

CSB Public Hearing:  
**Carbide Industries, LLC**  
Electric Arc Furnace Explosion

Louisville, KY

February 7, 2013

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## List of Participants

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**RAFAEL MOURE-ERASO**

CSB Chairperson

**BETH ROSENBERG**

CSB Board Member

**MARK GRIFFON**

CSB Board Member

**DANIEL HOROWITZ**

CSB Managing Director

**JOHNNIE BANKS**

CSB Investigator

**CHRISTINA MORGAN**

CSB Investigator

## 2 Opening Remarks

### 2.1 RAFAEL MOURE-ERASO

Good afternoon. Good afternoon, everyone. My name is Rafael Moure-Eraso. I am the Chairperson of the US Chemical Safety Board of the CSB – or the CSB, I should say. I would like to welcome all to this US Chemical Safety Board public meeting here in Louisville, Kentucky.

I have some opening remarks. But before beginning, for those of you here in this meeting room, we want to inform everyone of the location of safety exits in case of emergency. There are two safety exits in the back that could be safety exits in case of an emergency. So, the door that you entered and the other door that could be used in case of an emergency.

We are here to listen to the final report presentation on the CSB investigation into the accident at Carbide Industries that took the lives of two workers: Jorge Louis Medina and Steven Nichols. I want to express in the name of the Chemical Safety Board our condolences to the family and the friends and coworkers of these men. I would like to ask you here for a moment of silence in respect to the loss of these lives.

Thank you. All too often, in my view, the word “worker” gets dismissed by too many people when they read, hear, or see an accident like the tragedy we are discussing tonight. They may react by thinking, well, they work in a dangerous industry, that getting injured or killed is part of the routine of the job.

Well, our message is that the deaths of workers cannot simply be another cost of doing business. We have come to Louisville tonight to say no way. My colleagues and I on the Board believe workers have the right to a safe workplace.

If you look at all the CSB accident reports over the 15 years that we have been functioning, there are many common threads. One of them is this: so-called small accidents occur regularly over the years and they are not investigated by the company to find out why they are occurring. Time goes on. Then several things come together and one day, there is a catastrophic accident.

Today happens to be the five-year anniversary of a horrible accident that occurred in Georgia at the Imperial Sugar Company. Exactly five years ago today on February 7, huge explosions and big fires brought the entire sugar refinery down and eight workers died in that blast. Six more died of burns in the following weeks and months after the explosion. For years at Imperial Sugar, alarms, near-misses, so-called small fires continued until one day, the big tragedy struck.

To me, that is a big lesson to think about as we discuss today the Carbide accident and commit ourselves to worker safety.

I would like to refer you to your agendas that people picked up at the entrance where we have the order of what is going to be happening today. I would like to hear from the investigation team about their findings and recommendations. It will be the third point on the agenda. And, after the presentation of the findings and recommendations, the Board will have an opportunity to question the staff on issues related to the report. And then we will have a period for public comment. Any one of you present here will have three minutes to make a comment or ask a question.

## Opening Remarks

We have a list that our managing director has of people that have requested to present a comment. If you are not on the list, please go to Dr. Horowitz and put your name in. It is always good to have the list so that we can ask people in order.

We are also asking if any coworkers or family members would like to comment or make any statements. You are welcome to do so. And what I would like to do at this time is I would like to introduce the Board members and the people that are sitting at this table here. I have two board members with me. Beth Rosenberg is the board member to my right here, and Mark Griffon to my left. Also sitting beside me here is the General Counsel of the Chemical Safety Board, Richard Loeb.

At this time, before moving into the report itself, I would like to ask the board members if they would like to make some comments before we start the proceedings. I would like to ask Member Rosenberg if she has something to say.

### **2.2 BETH ROSENBERG**

Thank you, Chairman Moure. I will only take a moment. I am new to the Board. I have been with the Chemical Safety Board less than a month. But I have spent my whole adult life in worker safety and health because I am enraged that people still die while trying to make a living. I am sure I speak for our board members and our investigators when I say that we join you in your grief and your rage and hope that the work of the CSB prevents the incident that happened at Carbide Industries from ever happening again.

### **2.3 RAFAEL MOURE-ERASO**

Thank you, thank you, Board Member Rosenberg. I will ask Mr. Mark Griffon if he has some comments.

### **2.4 MARK GRIFFON**

Thank you, Mr. Chairman. I also want to express my condolences to family and friends of the victims. This is another case of an incident that should have and could have been prevented. And, adding to my concerns on this one is that there were so many warning signs before this and it just did not have to happen. For years, the company had experienced smaller magnitude blows from this furnace, which apparently resulted in minor changes or adjustments and no real major changes to the way they were operating. The blows basically became accepted as the normal, and that is a big concern to me, that is not a normal thing for a process.

