Thank you.

CHAIR MOURE-ERASO: I would like to add a comment. I hope that Mr. Wright agrees that there are different views, even among the Board, about these issues, and that you probably will excuse me if I probably disagree with some of the statements that you just made. And, specifically, I think it's overly optimistic to have expectations that NFPA will be addressing the gap simply by pointing them out to them. I do believe that in this particular case in NFPA, a more prescriptive approach, more specifics are required for addressing those gaps, rather than simply pointing them out. This is kind of my view, and my experience on trade associations. That's a comment.

MEMBER WRIGHT: Okay.

CHAIR MOURE-ERASO: Any other questions from the Board? Okay. At this time, I would like to move into the Panel portion of tonight's meeting. We have two panels. The

first panel that we have that I go to is the -- the panelists will sit in the table in front of us.

The first panelist is Dr. Paul Amyotte, Professor of Chemical Engineering at Dalhousie University in Halifax, Canada. Dr. Amyotte holds a Bachelor's Degree from the Royal Military College of Canada, and a Master's from Queen Victoria University, and a Ph.D. from the Technical University of Nova Scotia, all in Chemical Engineering. He is the editor of the Journal of Loss Prevention in the Process Industries, and is co-author with Trevor Kletz of the second edition of "Process Plants: A Handbook for Inherently Safer Designs."

Professor Amyotte, please proceed with your statement.

DR. AMYOTTE: Thank you, Mr. Chairman. Is someone turning these on? Okay. I don't see a button. Can you hear me all right?

Mr. Chairman, Members of the Board, ladies and gentlemen, I'd like to begin by

expressing my condolences to the families of the men who died as a result of the Kleen Energy Natural Gas explosion, and to all who have been adversely impacted by this event. I also want to thank the U.S. Chemical Safety Board for the opportunity to be here this evening, and to give this presentation.

I would ask that the full text of my written submission be entered into the record of this public hearing.

There are two main points I wish to make. First, I will comment on the CSB investigation team's urgent recommendations from the perspective of inherent safety. And, second, I will comment on the general use of the language of inherent safety by the CSB in its investigation reports.

On the first point, I wholeheartedly support the recommendations relating to inherently safer alternatives to natural gas flows for pipeline cleaning. On the second point, I commend the Chemical Safety Board for

its use of inherent safety terminology, and I strongly encourage the Board to continue such usage in its investigation reports.

A good explanation of inherent safety is given in Item 33 of the Urgent Recommendations. Briefly, inherent safety is a proactive approach in which hazards are eliminated or lessened, so as to reduce the risk with both engineered or add-on devices, or procedural intervention.

The principles of inherent safety work in conjunction with other means of reducing risk, namely, passive and active engineered safety, and procedural safety, within a framework that's commonly known as the hierarchy of controls. Inherent safety being the most effective and robust approach to risk reduction sits at the top of the hierarchy.

It is followed in order of decreasing effectiveness by passive engineered safety devices, such as explosion relief vents, then active engineered safety devices, such as

automatic fire suppression systems, and, finally, procedural safety measures, such as ignition source control by hot work permitting, for example. So, inherent safety is not a standalone concept. As I just described, inherent safety works through a hierarchical arrangement in concert with engineered and procedural safety to reduce risk.

Inherent safety is not, however, a panacea for all hazards, and all risks, nor does the hierarchy of controls invalidate the usefulness of engineered and procedural safety measures, quite the opposite. The hierarchy of controls recognizes the importance of engineered and procedural safety by highlighting the need for careful examination of the reliability of both mechanical devices and human actions.

The CSB Urgent Recommendations arising from the Kleen Energy explosion well address these features of inherent safety. One sees evidence of the use of the hierarchy of controls in the recommendations being made to the

Occupational Safety and Health Administration. These recommendations incorporate, first, elimination of the fire and explosion hazard by prohibiting the release of flammable gas to the atmosphere for the purpose of cleaning fuel gas piping through to the use of combustible gas monitoring, and, finally, the development of flammable gas safety procedures and training.

Item 33 in the Urgent Recommendations invokes the inherent safety principle of substitution in the case of replacing natural gas with a less hazardous gas, such as air, in the cleaning of fuel gas piping. I would suggest that the principle of simplification is also relevant here in helping to ease the complex requirements for discharge design when using natural gas for pipeline cleaning. And these are noted in Item 31 of the Urgent Recommendations.

Item 64 addresses the issue of whether alternative cleaning methods are technically feasible by commenting that safer alternatives, such as air, are just as effective as natural gas

for cleaning fuel gas piping. The facts that inherent safety implementation is hazard-specific, and is not a cure for all safety issues, are recognized in Items 19 and 24 of the Urgent Recommendations. Clear reference is made to the removal of fire and explosion hazards by the use of alternative cleaning methods, such as pigging with air or nitrogen, air, nitrogen, or steam blows in cleaning with water or chemicals. New hazards may be introduced, however, as noted in Item 23 of the recommendations, in which the asphyxiation hazard of nitrogen is identified. One would also have to recognize that even the use of a seemingly benign substance, such as air, entails propelling a gas through a pipeline under some pressure. This further illustrates the importance of having an effective safety management system with management of change as a key system element.

Turning very briefly to the general matter of inherent safety terminology in CSB investigation reports, I am heartened by the

continuing trend of increased usage. One clearly sees the inherent safety concept and principles front and center in the Urgent Recommendations under discussion this evening. Looking at completed investigations, I would cite the Inherent Safety Analysis given in both the BP Texas City Report, and the Valero McKee Refinery Report.

One often hears the comment that inherent safety is common sense, but what may be common sense to some, is simply unknown to others. Our goal must, therefore, be to insure that inherent safety becomes common knowledge so that it can become common practice, not just for those knowledgeable in the fields of process safety and occupational safety, but for all plant personnel, all business managers, all regulators, and the general public.

The CSB investigation reports have a key role to play in bringing inherent safety into the mainstream of industrial practice by serving as valuable case studies of lessons learned.

In conclusion, I fully concur with the Kleen Energy Urgent Recommendations, and I encourage the CSB to continue the explicit incorporation of inherent safety considerations in its incident investigations, and reports. Although I would not normally use the word "unsafe", preferring instead to say "less safe," I do agree with the statement made in Item 60 of the recommendations, "From a fire and explosion perspective, releasing large volumes of natural gas in the vicinity of workers or ignition sources is, indeed, inherently unsafe."

To paraphrase Professor Trevor Kletz in his landmark paper on Inherent Safety titled, "What You Don't Have Can't Leak," what you don't have, can't explode. Thank you, Mr. Chairman.

CHAIR MOURE-ERASO: Thank you very much, Dr. Amyotte. We'll continue immediately with our second panelist, Mr. Ervin Patterson.

Mr. Patterson is currently a Staff Manager for major power utility in the Southwest with responsibility for all startup and

commissioning activities within the company's portfolio. He has extensive experience in the power industry, including startup and commissioning, plant management, and all phases of plant operation.

Mr. Patterson, please proceed with your statement.

MR. PATTERSON: Thank you, Mr. Chairman. I also would like to thank the Board Members of the Chemical Safety Board for allowing me to speak here today, tonight. And on behalf of my wife, my daughter, and myself, I would like to offer our condolences to the family members of the workers that lost their lives in an industry that I, myself, work in every day.

CHAIR MOURE-ERASO: Could you pull the microphone closer to your mouth, please?

MR. PATTERSON: I'm sorry. Is this better? Okay. Thank you.

My presentation tonight will be on alternative methods to insure proper cleaning of fuel gas piping. There are several alternative

methods today for insuring the cleanliness of fuel gas piping that I have found to be much safer, and more efficient than the use of natural gas, which until the last few years had been the standard method across the industry.

I recommend, and use a combination of methods in my startup projects which insures safety foremost by, one, using alternative means for cleaning, which is nitrogen; two, reducing duration or time involvement; and, three, reducing the number of blows required. This combination will achieve the end product of clean piping in a safer and more efficient manner.

First would be design specs. The first step to achieving the desired outcome of clean fuel gas piping with a reduction in time and number of blows involve the design specs at the engineering fabrication level. Fuel gas piping can be speced out to be pickled, which is coated piping to prevent corrosion at the fabrication shop, which will reduce the opportunity for the pipe to corrode during

construction phase. This will reduce the amount of debris that will have to be removed during the pipe cleaning process, which results in decreased number of blows required to achieve the required cleaning criteria. Thus, risks have been eliminated and minimized at initiation of the project through design and engineering, especially if fuel gas is to be used as the medium.

Next, the Build It Clean Program. The next step to insure a shorter duration of pipe cleaning blows is to develop a Build It Clean Program within the Construction QA/QC Department. This program should mandate that the piping remain capped once received at site until the installation process begins. The Build It Clean Program should dictate that all piping will be hand-cleaned, inspected, and documented by a QA/QC document as it is being installed. This, also, will lead to shorter duration of final cleaning requirements, again, minimizing risk during the blows right from the beginning of the

project.