In addition to my concerns for the workers' safety, I was here. I deployed with the team a day after the incident and there was quite a bit of concern from the community on the community notification system. And I think that is a major concern that I have. Carbide Industries is situated in a very industrial area, many companies are in this area. And the community needs to, and I think the leaders of the community owe it to the citizens for better communication and better notification and I hope that is improved since the day after this event.

Finally, I am hopeful that the findings and recommendations in our report will go toward preventing this or similar tragedies in the future. Thank you.

## Opening Remarks

### **2.5 RAFAEL MOURE-ERASO**

Thank you, Board Member Griffon. To review what is going to happen during the rest of the meeting, we are going to hear a report from the investigative team and then we are going to hear comments and then we will take a vote, the Board will take a vote to approve or disapprove of the report as presented. At this time to introduce the investigation team, I would like to call on the Managing Director of the Chemical Safety Board, Dr. Daniel Horowitz, who will make the introductions. Dr. Horowitz.

### **3 Introduction of Investigative Team**

#### **3.1 DANIEL HOROWITZ**

Thank you, Mr. Chairman. We have two members of the team here tonight. At my immediate left is Mr. Johnnie Banks. He is our longest continuously serving investigator at the Chemical Safety Board. He has led many important investigations, including the fatal DuPont phosgene release in West Virginia, the fatal dust fires at the Hoeganaes company in Tennessee, an oilfield incident at the Partridge-Raleigh site in Mississippi, and many other cases too numerous to mention. He also participated in the Board's major investigations at the West Pharm, BP Texas City, and Imperial Sugar Refineries. He holds a bachelor's degree from the University of California at Berkeley, worked for a number of years at the Chevron Richmond Refinery in California where he was a head operator and organizer of their Triangle of Prevention Program.

And at my far left is Miss Christina Morgan. She is a Recommendation Specialist with the Chemical Safety Board. She is a graduate of Lafayette College and has a Master's of Public Health from George Washington University and conducted research both there and at NIOSH prior to joining the Board. Among her noteworthy accomplishments as a recommendation specialist was advocacy for a very important National Fire Protection Association standard, NFPA 56, which is being applied at power plants throughout the country and is protecting workers.

Those are the two team members we have. And I will ask Mr. Banks to present the findings from the case. Thank you.



## **4 CSB Investigation Team Introduction**

### **4.1 JOHNNIE BANKS**

Thank you. Mr. Chairman, Board Member Rosenberg, Board Member Griffon, Mr. Loeb, ladies and gentlemen, good evening. We are prepared to present the findings from our investigation of an electric arc furnace explosion that occurred at the Carbide Industries facility in Louisville, Kentucky. This incident occurred on March 21, 2011, and resulted in two worker fatalities and two injuries.

I would like to take this opportunity to provide an overview of the agenda for tonight's proceedings. We will begin with our presentation of investigation findings; we will then entertain questions from the Board. The public will be invited to offer comments and the board members will vote on the team's proposed findings and recommendations. The board will then briefly discuss the other CSB matters requiring a board vote. And, finally, we will have a closing statement from the chair.

Before I start the proceedings, I would like to introduce the investigative team that includes a representative from the Office of Recommendations, Miss Christina Morgan, and myself. There were many other contributors to this product, however, that are not with us here tonight, but I would like to introduce them as well: Mr. Marc Saenz, Lucy Sciallo-Tyler, and Reepa Shroff.

Continuing with the presentation of tonight's agenda, we will move to an overview of the Carbide facility, followed by a brief description of the process and the incident. We will then proceed from there to investigation findings and key learning; and, finally, to propose recommendations developed over the course of our investigation.

## 5 Carbide Industries – Process Description

### 5.1 JOHNNIE BANKS

Carbide Industries is the larger of two North American producers of calcium carbide and supplies calcium carbide primarily to the iron and steel industry. The company employs about 160 workers in operations, maintenance, and administration. The Louisville site operated one 50-megawatt electric arc furnace (EAF) with the capacity to produce about 120 tons of molten calcium carbide per year. The site grinds and packages the solid into multiple grades of calcium carbide for sale. The calcium carbide is also used in the production of acetylene gas.

Here we have an overhead view of the Carbide Industries facility. The furnace building is shown here, occupied about five stories, and also included the control room.

Looking at the process description, premixed coke and lime, also known as calcium oxide, are fed into the electric arc furnace. The EAF provides electricity, which causes the temperature to rise above 4100°F. The coke reacts with the lime to form liquid calcium carbide.

Here is an elevation drawing of the furnace area. As I mentioned earlier, we have a five-story structure where the furnace is shown there. The control room, which occupied the space on the second floor -- and it is key to point out was about 12 feet from the furnace. The transformer room was on the third floor. The feed shoots were on the fourth floor and the feed conveyor belt on the fifth floor. All of the material that was produced in the furnace was drawn off into hoppers and transported out for sale.

The EAF at Carbide Industries was located on the ground floor, as I said, of the five-story furnace building. The furnace was a refractory-lined metal tank with three holes in the sidewall to drain the molten calcium carbide product. These three hole positions were at an elevation on the mezzanine level between the second and ground floors. Due to the height of the furnace, the cover of the furnace was at the second-floor level, the same level as the control room where the furnace operators controlled the chemical and electrical feeds to the furnace. The control room, bottom left, as I mentioned, was about 12 feet from the furnace. It had a window made of dual pane, one-half inch thick wire-reinforced glass. The three electrodes protruded through the furnace cover and the electrodes extended from the fifth floor down to just below the second floor.

Here is a photo of the typical operation of the Carbide furnace prior to the March 2011 incident.

The furnace cover was about four feet tall and made of refractory-lined metal that was water-cooled. The refractory prevented the high temperature materials in the furnace from contacting and melting the metal tank and cover. The furnace was fabricated in several sections and bolted together. Cooling water flowed through the hollow section as additional protection against overheating. This circle that we have there indicates the location of the employees at the time of the incident, relative to the stairways coming into the control room.

In looking at furnace blows, the US Chemical Safety Board investigators interviewed Carbide Industries' personnel regarding the difficulty in operating the process. In addition to incidents of cooling water leaking from the furnace cover into the furnace, workers described instances of excess pressure developing

## Carbide Industries – Process Description

in the furnace. They called these excess pressure incidents “blows” because the excess pressure would blow hot gases and sometimes coke and lime feed material out of the furnace onto the second floor of the building. These blows occurred in the furnace a few times per year. After a furnace blow, the operators would remove the ejected material and restart the furnace.

The effects of water leaks varied from no noticeable impacts to potential effects such as bridging, which ultimately led to blows.

## 6 Carbide Industries – Incident Description

### 6.1 JOHNNIE BANKS

We will now move to the incident description. At about 5:40 pm on Monday, March 21, 2011, the EAF at the Carbide Rubbertown facility violently over-pressured, ejecting solid and powdered debris, hot gases and molten calcium carbide at temperatures near 3800°F. Witnesses reported an initial overpressure event from the furnace, a large explosion, and two to three more overpressure events.

Hot material was ejected from the active tap hole on the mezzanine level. The hot gases and debris blown from the furnace broke through the double-pane reinforced glass window of the control room, severely burning the two workers inside. They died within 24 hours from their injuries.

In this picture here, we have a photograph of the furnace. Somewhere within 12 feet of this perimeter housed the control room.

The cloud and debris from the smoke traveled high enough to obscure the five-story tower structure, which normally would be visible in this picture taken shortly after the incident occurred.

We also looked at the emergency response. Carbide Industries' safety, health and environmental manager and members of the Carbide emergency response team helped evacuate the two workers from the control room, provided oxygen and monitored vital signs. Incident command was established about two minutes after the incident occurred. An assistant fire chief of the Lake Dreamland Fire Department was driving by at the time of the incident and immediately responded.

Because of concerns of product contamination and the unknown conditions of the immediate location of the incident, the incident commander established a staging area about one-half mile upwind from the facility and the command post at the front gate and called ambulances to a staging area. The first ambulance was dispatched at 5:40 pm, with two more dispatched shortly thereafter, and arrived on scene within 15 minutes. Carbide personnel and Lake Dreamland firefighters transported the injured employees to the main gate where they met emergency medical technicians (EMTs).

The fire department decontaminated the injured employees with water, while the Carbide emergency response team and a fire department paramedic provided oxygen and monitored vital signs. One victim went into cardiac arrest and the paramedic began performing CPR on him. About 40 minutes after the initial incident, off-site EMS began transporting victims to the hospital.

In considering the consequences of this tragic incident, these victims arrived at the hospital about 12 minutes later and succumbed to their injuries in less than 24 hours. A third ambulance transported the injured worker who had been knocked down, knocked to the ground, and injured by the blast.

In looking at this incident, the CSB was able to develop several likely scenarios that could have contributed to the cause of the incident. One consideration was the role that fouling played in the insulation of the material on the underside of the furnace from the cooling water. The high temperature of the furnace softens the metal and the metal sags under its own weight. With continued exposure to the

## Carbide Industries – Incident Description

furnace temperatures, the metal sagged and bulged, cracks open, which led to the formation of a leak. And that is best depicted in this photo on the far left.