Next is pigging, as you've already heard discussion on. Once the fuel gas piping is installed, the underground portion, which is more susceptible to corrosion due to condensation that will develop in that portion of the pipe, the pre-cleaning method of pigging can be used to remove the majority of this corrosion in the underground section of the pipe. This should be performed just prior to final pipe blows. And, again, this will shorten the duration of the final cleaning, thus, minimizing risk, again.

Nitrogen. As for the actual piping blows that are required to meet the final OEM cleaning criteria, I have found that utilization of Nitrogen will provide the same results as using natural gas as the media to perform this function.

First, you must insure the fuel gas supplier is delivering clean dry gas to your site. This is done by reviewing and witnessing their cleaning procedures, and cleaning process.

For the on-site piping, nitrogen along with a temporary pump station is used to pack the pipe with nitrogen, and then increase the pressure up to the required PSI to achieve the cleaning force ratio required to perform the proper blow. Temporary pressure gauges, and temperature gauges, along with the ultrasonic flow meter will need to be placed on the piping to insure you are reaching the required CFR. The CFR calculation must also take into account the properties of nitrogen, along with the pipe diameter and design flows. Depending on the configuration of the pipe layout within the site, the entire site piping can be included in the cleaning process, or the pipe can be broken into sections for cleaning, depending on which is more economical.

The exit point with these blows is typically at the fuel gas heater. A detailed procedure must be written, reviewed, and followed insuring all potential hazards are identified. The actual site conditions are a prerequisite to perform this activity, even if nitrogen is used

in the place of fuel gas.

As for the piping from the gas heaters to the combustion turbine, this is, typically, vendor-supplied stainless steel pipe, which merely requires cleaning. Any loose material that may have accumulated is removed. For this cleaning process, a detailed procedure insures each stage of piping is properly cleaned. Dry compressed air provided by the on-site air compressors is typically the cleaning media. CFR is not required for this function, nor is fuel gas required to achieve this activity.

As for maintenance, the purging and venting of a fuel gas system that is in service prior to maintenance activities requires special consideration. A typical design is a low point vent which will not properly disperse the fuel gas during this purging activity. A safer means to perform this is to route these vents to a common header, and route the header vent to a safe location for purging. A permanent grounding device can be installed, as well as a LEL device,

which provides feedback to a DCS for the operator to determine when the evacuation of gas is complete. Depending on the configuration of the fuel gas piping, two or more of these common vent headers may need to be installed in the design.

Fuel gas. In the event that fuel gas has to be used as the media for pipe cleaning, a well written procedure must be reviewed and followed to insure the safety of the site workers, and protection of the site equipment. Typically, the only staff allowed on site should be those directly involved in the gas blows. All ignition sources must be isolated within the job site within 300 feet of the exit point. No individual gas blow should last longer than three minutes. You should allow 15 minutes in between each individual blow, and after 15 minutes if any LEL is detected within 50 foot of the exit point, you should wait another 15 minutes and re-evaluate.

The exit point must be at least 15 feet higher than any structure within 100 feet

that has the potential to contain fuel gas. Proper grounds must be put into place on the exit point of this vent.

In conclusion, based on past experience, I feel that the combination of methods and procedures provide a safer alternative, and provide the same results to achieve the required cleaning criteria. Picking of the pipe at fabrication, insuring the pipe is protected prior to being sent to the site, maintaining the integrity of the pipe through the Build It Clean Program during the construction phase, and, finally, utilizing nitrogen and obtaining the required CFR in lieu of gas. Thank you.

CHAIR MOURE-ERASO: Thank you very much, Mr. Patterson. Our next panelist is Larry Danner from the General Electric Energy Company.

Mr. Danner has worked with General Electric since 2000, where he's a Senior Professional Engineer, and the Principal Engineer for Product Safety. He's a graduate from the

Northrop Institute of Technology with a degree in Aerospace Engineering. Mr. Danner is a Certified Safety Professional in System Safety Aspects, and a member of the American Society of Safety Engineers, and the National Fire Protection Association, where he serves on three technical committees, including the NFPA 37, Standards for the Installation and Use of Stationary Combustion Engines and Gas Turbines. Also, I would like to add that Mr. Danner is the first F-16 pilot that I met in my life. He's a former F-16 pilot.

Mr. Danner, please proceed with your statement.

MR. DANNER: Honorable Chairman and Members of the Board, thank you very much for this opportunity to speak here. And on behalf of the entire GE Energy family, we wish to express our condolences to those who have been affected by this tragedy.

I'm going to speak on behalf of GE Energy this evening, and hopefully give everyone an appreciation for the relationships that do

exist. GE Energy manufactures and services power generation equipment of all forms, steam turbines, gas turbines, wind turbines, et cetera. We primarily sell equipment to power plants, but sometimes we also do get involved in the plant design, construction, depending upon the commercial arrangements with the customer.

For all projects, we do provide our technical advisors, or TAs, for training and details of setting up and adjusting the GE Energy equipment for optimum performance. They have very limited involvement in the plant construction activities, overall. They're usually not involved in any of the balance of plant activities, which would include cleaning of piping. They may review the cleanliness results as mentioned during the investigator's report based on actual tests, witnessing, or contractor reports, but that is the extent of their relationship with that.

We do share our recommendations on pipe cleaning, and partnership in turnkey

projects at all times with our construction contractors as part of our standard data package. And those partnerships in turnkey are those projects where we would actually be involved in the design of the plant.

For all projects, the construction contractor is responsible for cleaning of the gas piping. Cleaning method is left to the discretion of that contractor, unless on those very, very rare occasions where GE Energy has primary responsibility for oversight of the construction. There are on occasional turnkey projects.

Our relationship on the Kleen Energy mishap. Upon hearing of this tragic explosion, we initiated an internal review the morning of February 8th, the day after the accident. This review was undertaken even though GE Energy had no involvement in the plant in order to learn as much as possible about the accident from the public sources, and then to review our existing procedures in order to learn as much as we could,

and thereby put in any improvements, or strengthening in light of lessons learned.

The review team consisted of representation from throughout GE Energy business units, U.S., International, our various functional representatives from Engineering Services, commercial, Chief Engineer's Office and Product Safety. We identified those procedures that did talk about gas blows, and the recommendations for risk mitigation that were contained in those procedures covering gas blows, and recommendations regarding alternative cleaning methods.

What we found was there are very few documents that discussed cleaning methods. Mostly, they specified how clean the system must be. The documents that discussed releasing gas as part of the cleaning process, referred to such release through a vent routed to a safe outdoor area.

With respect to pipe cleaning, we found air blows had been recommended by GE Energy

as the first choice as early as 1999 in the guidance that we could track down, that we do provide to clients, partners, contractors purchasing heavy-duty gas turbines. In this document, the guidance specifically required an outdoor release from an area separated from buildings, sanitized of ignition sources, and restrictions placed on personnel in the area.

The review team looked at the information that was being made public by the Chemical Safety Board investigators to find out if there were any more lessons learned that we might apply. Don Holmstrom, the lead CSB investigator, in his February 25th public statement provided critical focus to our efforts to refine our gas blow procedures. GE Energy considered those statements when drafting the April update to GE's guidance regarding gas blow, which we later provided to your investigation team.

The revised elements included an expanded list of cleaning options, air, nitrogen

purging, pigging, et cetera, specifically defining gas blows as a method of absolute last resort, and that the gas release must be routed through a vent to a safe area. Expanded safety analysis and documentation requirements require high-level management review in advance of any gas blow to confirm that there were no feasible alternatives, if GE has the ability to choose the cleaning method. Require concurrence for the gas blow by senior GE management, if we, in fact, have selection authority prior to giving permission to GE staff to commit to a gas blow. In other words, making it as difficult as possible to get to that decision. You have to prove that it's the only way to do it.

Where GE Energy does not have responsibility for selecting the cleaning method, it has established a firm policy where employees shall not be present during gas blows. And exception to this policy will only be granted if the entity conducting the operation has specifically requested such presence, provided

the documentation outlined in the updated GE Energy guidelines, and the presence of an employee is approved by the appropriate senior manager following review by GE's Environmental Health and Safety management. We have taken every step we can to make gas blows something that will not happen again under GE watch.

Thank you, again, for this opportunity to appear today, and we look forward to continuing to work cooperatively with the Chemical Safety Board, and others in industry to improve the safety procedures. Thank you.

CHAIR MOURE-ERASO: Thank you very much, Mr. Danner. This is the end of Panel One, so I would like to ask the members of the Board if they have any specific questions for Panel One.

MEMBER WARK: Yes. Thank you, Mr. Chairman. I'd like to thank all three panelists. You answered most of the questions I had, and I appreciate that.