Another possible cause of leaks was a sudden eruption of hot liquid from the furnace, which the operators call a “boil-up.” Repeated boil-ups of hot material from the furnace can cause a water leak by contacting the underside of the cover, eroding its ceramic lining and eventually melting a hole in the metal furnace cover causing a water leak. This type of failure is shown in the upper picture on the far left that shows a hole of about five inches in this photo. That is the blow-up of those phenomena.

Here again we have the same two photos that depict the crack in the furnace cover due to fouling, and the cooling water leak in the furnace cover with the ceramic worn away there.

These leaks are known to contribute to a phenomena known as *bridging* in the EAF, also called arching, a formation of a hollow cavity occurs under a pile of solids that would otherwise flow downward under the force of gravity. This can occur even in the absence of water. The hollow cavity forms due to the cohesiveness of the particles that prevent flow and can be formed in the presence of water or insufficient mixing of the fine particles in the feed. The temperature required to start the reaction between calcium carbide and calcium oxide can be reached in as little as one minute after the feed arches.

Reaction between calcium carbide and calcium oxide generates gas about two-and-a-half times as fast as normal calcium carbide forming reactions.

One other consideration in this investigation was the notion of normalization of deviance. The tolerance of abnormal effects such as blows led the team to considering the normalization of deviance at the facility. Because of the acceptance of the occurrence of blows, a new norm occurred where a boom in the furnace was considered routine. The Carbide Industries’ facility has operated for over 30 years and had a history of low consequence incidents in the furnace. The CSB interviews with operators indicated that small over-pressure events or blows occurred in the furnace for the past 20 years. In 1991, a large over-pressure incident blew in the windows to the control room. Carbide replaced the window glass with reinforced glass.

The window was damaged in 2004. After the 2004 incident, Carbide replaced the single-pane reinforced glass with double-pane reinforced glass which was blown in by the March 2011 incident and which directly contributed to the fatal thermal injuries.

Despite these previous incidents, Carbide’s response to the previous incident did not sufficiently address the hazards nor prevent the events from escalating. The CSB requested investigation reports for the 1991 and 2004 incidents and engineering analyses for the modifications to the window but Carbide was unable to provide any analysis, meeting summaries or other documentation. Without a proper investigation of the incident, Carbide could not address the root cause to prevent future incidents, nor could the company perform a detailed hazard analysis that could have identified other potential incident scenarios.

By failing to analyze these incidents further, Carbide did not identify and address the potential for even higher consequence incidents. Such an analysis would have likely identified the need to relocate the control room and install video cameras to monitor furnace operations.

We also considered industry codes and standards and discovered that there were only a few codes and standards that provide guides on how to safely operate electric arc furnaces, one of which is offered by the

## Carbide Industries – Incident Description

National Fire Protection Association (NFPA). The National Fire Protection Association is an industry consensus organization that develops and maintains standards and codes directed at fire prevention and response. Various federal state and local authorities have adopted NFPA codes and standards. As with any consensus standard, when a particular standard is not a regulatory requirement, individual companies can adopt the standard as part of their own policies and procedures.

One NFPA standard applicable in this case is NFPA 86. NFPA 86, Standard for Ovens and Furnaces, an industry consensus standard applies to facilities with ovens and furnaces. This standard addresses issues that seek to minimize the exposure of personnel to personal injury. The majority of the standard applies to new or significantly modified construction when the authority having the jurisdiction adopts the standard in the state or local codes such as building codes and fire prevention codes.

The furnace involved in the March 21 incident is considered by definition a Class A furnace because it collects and vents flammable gases in a low oxygen environment that are a byproduct of the chemical reactions that produce calcium carbide. Because NFPA 86 is silent on the coverage of EAFs, operating Class A furnaces, there are no operation requirements specifically directed to Class A EAFs for provisions such as safety devices, interlocks, and safe distances to occupy work areas.

Next, we will take a look at the key findings from this investigation.

There will be an opportunity for public comment at the conclusion of this portion.

## **7 Carbide Industries – Key Findings**

### **7.1 JOHNNIE BANKS**

Due to the investigation of the events at the Carbide Industries' facility, the CSB found that the force of the explosion in the EAF broke the dual-paned wire-reinforced control room, killing two workers. Previous furnace over-pressure events had broken the control room windows because there were no fatalities. Neither the previous owner nor Carbide Industries determined that the control room should be relocated and cameras installed to better protect workers when they remotely monitored the furnace.

Twenty-six work orders were issued for water leak repairs on the furnace cover in the five months preceding the March 2011 incident. The plant continued operating, despite the hazard from the ongoing water leaks.

The previous incident involving blows were normalized because the company did not adequately address them when they occurred. A new furnace cover was built for the EAF but was awaiting refractory lining at the time of the incident. Although Carbide was not required to follow the process safety management standard, had Carbide applied principles of process safety management program, elements of over-pressure events in the furnace may have been eliminated. NFPA 86 did not specify safety requirements for electric arc furnaces operating in Class A furnaces such as the one at Carbide Industries.

Next, we'll move to proposed recommendations and my colleague, Miss Morgan, will take the proceedings from there.

## **8 Carbide Industries – Proposed Recommendations**

### **8.1 CHRISTINA MORGAN**

Thank you, Mr. Banks. I will now read the three recommendations that the team is proposing the Board issue this evening.

#### **8.1.1 Recommendation to NFPA**

The first recommendation is to the National Fire Protection Association and reads as follows:

Establish a committee to evaluate and develop a standard that defines the safety requirements for electric arc furnaces operated with flammable materials and low oxygen atmospheres. At a minimum, establish requirements that electric arc furnaces containing flammables have:

- Adequate safety instrumentation and controls to prevent explosions and over-pressure events;
- Mechanical integrity and inspection programs; and
- A documented siting analysis to ensure that control rooms and other occupied areas are adequately protected.

#### **8.1.2 Recommendations to Carbide Industries**

The second recommendation is to Carbide Industries and reads as follows:

- Modify the design of the electric arc furnace and related structures including the control room to comply with the NFPA standard developed per R1 of this case study.

The third and final recommendation is also to Carbide Industries and reads as follows:

- Implement a mechanical integrity program for the electric arc furnace and cover, including preventive maintenance based on periodic inspections and timely replacement of the furnace cover. At a minimum, the program should include factors such as leak detection and repair and refractory lining wear.

### **8.2 INFORMATION ON CSB RECOMMENDATIONS**

I want to provide a little bit of information about CSB's recommendations. CSB recommendations are a primary tool for effecting widespread and lasting safety improvements. Recipients of CSB's recommendations include local, state, and federal government with the ability to approve laws and regulations and enhance regulatory enforcement activity. Professional organizations, trade associations, and other standards development organizations that can issue voluntary consensus standards, best practice guides, and industry safety alerts; and, lastly, to corporations and facilities that may improve their safety management systems to prevent the recurrence of incidents.



## Carbide Industries – Proposed Recommendations

CSB's recommendations are formulated to directly address the findings of our incident investigations and studies. They typically focus on system or management level improvement to prevent recurrence. I would also like to add that the CSB has an Office of Recommendations which follows-up on each recommendation issued by the Board and monitors their progress. We also keep track of the status of all recommendations at [CSB.GOV/recommendations](https://www.csb.gov/recommendations).

Now I will turn it back over to Chairman Moure-Eraso for the Board question segment.

## 9 Questions & Answers by CSB Board

### 9.1 RAFAEL MOURE-ERASO

Thank you very much. As the agenda reads, first the Board will have an opportunity to ask questions of the investigative team, followed by we will open the floor for questions and comments from the public. Is there any Board member that would like to start with a question? Member Rosenberg.

### 9.2 BETH ROSENBERG

Thank you. Mr. Banks, you mentioned the normalization of deviance where in a workplace, what should not be tolerated eventually becomes tolerated as routine and normal. I was wondering how you would change that, how can you possibly change the culture of a place that tolerates unacceptable things?

### 9.3 JOHNNIE BANKS

Well, from my observations that in those instances where there has been a drift of standard acceptable practice, it starts at the top where the company has to encourage employees to raise their hand when something is amiss and actually make that a part of that work culture. The acceptance of unusual or out-of-the-ordinary actions in the plant occur gradually. They do not just start at once. But if there is not an adverse consequence from that first time that the action is done, it gets reinforced that it is okay to do that. I mentioned this morning at the press conference that I think the most dramatic instance of that was cited in a tragic incident that we are commemorating the 10-year anniversary of, the space shuttle, Columbia, tragedy. Every time that space shuttle lifted, there were foam strikes and this was known and it just became a part of that culture to accept that as being normal. And it was not until after the fact, after the space shuttle deteriorated on reentry to the earth's atmosphere, that there was a huge cry about how tragic it was and how could that happen. And there were engineers that in interviews afterwards that said I wish I had raised my hand because I knew that that could have absolutely catastrophic outcomes.

And, so, the whole discussion of normalization of deviance came about from that and it is applicable in a lot of the cases that we go to where you will hear folks say well, why did you do it that way and they will say because we have always done it that way. And it is not that folks are trying to get by with a fast one; they are doing things to get the wash out, to get the job done. And, in most cases they are doing extraordinary things to say start a process up where there is not a programmatic means to do that and so they have to get creative. If the temperature will not get to the right level to start, they figure out a way to make it happen. And when they do that and nothing bad happens, it reinforces that it is okay to bypass safeguards that are built into the process. And, sometimes they reward it with gift cards or whatever. And then the next time, it gets reinforced again and again and again. And then there is the one time when the stars line up and there is one element that is out of place and the outcome is oftentimes tragic.