I do have one for Mr. Danner, and I'm

going to be going into unchartered territory for me, but as a function of your warranty, your guarantee on the turbines, do you -- would you ever consider as a final step to disallow gas blows under the warranty?

MR. DANNER: That would be a consideration that I would have to take back to those folks with respect to that question, sir.

MEMBER WARK: Okay. That's all I have.

CHAIR MOURE-ERASO: I would like to ask the investigative team if they have any particular questions for the members of Panel One.

INVESTIGATOR HOLMSTROM: I just have, I guess, a follow-up to Mr. Patterson. First of all, thank everybody. They were great presentations. Thank you very much.

Mr. Patterson, can you tell us about whether you think nitrogen blows are as feasible and economical as gas blows? We heard, I think, earlier today in a presentation that one person

stated that perhaps they thought nitrogen blows might take 14 days compared to two days for gas blows. You've done both, so can you tell us about that?

MR. PATTERSON: Yes, sir, I can. Thank you for the question. Actually, I finished up two years ago a four by one project, four by one combined cycle plant, as you heard Laura explain earlier what that was, which is Quality's project. And we performed nitrogen blows on that project versus gas blows, and the outcome was a fraction of the cost. And I think mainly because earlier, as you stated, when you are blowing the gas, typically any kind of pressure control valves are left 100 percent open as not to damage them. So, the flow of gas is controlled with a block valve. And, typically, companies are not even trying to determine what the CFR is. Therefore, that leads to the large amounts of gas that you described earlier that was discharged. You know, just having to run a valve open that discharges so much gas, so much more than is

needed to clean -- obtain the CFR, where in a more controlled environment with nitrogen, it is actually we can fill the line, just the section we want to clean with nitrogen. Then we just can pump it to the pressure that's required to obtain the CFR, so we use a lot less media, being nitrogen. Therefore, it's proved to be much more economical for us, not only safer, which is the main reason, but much more economical. I think if you had to buy the gas to heat homes for that many years, you would compare the cost.

CHAIR MOURE-ERASO: Do you have another question?

INVESTIGATOR HOLMSTROM: No.

CHAIR MOURE-ERASO: A follow-up with this. When you are -- you have experience with nitrogen blow, is it possible to recover the nitrogen? Could you recycle it, rather than blowing it up, and reusing it again?

MR. PATTERSON: No, sir. And the reason not is because of the required CFR directs a point you have to maintain the velocity in the

flow. And if you try to bottle that, or capture that, then you're not actually getting the cleaning force ratio that's required at the exit point to clean the entire piping. That is the main challenge, is obtaining the CFR throughout the entire pipe. Therefore, you have to have an exit point that you -

CHAIR MOURE-ERASO: Thank you. I apologize to Mr. Bresland. I didn't see, he wanted to ask question to the panel. Please, Mr. Bresland.

MEMBER BRESLAND: Thank you, Mr. Chairman.

A question for Mr. Danner. How much does a turbine cost? If I wanted to go out and buy a GE turbine tomorrow to make electricity, what would I pay for it?

MR. DANNER: Depending on the turbine, it's a few tens of millions to over $100 million, depending upon the amount of equipment that you're buying with it.

MEMBER BRESLAND: So, it is a valuable

piece of equipment that needs to be protected --

MR. DANNER: Yes, sir.

MEMBER BRESLAND: -- from dirt.

MR. DANNER: Yes, sir.

MEMBER BRESLAND: The blow that we saw, the photograph that we saw of the blow, the vertical blow, it seemed that there's a lot of dirt in that. Is that typical?

MR. DANNER: That dirt, my understanding of that is it's typically the dirt that is -- I think that my colleague, Mr. Patterson, referred to that, is the piping, itself, gets interior rust and things of that nature due to storage and so on, and it's blowing that out. Our equipment, such as our gas heaters and filters, and so on, are all detail clean and provided clean to the site.

MEMBER BRESLAND: Okay. Thank you.

CHAIR MOURE-ERASO: Mr. Wright.

MEMBER WRIGHT: Thank you, Mr. Chairman. I want to thank the members of the panel, as well. Very informative.

I agree with Trevor Kletz. I quote him quite often. However, I didn't quite catch, I think it was the second page, and I wish I had a copy of your statement so I could read it, and maybe not have to ask you this, but I believe you said provided that it doesn't interfere with the process, or maybe I'll catch you afterwards and read your statement.

DR. AMYOTTE: I commented that inherent safety is not a standalone concept. It's not a cure-all.

MEMBER WRIGHT: No, I understand that.

DR. AMYOTTE: As management change, the whole thing, cost-effective.

MEMBER WRIGHT: No, I'll look at it later, and then we can discuss it offline properly.

DR. AMYOTTE: Okay.

MEMBER WRIGHT: Mr. Patterson, you've got quite an extensive background in doing these, and my question is, have you ever experienced any flashing or explosions in any of the gas blows

that you've been associated with?

MR. PATTERSON: No, sir. Fortunately, I have not.

MEMBER WRIGHT: Knock on wood, as they say.

MR. PATTERSON: Right. Actually, I was an employee of Calpine when the work scale incident was referred to earlier, I was on another job site, actually. And that was when we took a real hard look, or, personally, I did, that we need to look at alternative methods. We've always tried to take extra measure to write a good detailed procedure, and make sure it's site safety, and worker safety, but any time you're using natural gas, there's always a risk.

MEMBER WRIGHT: And I wish more people had taken a harder look after that incident, because that one didn't cost any lives, and in this particular case so many years later, we regretfully are here discussing this issue.

MR. PATTERSON: Yes, sir. We're in the industry now where we're seeing more and more

natural gas plants being built; therefore, there's more and more natural gas piping to be cleaned, so the potential is there, a lot higher.

MEMBER WRIGHT: Absolutely. And then, finally, with Mr. Danner, have you experienced with any of your equipment whether you're associated with the particular build or whether you're just supplying equipment, any explosions or fires due to gas blows?

MR. DANNER: Since you asked that question, I will have to admit that the Calpine equipment was provided by the GE Air Derivative Organization, and that the earlier 2001 mishap was also GE equipment. When we were notified with respect to that 2001 mishap, we did an internal search, and, again, it was pure equipment only, we could find no record of that having been reported within the GE system, so we were unaware of that one.

MEMBER WRIGHT: And then, finally, just a general statement, that I applaud the efforts of General Electric here, and I hope that

your peers will undertake as valiant of efforts that you've undertaken at this stage of the development of safe procedures in installing and making operational your equipment. So, my hat is off to you.

MR. DANNER: Thank you. We do look forward to working with the industry community, as well as NFPA's document.

MEMBER WRIGHT: Thank you, Mr. Chairman.

CHAIR MOURE-ERASO: Thank you, Mr. Wright.

One question for Mr. Danner.

MR. DANNER: Yes, sir.

CHAIR MOURE-ERASO: Can you conceive of any situation in which you will require a burn-up with natural gas? I mean, you said that you discourage it, but can you -- will you make in any particular situation a recommendation to do it with natural gas in some situation?

MR. DANNER: GE Energy's policy right now is to not use gas to blow it. If anyone were

to come to us and say we need to use natural gas, they would have to prove to us, and I say prove to us at a senior management level that all the other alternatives are technically unfeasible. So, with what we know today, we do not believe that to be the case that we would ever do that. The door is open, but, again, the burden of proof would be on the person proposing that.

CHAIR MOURE-ERASO: Thank you. You have a comment?

MR. PATTERSON: I would just like to add a comment to that. The company I'm involved with now, we've actually issued a standing order that -- because we self-perform our startup activities, which is gas blows, so the company, we have issued a standing order that no natural gas will be used for any pipe cleaning.

CHAIR MOURE-ERASO: Are there any more questions from the panel or the investigator?

INVESTIGATOR HOLMSTROM: One final question for Professor Amyotte. How is natural gas regulated in Canada?

DR. AMYOTTE: You would ask the one question I really can't answer. I happen to come from the eastern part of Canada, where we're sort of more coal and imported oil, though we do have offshore natural gas. I think you probably, Mr. Holmstrom, would have to ask someone from Alberta that question. But I think in terms of the discussion this evening, I'm much more familiar with the coal mines, although we don't have any active coal mines in Nova Scotia at the present time. We did have both provincially and federally regulated, and I think, if I pick up on the gist of your question, there are and remain on the books regulations to deal with percentage of the lower limit of methane at which point machinery would have to shutdown, the evacuation of the mines would occur, I suspect much like in the United States. And those are, I believe, 20 percent and 40 percent of the lower limit.

In Nova Scotia, we do have general regulations attached to our Occupational Health and Safety Act, and they speak to the requirement

for an employer to render harmless the atmosphere in a work environment, which, I believe, would cover more generally the type of issue that we're looking at this evening. There are also regulations about no atmospheric propane releases in Nova Scotia. You mentioned confined space, and a percentage of LEL for flammable gas is applicable there. So, I haven't answered directly your question, but I think, in general, and at least my part of Canada, there are regulations of a sort.