### 9.4 MARK GRIFFON

On a similar line of questioning, I was curious. The furnace lid, apparently it was noted that they were getting ready to replace this furnace lid. And I am curious how did the company determine that it needed replacement.

**9.5 JOHNNIE BANKS**

I would imagine that they had realized that with the high number of work orders that were coming in to repair it that there was a need to install a new furnace cover. As we understand, that furnace cover was near completion and was just awaiting some refractory work to be done on it at the time of the incident.

**9.6 MARK GRIFFON**

To follow-up on this, was there any monitoring done to examine the performance degradation prior to the incident by the company; either monitoring to look at how close is this furnace lid to a possible failure or monitoring to indicate that we could have a catastrophic event moments away. Was there any monitoring they were doing?

**9.7 JOHNNIE BANKS**

Not that I am aware of. I think there was an immediate response to the leak and an effort to maintain production to the best of their efforts to respond to the work orders. Come in, patch it, and get things going again. I am not seeing anything to indicate that there was a programmatic preventive maintenance or a mechanical integrity process that was engaged in in the monitoring of these furnace covers.

**9.8 RAFAEL MOURE-ERASO**

I have a question for the team. You mention in the report that the activities and the process itself was not under the OSHA process safety management regulation. My question is do you think it had been under the process safety management regulation it would have made a difference and also if you considered to make recommendations to Kentucky OSHA to include this type of operation under the process safety management.

**9.9 JOHNNIE BANKS**

There are threshold quantities required for inclusion in the PSM, Process Safety Management program. And the facility did not meet that threshold. Had they voluntarily complied with Process Safety Management guidelines, they may have had a mechanical integrity program incident investigation in the process, preventive maintenance process – all those are inclusive in the PSM program. The role of Kentucky OSHA, they issued citations against the facility. They are in the process of mitigated when we went to publication, so that issue has not been resolved to date.

**9.10 MARK GRIFFON**

Just to go back to this monitoring. I know you reference in this report a 1965 paper; and, in it, they seem to suggest some possible monitoring that could almost, for example, the CO levels might drop before such an event, a decrease. And I am just curious if the company over all these years has explored these options. It seems like this sort of event was known about at least in the literature for a long time and I am wondering if they explored any of these options of the idea would be monitoring this flow and automatically have the electrode withdrawal or recess away to avoid the blow.

**9.11 JOHNNIE BANKS**

From everything we have gathered, there was not that type of monitoring but as you stated, the literature that we referred to from 1965 has been around for quite a while. The process itself, there are not a lot of entities that use this process. It is like a niche industry. And the folks that have knowledge of electric arc furnaces – it is not plentiful. In fact, when we issued the recommendation to NFPA, we found that they would have to do a search to find the appropriate parties to even sit on a committee to develop standards that would be appropriate for electric arc furnaces. So, there is not a lot of wealth of knowledge out there that is current and that we are aware of. But in terms of the type of monitoring that you speak to in this paper, we are not aware of that type of monitoring that was in place.

**9.12 MARK GRIFFON**

This might be more to Miss Morgan. A question on the recommendations, slide 28, you talk about the NFPA process and similar to Chairman Moure-Eraso, I am curious whether you considered a recommendation to Kentucky OSHA to adopt the NFPA standard – assuming the committee develops a standard to adopt it into regulation, rather than just have it as a voluntary NFPA standard?

**9.13 JOHNNIE BANKS**

We did not consider that as a recommendation. We felt that in this instance, there was a need for a body that was a consensus standard body that would kind of hold sway over the process that this furnace fell under, that they would have the expertise to bring together the right people to create the type of standards that prior to this. There was a gap between what we observed between the Class A and Class B furnaces and so we addressed that with this recommendation specifically.

**9.14 MARK GRIFFON**

I have one more on another topic that I started in my opening comments on the emergency notification system. I was here the days after the incident and at least at the time, there was quite a bit of concern expressed from the community about the timeliness of the I think it is called the recall system and some confusion on the shelter in place notifications that went out. And I just think especially given the density of the industrial facilities in this area, I think it is important that that is working and I just wonder if we found any problems with that and if we know of any progress since the event in that area.

**9.15 JOHNNIE BANKS**

We were made aware that there were issues related to the notification that went out, both from the perspective of the police services doing some things and then also the actual call process. We became aware that after the fact, there were some modifications that were made to that system that were intended to improve notification. In terms of the investigation of this incident related to the causation of these injuries and fatalities, there was not a connection there and we did not get any indication that there were any injuries that were associated outside of the fence line related to this event. So, for that reason, we stayed strictly to the incident at the Carbide facility but we were aware of that and from what I have gathered in talking to principals that would have knowledge, they have made some changes to the system.