CHAIR MOURE-ERASO: If there are no more questions, I would like to thank Professor Amyotte, Ervin Patterson, and Larry Danner, members of Panel One. And I would like to invite the members of Panel Two to proceed to the front of the room so that we can continue the proceedings. Thank you.

At this time, I would like to move to the second group of panel presentations. Next, I would like to introduce Representative Matthew Lesser from the Connecticut State Legislature.

Mr. Lesser represents the towns of Middletown, Durham, Middlefield, and Rockfall.

In 2008, Matt was elected to the Connecticut General Assembly as its youngest member, where he serves in the Education, Public Health, Energy and Technology Committees. Representative Lesser, please proceed with your presentation.

REP. LESSER: Well, I'd like to first thank the Chemical Safety Board for inviting me to participate on this panel. One Sunday morning in February of this year, as I was enjoying my morning coffee, my windows rattled, and the related explosion shook my community, the City of Middletown, as well as the entire state. In the hours that followed, our focus was on rescue and recovery efforts. The days that followed that shifted to the investigation, and then weeks later supporting the victims, and the families of the victims. But now our priority is making sure that this never happens again, looking at the results of the investigations, and incorporating

the lessons learned.

I first want to acknowledge a couple of my colleagues who are here tonight. Deputy Speaker Jim O'Rourke serves with me on the Energy and Technology Committee. He also represents part of the City of Middletown, as well as Portland and Cromwell, as well as another Deputy Speaker, Linda Orange of Colchester. And I know they, as well as the Chairs of the Committee, Senator Furfaro and Representative Nardello care deeply about making sure that we learn lessons from this to make sure that we have safe power plants in the State of Connecticut.

One of the most striking lessons we learned at the very outset of our efforts on the legislative level was when we held a public hearing on the Energy and Technology Committee. We had all of the major state regulators in front of us, and we asked them straight out who was in charge, and we heard silence. That was striking to me, personally, and I know to the other members of the Committee. So, I think our first

priority is making sure that we do not have what is, in effect, at the state level a regulatory vacuum. We have local agencies in charge of safety, but we have no statewide look at safety in power plant construction and ongoing operations. So, our first effort, we've got legislative language that's currently being considered up at Hartford, Senate Bill 462. And the center piece of that is taking our state's Department of Public Utility Control and tasking it with general oversight over safety in power plant construction and operations.

Additionally, we take the Gas Pipeline Safety Unit, which is part of the Department of Public Utility control, and currently oversee safety for gas pipelines up until the meter of the power plant. And we asked them to follow behind the meter of the power plant and insure safety of gas operations inside the power plant. We ask that the Department of Public Utility Control adopt regulations that, at a minimum, they must adopt the recommendations, guidelines -

Urgent Recommendations, guidelines, and safety recommendations of the Chemical Safety Board, and we flat out ban the use of natural gas for natural gas blows for cleaning operations in gas pipelines.

Additionally, this legislation would reform the Connecticut Siting Council, which is tasked with examining the siting of major installations, including power plants. We add to their proceedings, the State Department of Emergency Management and Homeland Security, and the Department of Public Safety of the proceedings so we can get recommendations from those agencies, and that we insure that they take the safety of neighbors and neighboring houses and people into consideration.

We also have them separate the approval of the power plant into two phases, one for construction, and then the second phase, which is for actual operation, cannot be approved until they've certified the safety of the construction.

And then, finally, I think it's important to consider that all recent power plant construction in Connecticut has been of natural gas plants, so we ask that the Connecticut Siting Council take into consideration the diversity of our state's fuel mix in examining approvals of new power plants.

There are a couple of others that are of concern to this Committee, as well. One is of early completion incentives, so we've asked that in all new power plants that are currently being constructed, or will soon be constructed, that are financed in any way through state dollars, we ask that the terms of those contracts here on out be insured to not have any early completion incentives, and that if there are any current contracts that have early completion incentives, that they be modified to remove them. We are concerned that that might have a negative impact on power plant safety, and create dangerous incentives.

And then we also -- finally, we ask

that the Department of Emergency Management and Homeland Security, the Department of Public Safety, and the Connecticut Siting Council meet at least once per year to discuss any current safety issues at power plants. And, after that meeting, if there are any, to notify the Governor and local legislators of those concerns. I'm optimistic that we will be able to have legislation ready at the start of the next legislative session in January 2011, and I'm hopeful that we have -- I believe we have the support to pass needed reforms, and am optimistic about getting them through. Thank you.

CHAIR MOURE-ERASO: Thank you very much, Mr. Lesser. Our next panelist is Glenn Corbett, Associate Professor of Fire Science at the John Jay College of Criminal Justice in New York City, where he's also the Chair of the Department of Protection Management. He's a technical editor of Fire Engineer Magazine, and he's a former Assistant Chief of Waldwick, New Jersey Fire Department. And he has served, also,

as the President of the New Jersey Society of Fire Services Instructor. He testified before the 9/11 Commission, and recently served on the Federal Advisory Committee of the National Construction Safety Team that investigated the World Trade Center disaster.

Mr. Corbett, you may begin.

PROF. CORBETT: Thank you, Mr. Chairman, and thank you Members of the Board for inviting me here today. I'd like to also add my own condolences to the families and friends of those who were lost in this tragedy.

I'd like to spend a few moment talking about specifics about the code recommendations that have been made. Prior to coming to John Jay, actually, I spent about eight years as a code enforcement official in San Antonio and Austin's Fire Departments, and currently actually serve on New Jersey's Fire Code Council, though I'm representing only myself today.

The explosion at the Kleen Energy plant on February 7, 2010 has exposed a large gap

in our national codes, in particular, provisions dealing with natural gas purging, as well as natural gas blow operations. This incident, in addition to another explosion at the ConAgra Slim Jim plant in Garner, North Carolina in 2009 demand that this problem be promptly and properly addressed in our model codes.

Inherent danger of purging gas piping of trapped air, for example, with natural gas is obvious. While such purging operations are necessary and commonly take place in small installations, such as residential gas-fired equipment without incident, the higher volumes of expelled gas in larger commercial and industrial installation presents a much greater danger to construction workers and the public, in general.

Gas flow operations, on the other hand, conducted with very high gas pressures to remove trapped debris, such as slag and rust, are inherently hazardous, present a significant danger to workers and occupants in a facility. Stringent regulations are critical to insure

proper safety in both of these situations.

As many of you are aware, our nation relies heavily on the construction and safety codes developed by private non-profit code writing organizations, such as the National Fire Protection Association, International Code Council. Their codes and standards are adopted, and in many cases modified by local governments, states, and the federal government. The two most relevant codes addressing gas purging operations are the NFPA 54s have been discussed here, the International Fuel Gas Code, and International Code Council's International Fuel Gas Code. However, again, as have been mentioned earlier, electric utility plants, as Kleen Energy, are outside the scoping provisions of both of these codes. In addition, the high pressure gas blow that was used by Kleen Energy, reportedly at 650 PSI, was also outside the scope of NFPA 54 and the International Fuel Gas Code.

It's the scoping provisions of these two codes that create the greatest impediment to

insuring worker safety in construction and operation of electric utility plants who utilize natural gas as a fuel. In the wake of ConAgra and the Kleen Energy incidents, the NFPA issued emergency temporary - excuse me - an emergency tentative interim amendment to NFPA 54 changing the gas purging provisions. A subsequent vote was taken, the Technical Committee charged with overseeing NFPA 54, which failed to meet the necessary two-thirds affirmative vote needed for permanent inclusion in the codes. While these failed provisions were a slight improvement on the previous code language, these changes would have done nothing to address the scoping exemptions for electric utility power plants, nor would they have dealt with the dangerous gas blow operations. While the International Code Council has vowed to update it's 2012 edition of the International Fuel Gas Code, it's unclear what those changes may be.

At the heart of insuring a safe work environment and public safety in terms of gas

purging, and gas blow operations is actually code enforcement, the enforcement of NFPA 54, International Fuel Gas Code, often lies with local government, plumbing inspectors, and in some cases state inspectors. However, these inspectors do not, typically, inspect the gas pipe discharge areas prior to purging or gas blow operations, nor do they witness the actual operation itself. The codes do not require that inspection of gas purging operations or gas blows be performed, and I also do not believe that the Occupational Safety and Health Administration has had a policy of inspecting gas purging or gas blow operations at the time of the Kleen Energy explosion.

I've reviewed the recommendations from the Chemical Safety Board, and I am in total, complete agreement with your Urgent Recommendations. I would also suggest the following additional recommendations. Issue the same set of recommendations that have been issued to the NFPA, to the International Code Council.

While the ICC is a participant in NFPA 54 Code development process, the ICC publishes the nearly identical International Fuel Code, and should be presented with the same set of Urgent Recommendations.

In addition, I suggest that the CSB recommend NFPA 54 and International Fuel Gas Code require that medium and large-scale installations receive a permit for purging, gas purging operations. Given the danger involved, I also recommend this requirement also be placed in NFPA 1, the NFPA's Fire Code, as well as the International Fire Code from the ICC. Gas purging operations in medium and large-scale installations should not only receive a site inspection approval of a plumbing inspector, but also should receive the concurrent approval of the local Fire Marshal.

Number two, issue the same set of recommendations that have been made to the NFPA and to the ICC to OSHA, as well. Unfortunately, I have little confidence that the NFPA or the ICC

will in the near term future will actually make any changes that the CSB has recommended. OSHA will have to take the lead to address all these issues that you have identified.

Number three, recommend to OSHA that a permit system for conducting gas purging operations in medium and large-scale commercial industrial occupancies be created. Regulations similar to OSHA's Confined Space Lockout Tagout, requirements should be developed to insure proper gas purging operations in these medium and large-scale facilities. A permit will insure that the site of the purging operation will have been inspected for proper equipment installation, the necessary monitoring equipment is in place, and verify the safe dispersal area has been established prior to conducting the operation.

In closing, I wish to thank the U.S. Chemical Safety Board for allowing me to testify on this very important issue. I look forward to any questions you may have after the rest of the panelists have completed their presentations.

Thank you.

CHAIR MOURE-ERASO: Thank you very much, Mr. Corbett. Our next panelist is Mr. Michael Rosario.

Mr. Rosario is a Representative of Local 777 of the Plumbers and Pipefitter Unions AFL-CIO, and serves as the Business Agent for Harford and Tolland counties. Mr. Rosario, please proceed with your statement.

MR. ROSARIO: Good evening, everyone. My name is Michael Rosario. I'm Business Rep for Plumbers and Pipefitters, Local 777, and representing the Hartford New Britain Building Trades Council representing 15 trade unions within the jurisdiction of the Kleen Energy Plant. Our thoughts and prayers go out to the families, our continuing support. We will never forget what happened on that tragic day. On February 7th, four pipefitters were killed in this tragic set of events. Most of them were my friends. All four I talked to on a weekly basis, some of them I've known for over 20 years.

The unions, we are the most efficient skilled safest workforce in the construction industry. When one of our members goes to work and they don't come home, it affects all of us. And I take this personal, because of my commitment to the people that I represent, and my friends that were up on that job site that day.

This is our first statement that we've made since the tragic set of events on February 7th. We've kind of sat back and made really no statement, so tonight this will just be a real brief statement from us.

We have reviewed all the information that the Chemical Safety Board has provided us, and we are in full support of all recommendations that were set forth in front of us.

Every since the event happened, we never knew who CSB was. I got a call from Don Holmstrom the day after the event, and I was a little leery about talking to him. And we had a brief conversation. He was having a hard time getting up on site. Myself and Ed Riley, the

Business Manager of the Iron Workers, and the President of Hartford and New Britain Building Trades Council, were up on site, and Don finally had access to the site, and we met him face-to-face.

And, like I said, we were a little leery in the beginning, but once I met Don, and he looked me in the eye, and he looked Eddie in the eye, and we shook hands, and we sat down and talked, the feeling was right. And we invited them into our house, we opened up our training center in Meriden, Connecticut, Murdock Avenue, and we proceeded with many, many hours, countless hours of interviews down at our training center with the Chemical Safety Board of all the members that were up on site on that day. And we also conducted all the OSHA investigation interviews at our training center. So, we opened up our door and we welcomed CSB to our house. And we just appreciate the thorough investigation that everyone has provided for us, all the information that we got. And we really appreciate this.

We can't allow this to happen again. I will take whatever it takes, and I'm asking everybody behind me that's a resident of Connecticut, that you help us and follow us up to the Capitol to make sure that this doesn't happen again. We have a chance right here, right now to make a difference. If we rely on OSHA, and NFPA to change the regulations, it could take five to ten years. We have a chance to follow us up to the Capitol and talk to all our representatives in our area, and get this passed through, and make it a law here. We could be the star of the United States in changing this.

I wouldn't be able to sleep, myself, if I didn't come here tonight. I needed to come here, because those people were my friends. Not only am I there representative, but they were my friends. And we can't allow their names just to fade away. The longer we wait and time goes by, everyone will forget. We will never forget. The trade unions are here, we built America, we'll continue to build America. And I'm asking

everybody in this room to follow us, because the trade unions, we will be up at the Capitol pushing legislation, and making sure that all these recommendations that will be forwarded to Jody Rell are enacted and put into law. Thank you.

CHAIR MOURE-ERASO: Thank you, Mr. Rosario. I would like to also make a comment, that the welcoming that your organization have provided to CSB has really facilitated the conduction of a good investigation here. And the same wishes, and feelings of welcoming that you have for us, we in CSB have for you and your organization.

The next panel member is Mr. Steven Schrag, who serves as the Co-Chair of the Connecticut Council on Occupational Safety and Health, ConnectiCOSH. ConnectiCOSH is a non-profit statewide organization which help unions, individuals, and communities with healthier and safer working and living conditions. Mr. Schrag, you may begin your statement.

MR. SCHRAG: Thank you. Good evening. My name is Steve Schrag, and I'm a Co-Chair of the Connecticut Council on Occupational Safety and Health. Like others, we want to extend our condolences to the families and friends of those who were killed, to know that we will keep them in our prayers. And I want to thank the CSB for the opportunity to speak tonight.

The Kleen Energy Gas Plant explosion raises many issues of concern to us. It's part of the daily toll of 16 workers who do not come to their families due to death on the job. This is unacceptable. We appreciate the role that the Chemical Safety Board plays in conducting root cause investigations of chemical accidents at fixed industrial facilities. The CSB root cause analysis will yield valuable information that can lead to the prevention of this unnecessary tragedy from occurring again.

After reviewing the preliminary analysis of the Middletown explosion, there are a couple of points that strike us as important.

The first point is that there was no safety meeting held on the day of the incident to specifically discuss the hazards of natural gas blows. Ongoing training and communication with workers is crucial to insuring that proper procedures are followed.

There is always pressure to increase worker productivity, and the only way that worker safety is part of the calculation is when workers are regularly informed by supervisors about the safe way to do the job. This sends a signal that the supervisor's is expecting them to do the job safe, not just quick.

The second point that concerns us was that inconsistent instructions were issued with some contractors continuing to work inside the generation building during the natural gas blow. If all of the workers involved with those activities had been properly notified that a gas blow was being conducted, they would have been evacuated, and the activity discontinued. It is crucial that there be a line of authority

regarding what activities should happen during potentially dangerous operations. Clear procedures issued by those with authority lead to safer work places.

I coordinate the SCIU Eastern Region HAZMAT program, and work to establish training and education in work places. Training is essential to help workers understand the seriousness of the hazard that they face. However, it is not possible to reduce their exposure to health and safety risk through training alone.

Years ago, I worked with one of our bargaining units who represented highway workers. They used air guns to blow out brake linings during brake jobs on trucks. This created airborne asbestos, which put everyone in the garage at risk. We were told that they had done this job this way for 25 years, and would not change their operations easily. We conducted workshops, we brought info to their attention about the damage to their health, but we also

described the tool that could help protect them while doing their work. We were successful in convincing management to buy these tools, and after their introduction to the workplace, supervisors and front line workers self-policed to make sure everyone used it properly. The information helped, but alone it was not enough. Proper tools and clear procedures were just as important.

Given that there have been several other similar gas explosions since 1997, one solution to this hazardous operation is to establish a federal regulation requiring a system of safety-type standard. This could be modeled on the process safety management regulation.

ConnectiCOSH has worked for requirements that encourage use of safer cleaning chemicals, and substitution of safer chemicals and other work process, and we advocate that a requirement that employers look for and use safer technologies, and materials as another means of reducing gas blow dangers. However, whatever

regulatory changes that are made will not be as useful unless there is accountability to comply with them. There needs to be a mechanism to insure that the corporate officials at the highest levels make health and safety a priority.

Currently, the federal law Sarbanes-Oxley, requires that CEOs take personal responsibility for all accounting and audit documents. A workplace environmental version could require the CEOs to sign-off and take personal responsibility for adequate safety and health programs.

Another proposal is to require hazard monitoring be conducted by an independent industrial hygienist, or safety personnel on site, like a fire marshal, or other non-employee of the responsible corporation in order to reduce potential conflict of interest problems.

And, finally, for those corporations who have a track record of non-compliance with health and safety regulations, eligibility for tax breaks, contracts, or other public resources

should be prohibited. We should not reward bad behavior with public money. We need a corporate ethics regulation.