## Questions & Answers by CSB Board

### **9.16 CHAIRMAN MOURE-ERASO**

Thank you. This ends the part of the questions of the Board. Now with the agenda, we enter into public comment. I would like to ask Dr. Daniel Horowitz to basically marshal the public comments. So, please, Dr. Horowitz.

## 10 Comments and Questions by Public

### 10.1 DANIEL HOROWITZ

Thank you, Mr. Chairman. If you would please, those of you who wish to comment, if you have not signed up, that is perfectly fine. You are all welcome to comment. Please hold your comments to three minutes each and keep them on the subject at hand if you would. We have a few folks who have signed up already for comments. First is Councilwoman Attica Scott. Could you please spell your name?

### 10.2 ATTICA SCOTT

It is Attica Scott and I am the Councilwoman for District One in which every single neighborhood that is around the Rubbertown Corridor is located. And I am here as a voice for many of the residents who live in Chickasaw and Park Duval and who live in Alpha Gardens, Lake Dreamland, so on and so forth.

First I want to say that of course I wish this meeting had been held in a location in West Louisville where more residents could have attended, that would have been much more convenient and made a whole lot of sense. And to Miss Rosenberg, thank you so much for respecting the right of residents to be angry. So often we are treated as if we have no right to be angry. Many of us are here to stand for community safety, for worker safety and for environmental justice. And, yes, we need improved communication, no resident, some of who are sitting here today, should have to go door-to-door to notify people about an explosion or drive through Chickasaw Park to notify people about an explosion. That is not okay and it is unacceptable.

My question to you all is what is the community responsibility of Carbide; what accountability do they have to our community besides your recommendations. You are correct that my job as an elected official is to make public health and public safety top priorities and that is why I am here today. Management has a privilege of going home to places that are far from West Louisville. They do not have to wake up and try to go to sleep to the smells that are emitted from the plants in Rubbertown. They do not wake up and go to sleep thinking about their children's safety. Thank you for holding Carbide accountable and for reminding our community that we matter.

### 10.3 BETH ROSENBERG

Has there been improvement in the emergency response system. We wanted to know about that. We were concerned about that.

### 10.4 ATTICA SCOTT

The system still has numerous flaws, especially as it relates to the distance in which people are notified. So, last year, there was an incident that happened and people who lived within a one-mile radius were notified. But there are people who take their children to school, who work in the areas who do not necessarily live in the one-mile radius who had no idea that an incident had occurred, so there are a lot more improvements that need to be made to the system. And what I would appreciate is if other

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governmental entities like you would respect the opinions of residents when they give them and make those changes. Thank you.

### **10.5 DANIEL HOROWITZ**

Thank you. Mr. Nichols, I am sorry I do not have your first name here. Could you say and spell that as well.

### **10.6 GORDON NICHOLS**

The name is Gordon Nichols. I do not really have any questions but I do have a few statements. First we would like to also extend our condolences to the family and friends of the lost workers. Even though they are not a facility represented by my local, they are our brothers in labor and we mourn their loss. USW is a strong supporter of the CSB. We appreciate the difficulty of the work you do and we value the investigations performed by the staff. The response to the Carbide facility in Louisville Rubbertown was just a few doors down from several plants that we do represent. We recognize the scope and the extent of the hazards in the area and from this type of manufacturing. Our union works diligently to make sure that our workplaces and our community are safe. We also recognize the need for involvement of workers and community in these responses. We want to continue to work with the city of Louisville to ensure that the community emergency response system not only meets but also exceeds the needs of everyone involved. We would like again to thank the members of the CSB and your staff for continuing to do work to protect workers and to continue workplace safety and health.

On a more personal note, seeing this report today and seeing that there were 26 work orders, whatever you want to call them, to correct some of these hazards and those were ignored, my personal opinion is that is criminal and it is a shame in this country today that it is not treated as criminal. And that is my opinion. Thank you.

### **10.7 DANIEL HOROWITZ**

Thank you, Mr. Nichols. The next commenter is Ebony Neil Cochrane.