Unfortunately, history shows that workers do not get protections from hazards until there are deaths, the Triangle Shirtwaist Factory fire, Gauley Bridge silica exposure, and Farmington, West Virginia mine collapse. We intend to make sure that these workers that died in Middletown did not die in vain, and we will organize until serious and substantial change to protect workers from these hazards on the job is enacted. Thank you for your time and consideration.

CHAIR MOURE-ERASO: Thank you, Mr. Schrag. I would like now to ask if there are any questions from Members of the Board, or the investigative team of Panel Two.

MEMBER BRESLAND: A question for Representative Lesser. Just quickly, what is the status of the recommendations that were made by the Governor's Panel as a result of the accident?

REP. LESSER: My understanding, there are two panels. There is the Nieves Commission, and then there is the Thomas Commission. The Nieves Commission has released the findings - released its findings recently. The Thomas Commission is now making recommendations now for action based on the Nieves Commission's investigations into what caused the disaster. Now, we're waiting word on what the Thomas Commission recommends, and what actions to take to make sure that that never happens again. On the Energy and Technology Committee, we will review the findings of both panels, and look at them very closely, as we look at a legislative action to take.

MEMBER BRESLAND: One of the recommendations we're making to the State of Connecticut is that they enact legislation to prohibit the use of flammable gas to clean fuel piping. What's the likelihood of that passing in the State?

REP. LESSER: Well, I'm no soothsayer,

but it was in our legislation, the Senate Bill 462, this past legislative session. I think there's strong support for that on the Committee, and the House, and the Senate, in general.

MEMBER BRESLAND: Okay. Thank you.

CHAIR MOURE-ERASO: I would like to make some comments before releasing Panel Two. I, especially, would like to thank Professor Glenn Corbett for his statement, and his work in this field. I know that he's second time in the day that he goes through this process. He presented testimony this morning in the House of Representatives here, and we appreciate you coming here, and also talking to us this afternoon.

Also, I would like to observe that Mr. Lesser, and Mr. Rosario, and Mr. Schrag are representatives of the community of Middletown, and the people of Connecticut. And we are very glad that to have the community come and talk to us, and participate in these proceedings.

Our next statement, or next part is

public comments. And we have a list with a few persons that are going to be presenting comments. We would like to -- the person that comes to present comes to the microphone to give us their name and their affiliation, and we very much request that you limit your comments for three minutes. You should do this in consideration to your other fellow persons commenting that also have three minutes.

The first person to present comments is going to be comments from the O&G Industry, Incorporated to the Chemical Safety Board that were submitted to us through the mail. And I have asked Chris Warner, our Chief Counsel, to read those comments. So, Mr. Warner, please.

MR. WARNER: Thank you, Mr. Chairman. I will read O&G comments that have been submitted to the Board.

"We would like to thank the Chemical Safety Board for the professionalism and sensitivity it demonstrated during its investigation of the tragedy that occurred at the

Kleen Energy site on February 7, 2010. O&G welcomed the CSB's arrival to the Kleen Energy site in February, as it did OSHA, the Middletown Fire Marshal's office, Middletown Fire and Police Departments, and the Connecticut Department of Public Safety. O&G fully cooperated with all of these investigative agencies, so that industry procedures and standards could hopefully be developed to avoid a devastating event of this type from ever occurring again. We ask everyone to again join us in remembering those that lost their lives, or were injured. These individuals and their families, friends, and coworkers remain in our thoughts and prayers.

O&G utilizes contractors that employ current industry standards in their specialized work. However, when those standards can be improved, they should be. And companies like O&G, who seek to stay at the forefront of industry safety, should immediately and enthusiastically require their subcontractors to adopt those improvements that may make a job

safer.

The recommendations raised for consideration by the Board today include utilizing substances other than natural gas for the cleaning of fuel gas piping. O&G supports this recommendation, and its subcontractors will not be utilizing natural gas to clean the fuel gas piping when that stage of construction is reached during the rebuilding of the Kleen Energy plant.

O&G is currently exploring appropriate alternatives and is most appreciative to Dan Tillema of CSB's investigative team for his assistance in this regard. O&G also supports the formulation and adoption of regulations and standards to specifically govern the construction activities of this type that will have the desired effect of a deep and long-lasting positive impact on overall job site safety.

We are proud to support the recommendations made by Don Holmstrom's investigative team who devoted a tremendous

amount of time and energy to thoroughly examine the events of February 7th, and we express our sincere hope that they are adopted by the Board. However, whether adopted or not, O&G will, itself, implement these recommendations to the fullest extent possible. O&G will continue to work with the Chemical Safety Board, and other federal and state agencies, as well as union workers, contractors, and other industry specialists to improve construction practices with a goal of creating safer work sites." End of the statement.

CHAIR MOURE-ERASO: Thank you. I have on my list here of people that have put for comment, Mr. Evan Yates for the United Food and Commercial Workers. I see him approaching to the microphone.

MR. YATES: Good evening. I'd like to thank the CSB for allowing me this opportunity to comment, and I'd like to offer the thoughts and prayers of our 1.3 million members to the families affected by this disaster, especially

the thoughts and prayers of our members who know all too well how you're feeling tonight. And I'm saddened to say this is the third time I've attended a hearing of the Chemical Safety Board, although it is -- I thank you for holding these public hearings.

The tragic explosion of the Kleen Energy plant that devastated Middletown and ended lives and livelihoods was not an isolated incident. In fact, it is part of a continuing pattern of horrific natural gas explosions that we at the United Food and Commercial Workers unfortunately know all too well.

A year ago this month, on June 9th, 2009, members of the UFCW were at work at the ConAgra Foods Plant in Garner, North Carolina, when an explosion tore through their plant killing four workers, injuring more than 70 others, and causing the eventual closure of the plant that was the heart of the community. The culprit was natural gas being purged from a pipe as part of the installation of an industrial

water heater in the center of the plant.

In the aftermath of the explosion, our union worked with our employers to protect our members. The UFCW sought both an explanation of this dangerous procedure, and insurance that the horror of this explosion would never happen again. But what we found shocked us, and compelled us to take action to protect all workers. From Wyoming to Michigan, and Missouri, similar conflagrations caused by natural gas have repeatedly taken lives and destroyed communities. This virtually unregulated world in which natural gas equipment is used in installs is killing America's workers.

The members of this Board and their investigators know this. After the Garner explosion, they recommended that the National Fire Protection Association take action to change the safety and building codes to prevent future incidents like this one. The UFCW visited the NFPA's committee hearings, and lobbied its members to make America's working environment

safer, but the NFPA co-opted by the natural gas and propane industries refused to act.

The word of the explosion here in Connecticut doubled our resolve to fix this lack of oversight and regulation. So, that's why the UFCW is here today, to state unequivocally that voluntary regulatory agencies like the NFPA are a failure. To prevent future disasters like the ones our members have been a part of, there must be a new Occupational Safety and Health Administration regulation or national legislative action to protect our workers, and our communities.

We urge this Board to join us in recommending these solutions to our natural gas safety crises rather than those dependent on industry-controlled groups, like the NFPA.

CHAIR MOURE-ERASO: Thank you very much, Mr. Yates. The next person that we have on our list is Mr. Mike Morans from the Siemens Corporation.

MR. MORANS: Thank you. My name is

Mike Morans, and I'm here tonight on behalf of Siemens Energy, Inc., and would like to thank the Chemical Safety Board for its efforts to improve workplace safety, and for the opportunity to add these brief comments to the record of the investigation. I would like to begin by extending condolences to the families of those who were lost, as well as those who were injured in this tragic accident.

Siemens shares the Chemical Safety Board's goal to prevent accidents like this from happening in the future, and supports the efforts of the Board to analyze this incident with the ultimate goal of making recommendations that would do just that. Siemens agrees with the Chemical Safety Board's findings that the contractors who clean our plant gas lines can successfully use many other methods besides natural gas, cleaning methods to assure that the fuel supply systems for the gas turbines are clean, and free of contamination.

While Siemens does not design,

install, or maintain power plant gas pipelines that carry fuel to its gas turbines, Siemens is committed to promoting safe work practices, and, therefore, will make it clear to power plant owners and operators that authorities have warned against the use of fuel gas as a cleaning substance for pipelines. Siemens has never required, nor does not give any recommendations for the use of fuel gas as a cleaning substance.

Siemens advocates the development of national codes and standards as the best way to broadly and consistently define, and enforce safe work practices concerning fuel gas pipeline cleaning at power plants, as well as at other industrial and chemical operations.

As it relates to the recommendation to expressly state an upper limit to the cleaning force ratio, or cleanliness specification for fuel gas pipe cleaning, Siemens does not believe that this is necessary, since economic, practical, and safety considerations all dictate that the fuel gas pipe cleanliness be achieved by

achieving a cleaning force ratio or cleanliness specification that is as close to the turbine manufacturer's minimum as possible. Significantly exceeding the cleaning specification is inefficient, and needlessly expensive.

With this clarification, for the record, Siemens concludes by again thanking the Chemical Safety Board for its efforts to use the tools at its disposal to try and avoid another tragedy like the explosion at the Kleen Energy site.

Siemens has people working in power plants like Kleen every day of the year, and we have a strong commitment to promoting safety. That's why we support national codes and standards clearly defining the methods, procedures associated with safe cleaning of fuel gas systems.

While gas turbine manufacturers can certainly encourage and endorse the use of alternate methods, we don't believe that we are

in a position to enforce their use. That is best achieved through national codes and standards. We pledge to support the recommendations of the Chemical Safety Board, and are committed to actively participate with the NFPA, National Fire Protection Association, and the ASME, American Society of Mechanical Engineers, and other interested parties in establishing national codes and standards for fuel gas pipe cleaning to help insure worker safety.

Thank you, again, for the opportunity to comment briefly for the record of the investigation.

CHAIR MOURE-ERASO: Thank you very much, Mr. Morans. The next person that is on the list here is Mr. Larry Whitmore, who is a resident of Portland, Connecticut. Is he still in the -- okay. Thank you.

MR. WHITMORE: Yes, thank you. I just wanted to make some comments about the transition that's going to take place now from the natural gas purging to the non-natural gas purging.

I think it's very important right now to, as the Board make recommendations for flaring, minimum height for the pipe, exhaust to make the purging of these ongoing plants safe, okay. The next -- as you transition to a non-flammable gas, I think the person who suggested the sectional cleaning of the pipe as it's being installed to preclude the use of this high-volume gas. There's a lot of different ways to produce high-volume gas that can be used for this cleaning. One is a burst generator commonly used for different industrial purposes, and also a small jet engine type gas generator.

So, I just wanted to say that a five-year span for OSHA to come up with regulations is totally unacceptable, and for the future safety of our country, we have to do something immediately. Thank you.

CHAIR MOURE-ERASO: Thank you very much, Mr. Whitmore. The next person that we have on the list is Representative James O'Rourke, the Deputy Speaker of the House in Connecticut. Mr.

O'Rourke.

REP. O'ROURKE: Good evening. I want to thank the Chemical Safety Board. I represent all the people here in Portland, Connecticut, some of my constituents in the neighborhood right near here, whose homes, luckily not their personal safety, no one was hurt there, but they were most closely impacted by the explosion being straight across the river from there.

Throughout -- ever since this happened on Super Bowl Sunday, your Board has been the one governmental agency that I've been able to see that's been proactive, informative, and very diligent in communicating with our state government and local officials, and with the public, and even to the point where before this ever happened, you folks have called for an end to gas purging. I was surprised to see that, not having ever hard of an explosion of this type.

I think it's a sad commentary that over the last 30 years too many of our governmental agencies, our regulatory agencies

have become really toothless captives of what they call stakeholder groups. And that's a euphemism for the lawyers and lobbyists that represent wealthy trade organizations of the industries who have a vested financial interest in preventing regulation and safety precautions, the kinds of which your Board, and labor unions, and other advocates have called for over the years.

I was at the hearing this morning. I was appalled, really, to listen to folks talk about how it would take OSHA five years to institute the kinds of regulations and adopt them that you called for even before this explosion happened. How many people need to be killed? How many people -- how much damage to property, how much damage to human life has to happen before these agencies take action?

And for that reason, Representative Lesser did an excellent job explaining. I'm a member like him of the Energy and Technology Committee at the legislature. Tomorrow, I'll be

writing a letter to the Speaker, and meeting with him, and communicating with also our President pro tem in the State Senate and our Governor to call for, at a minimum, at the earliest convenience a special session to outlaw the practice of gas purging at Connecticut gas plant around the state, and if this happens at any other facilities, as well. There's really no excuse for us to wait any longer. I was glad to hear the letter that you read from the construction company that was building across the river, rebuilding that plant, that they intend to abide by your recommendations in this regard. I expect that they're not doing gas purging any more there. I hope that I'm right.

I also would like to see them address the legitimate damage claims from my constituents here in Portland, whose homes were damaged. That seems to not be taking place right now. I know that's probably not under your purview. But, again, I want to thank you for your work, and this meant a lot to us. It's been very helpful

to us, and I especially want to acknowledge Mr. - I keep thinking Homestead, but that's not it.

CHAIR MOURE-ERASO: Holmstrom.

REP. O'ROURKE: Holmstrom. I'm sorry. Mr. Holmstrom. I should remember that, because he has done an outstanding job right from the beginning. He attended our Energy Committee hearings at the State Capitol. He's been right there with the media in the state giving us and the people of the state really some great information, and knowledge, and leading us in the right direction. And I really want to commend him and the staff, and you folks, as well, to keep up the good work and the fight to protect people lives and property. Thank you very much.

CHAIR MOURE-ERASO: Thank you very much, Mr. O'Rourke. The next person that we have is Mr. Leslie McFadden. Is he present in the room? I'm sorry, Ms.

MS. McFADDEN: Thank you. This is my first time attending a forum like this, so I'm not sure whether any exchange is acceptable, or

not. I am an attorney in Middletown, and I represent one of the people who was injured in the blast. And I was just recently retained, so I'm trying to gain all the information I can to represent him well. And it seems that there is at least a wave of people who believe that the gas blowing technique should be displaced by other safer methods. Are the safer methods, or the technology to use the safer methods more expensive than the natural gas blows?

MR. WARNER: Excuse me, ma'am. Let me direct -- this is just a comment period. It's not a question and answer period.

MS. McFADDEN: Okay. Well, I'm sure I'll dig into that answer. Thank you.

CHAIR MOURE-ERASO: Thank you very much. Appreciate your comments. The last person I have here on my list is Mr. Earl Roberts. He is a resident from the Town of Middletown. Mr. Roberts.

MR. ROBERTS: Good evening. Thank you very much. Bear with me, I have copious notes,

but I believe they're all very relevant.

A little bit of background about myself. I attended the meeting this morning, and have garnished some great information. I was an elected official in the City of Middletown when this application became -- as a permit process in 2002. I have very good background in it. I served two terms on a Fire Commission, South Fire District, which this plant falls within that jurisdiction, and was a member at the time of the explosion. I'm an intervener in deciding Council applications for this process, and I am also a resident who lives within 1,800 feet when this plant went off. And I can tell you from my left ear with my Navy experience, it was horrendous. And my sympathies go to those people who suffered much more. And I think we all have to be cognizant, and I'm sure you all are tonight and hereafter.

Some quick points. In listening to the comments about the gas blows, in the life histories of these plants, are there other

opportunities for those gas blows, meaning retrofitting engines and turbines, do they have to revisit that? I think that's an important aspect in anything, because, indeed, regulation - we need to have standards. Being a former Navy veteran, submarines, nuclear power plants, we standardize like France does. We've come to common denominators. I think this industry has to refocus, in part. I'm a capitalist, but I think we need to focus on certain issues to standardize, clearly.

The issue of the morning of this blast, I called 911. As being a commissioner, I called the chief on his cell phone. I was concerned quickly, because we had heard on the news that there were deaths. And I asked him about did our fire marshal have any part in this inspection? I was informed quickly that there is no rules that required it. I think that is very unfortunate, very unfortunate, in any capacity such as this.

I was notified for several -- for over

probably 12 months of blasting on this site. And because of the laws in Connecticut, I was noticed constantly, every day of these blasts. But here you're purging such horrendous volatile chemicals or fuel, and there's no law. It's just a very tragic situation.

And the changing of technology with these plants going back to the purging, this particular plant, I recall the application was 530 megawatts. I think now, the Siemens individual could allude, it's either 619 or 620. I missed the number, but that's a major change, major. And I think it has to be relevant to site location, the size of piping, all the relevant hardware, and so forth, falls into this purging, I must believe. And when it's not taken by recommendation of Siemens of the number five pounds, I'm not a chemist or an engineer, so I can't -- but in recalling what was said here, that was way out of scope. Whether it's relevant or not, I can't make comment, and I won't, but I think the standardization point still comes to

the forefront.

And then the last part I want to make a point of is the siting of 125 more plants. I read in the Wall Street Journal recently expert testimony that there's over a trillion cubic feet of gas available in the North America continent. It's not going to go away, so, therefore, your work is going to be much more pertinent, no matter what commission, what President we serve under down the road, these commissions will have to deal with that, and rightfully so. We need fuel. That's why we're here tonight, and that we're here tonight because of that, and we're generating power.

So, with that, I personally encourage alternative fuels, nuclear power, or whatever you as individuals, or collectively, can do better on standardization, and cutting that umbilical cord to fossil fuels, I think we'll be better off. Thank you very much.

CHAIR MOURE-ERASO: Thank you, Mr. Roberts. I will invite now any other audience

members to move to the microphone and say any statement that they have. Please provide your name and your affiliation, if you have any. I will request very dearly, this has been a very long proceeding, that you limit yourself to three minutes, please.

MR. TUCKER: Thank you. My name is Walt Tucker. I'm the President of Nutmeg Chapter of American Society of Safety Engineers and a Certified Safety Professional, although I don't speak for the ASSE here today.

The question was asked earlier, were there any safety personnel on the job site, and if so, where were they? Well, the answer is, yes, there were, and he died in the explosion. It was my friend, Chris Walters, who's had 20 years of experience building power plants as a Safety Director. And he's done this without any guidelines, without any standards to go by. So, consequently, his only resource is his power of persuasion. So, whatever you people can do to get some standards enforced, to give my brothers

and sisters in the American Society of Safety Engineers the juice that they need to make their employers do the right thing, so much the better. I think you all have done a wonderful job in your investigation, and I certainly support all of the recommendations that are on the table. Thank you.

CHAIR MOURE-ERASO: Thank you very much. We really appreciate your statement. Is there anybody else, please? Please state your name, and limit yourself to three minutes, please.

MR. PUSKAR: My name is John Puskar. I'm with a company called Combustion Safety out of Cleveland, Ohio. My condolences to the folks that lost their lives and were injured.

A year ago today, I was at the ConAgra Garner site, so I understand the situations well. It's clear to me from what was said, Don, I believe you said that there were people who smelled the odor and left the site on their own. Yet, I believe that probably more than half of the power plants in the U.S., combined cycle

plants like this, use natural gas that's not odorized. I wonder if people realize that. I would hope that someone could address the odorization issue. I don't think there's a requirement for it. I think they're exempted from it. I would hope that the State of Connecticut considers that, as well. I think it's a good safety move, in general. Thank you.

CHAIR MOURE-ERASO: Thank you very much, appreciate your statement. Are there any other statements from the audience? Please, state your name, and please.

MS. BEAMER: Hi, my name is Carolyn Beamer. I'm a member of Local 777. I was there the day of the explosion. I have 29 years in the industry, and the one thing -- the elephant in the room, it seems to me, and on every job is money. It's always money. Whatever corners can be cut to make the job go faster, they will be. And there seems to be another -- what the gentleman just said before about safety. The safety on our jobs, normally the safety inspector

or the safety officer is an employer of the contractor, so he doesn't have any teeth. His job is tied to it. He does the best he can. We need these type of regulations to give him some teeth. It's so important.

My friends died. They were my dear friends. I was -- by the grace of God, I didn't die. We need regulations. We need standards, because on every job site, if there's a way around a standard or a regulation, it'll be found. If it cuts costs, that's the way it's going to happen. We need regulations. Thank you.

CHAIR MOURE-ERASO: Thank you very much, appreciate your statement. Any other persons in the audience that would like to talk in the microphone? Thank you very much.

Well, I appreciate your staying this far. It's been a very long meeting, and we are at the verge of finishing here. We would like to ask if anybody from the Board here has any comments. And, if not, we would like to proceed

to the vote of the recommendations. So, one comment.

MEMBER WRIGHT: Thank you, Mr. Chairman. I wish I shared everybody's belief that an OSHA regulation would prevent this, and that it would take effect immediately. But, unfortunately, it's been my experience that we have over - and I forgot the number now - between 20 and 21 open recommendations to OSHA that they haven't fully responded to yet. And that's over the course of my tenure of four years on the Board.

That being said, I would just simply like to say that I understand the extingent circumstances that we're facing with respect to doing the Deep Water Horizon investigation, and I'm disappointed that we have decided to forego a formal written report, and to conclude both this case and the ConAgra case at this public hearing. And, I guess, my realization is that the transcript from this hearing will, in fact, represent the report.

My preference would be to see a formal written report with analysis of the lessons learned, and I believe that others would have benefit from that. That's not to say that we won't get the word out, because Dr. Horowitz is very good about producing animations that tell a story far better than one could realize by reading a long lengthy report. However, I think our reputation may be tarnished somewhat by not following through with a written report. Again, I understand the extingent circumstances that we're under.

With that being said, I would request that the ConAgra transcripts from the meeting that we had there be included in the transcript from this meeting, so that all the issues we discussed there will be finalized in this particular report, if you will.

I firmly believe what Carolyn Merit, one of our former Chairpersons had to say, and that is "No worker should have to go to work and not have the expectation of coming home every

day." And I firmly believe that. However, I am also leery of being too prescriptive in the language that we make with respect to our recommendations.

I would dearly love to see changes, I would dearly love to see standards, but as the staff and my peers are aware, I think we should do our job, and that is identifying the gaps that exist in the coverage, and let the experts develop that. For example, when we recommended to OSHA to develop a combustible dust standard, we didn't tell them to prohibit anything, or to include anything. We said hey, you have a big gap here, and we have a lot of injuries, and a lot of deaths associated with combustible dust. Please make a combustible dust standard to address those hazards. So, I have a philosophical difference on how we make an approach to these recommendations. And I will stand by what I said in ConAgra, and I will stand by that tonight, although, I think there are some excellent recommendations, I think several of

them are too prescriptive. Thank you, Mr. Chairman.

CHAIR MOURE-ERASO: Thank you. Any other comments from the Board? So, I guess we'll proceed with the Board vote on the Urgent Recommendations as presented here.

Yes. The first thing is that I would like to ask that we have a motion from the Board to proceed with the recommendations.

MEMBER WARK: Mr. Chairman, I have a motion. Pursuant to the authority under 42 USC Subsection 741-2R6E(i) and (ii), and in the interest of preventing the serious harm that could result if the hazards underlying a natural gas explosion and fire at the Kleen Energy Power Plant are not promptly rectified, I move to approve the Urgent Safety Recommendations to U.S. Occupational Safety and Health Administration, the National Fire Protection Association, the American Gas Association, and the Chair of the NFPA 54 ANSI Z-223.1 Committee, the American Society of Mechanical Engineers, major gas

turbine manufacturers, General Electric, Solar, Siemens, Pratt & Whitney, and Mitsubishi heavy industry, and Rolls Royce, the Governor and Legislature of the State of Connecticut, and the Electric Power Research Institute, " as more fully set forth by the staff report on the Kleen Energy Power Plant Urgent Recommendations, which is attached and made a part of this motion.

CHAIR MOURE-ERASO: The motion has been read. Is there any second from the members of the Board?

MEMBER GRIFFON: I'll second the motion.

CHAIR MOURE-ERASO: Mark Griffon, Member of the Board seconds the motion. So, I'll open the floor for discussions of the Members of the Board on the motion. Not hearing any discussion, I think we proceed to the vote. Board Member Bresland.

MEMBER BRESLAND: I vote yes.

CHAIR MOURE-ERASO: Approve. Board Member Wright.

MEMBER WRIGHT: Thank you, Mr. Chairman. For the reasons cited this evening, as well as during the ConAgra public hearing, I vote no.

CHAIR MOURE-ERASO: Disapprove. Board Member Wark.

MEMBER WARK: I vote yes, Mr. Chairman.

CHAIR MOURE-ERASO: Approve. Board Member Griffon.

MEMBER GRIFFON: I vote yes in strong support for the motion.

CHAIR MOURE-ERASO: And Board Member Moure, that's me. I vote approve. So, the recommendations pass by a vote of 4-1. Thank you very much.

(Applause.)

CHAIR MOURE-ERASO: As we come to the end of the meeting, I would like to place to everyone here my commitment and the commitment of the whole agency, the Chemical Safety Board, to push for acceptance of these recommendations.

The Chemical Safety Board is more than an investigative agency. We must achieve change to insure safety of the workers, protect the public, and help keep the U.S. energy industry operating safely. That benefits every one of us.

At this time, and in closing, I would like to reiterate, and to mention again a recognition of our Chemical Board Safety colleagues who conducted what I consider an excellent investigation, specifically, Don Holmstrom, the investigator in charge. He's investigator supervisor of the Denver Office of CSB, and the lead investigator of this particular investigation here. Also, Mr. Dan Tillema, who's an investigator that is sitting, accompanied Mr. Holmstrom, and also Ms. Lauren Wilson, who's another investigator that was part of this team.

I would like, also -- excuse me. I would like also to mention that in Denver, and also listening on the phone are two other investigators that cooperated on the production of this investigation, and they are Cheryl

McKenzie, who's an investigator, and Mary Beth Mulcahy, that is another investigator. So, let's recognize their work.

(Applause.)

CHAIR MOURE-ERASO: I also would like to close by thanking, again, Mr. John Bresland sitting here to my side, my predecessor as Chairman and CEO of the Chemical Safety Board for his dedication, his commitment to the mission of the Chemical Safety Board, and his support for the timely completion of this investigation. John, a job very well done. Thank all of you for coming, and to being so patient of going through this very long proceeding, and I declare this meeting adjourned.

(Whereupon, the proceedings went off the record at 9:39 p.m.)