### **10.8 EBONY NEIL COCHRANE**

My name is Ebony Neil Cochrane. I am a member of REACT, Rubbertown Emergency Action. We are an all-volunteer group of residents who live near or at the fence line of a cluster of chemical plants commonly referred to as Rubbertown. I wrote a lot, so I am going to try to get all this. Let me skip over some of these things. Some of what I am going to talk about today is really geared toward the local authority. One thing I did read this morning in the Career Journal was that this furnace had multiple issues over multiple years. And what I would like to say is that the issue of not fully addressing problems involving equipment in Rubbertown chemical plants is not a new one and it is not only a Carbide issue. You can comb through years of malfunction reports and I am sure you will find equipment that has malfunctioned on more than one occasion in more than one chemical plant. I have seen some of these reports. I only with the CSB could investigate each and every one of the Rubbertown chemical plants. What do we want to see happen as a result of this investigation? Effective enforcement at all levels when there is an incident or malfunction. It is almost impossible to get the Louisville Metro Air Pollution District to thoroughly investigate complaints brought by fence line residents. Once we even had them tell

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us that they called each facility and each facility said that nothing was going on. What type of investigating is that? In the absence of a change in culture, effective enforcement will do. Number two, detailed inspection: regulators need to be proactive instead of responding after the fact. Point number three: updated procedures for the code red alert system. There have been at least a couple of incidents that resulted in people being notified of chemical plant incidents, but only within a mile of being notified. If someone signs up to receive all of the notifications, then they need to receive them. Additionally, people get called from an 800 number. How many people are going to pick up a call from an 800 number? So, we are going to basically ignore an 800 number and not know that there has been an explosion. And, for some people who are already ill and will be more susceptible to particulate matter or air emissions, so they may need to make the choice for themselves to evacuate, even though the local authorities say there is no need to; but there is a need to for some. Fourth, this city must create a plan. And that Our Call that you referred to, the Our Call system was actually a bulletin board system where people actually called every day to see if something happened. 99.9 percent probably of the people in the neighborhood never knew the number to Our Call and never knew it existed because this city does not educate its residents on the hazards that they live around. Number four, the city must create a plan of action with the community for incidents such as these. This plan must be practiced with the community at minimum on an annual basis. Several years ago, REACT asked the local EMA to come up with trainings for the community. Do you know what they did? They gave us pamphlets and asked us to distribute them in the neighborhood -- an unfunded organization that does not have the experience of even knowing what to tell people. And, also, when they tell people to shelter in place, they do not explain what that is. And that is not always the best thing to do. People are probably going to go to their basements, which is really not a good place to go when there has been a chemical event.

My last thing that I think needs to come out of this is that we want to see the use of inherently safer design technology and chemical processes, workers and people living near the fence line can no longer be seen as expendable. The government must require these facilities to protect life and quality of life to the best of their ability. There must be a mandated switch to safer alternatives. By not making the move to inherently safer technology, at minimum, you get releases that cause harm and nuisance to people. But at the other end of the spectrum, you get death like there was at Carbide. So what I want to say to you is there are thousands of people who live near these facilities that have been in our opinion running recklessly. And this is nothing against the workers but this is against the leadership of these companies who time and again ignore the warning signals. And this is to the mayor of this city and the Louisville Metro Air Pollution Control District, who just sit back lackadaisical saying that oh, that is the state's problem. This city, this mayor, this local air pollution control district must come up with a plan and they must come up with it now.

### **10.9 DANIEL HOROWITZ**

Thank you. I know there was a gentleman in the third row who had raised his hand. And do you still have a comment on the control room setting? Could I have a show of hands of who all in the audience might want to comment? Okay, come up, sir, and please say and spell your name. Thank you.

### **10.10 IRWIN CUTLER**

I am Irwin Cutler. I am an attorney. I represent the union that represents the workers at the Carbide plant. I knew many of them very well and know the very difficult conditions that they work under and the very hazardous conditions that they work under. And I commend the CSB for what appears to me from my



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little bit of knowledge, very good and very thorough work in accomplishing its task and making recommendations. Let me say – and I had not planned to speak here today but as I was sitting here, some thoughts occurred to me and they are not directly related to this particular incident but I think they are worth making. And the comment that I would like to make is that companies do not self-regulate. We have seen that with the banks, we have seen that with the mortgage companies, we have seen that with numerous other companies. And, whenever someone comes along, they try to impose some discipline, they want to tell big corporations and little corporations, medium-sized corporations what the rules are to protect our workers, to protect the residents near these companies, to protect consumers, we find a hue and cry that says oh, no, it is going to kill business, we cannot be competitive, this is just the hazard of doing business. And we have seen that in Congress today, we have seen that in the house, we have seen that in the Senate. We see our elected representatives, many of them trying to emasculate the boards and the agencies that protect our workers and protect our citizens. I have seen it myself with the National Labor Relations Board with some recent Supreme Court Decisions with a Senate that refuses to confirm for nomination good people who understand the law and who will support workers' rights.

Now I cannot comment on this particular incident. I hear what you all have said and I have to respect you all as the experts. But I hope that you all will take this home to your people in Congress, people in authority, our president, and various cabinet officers. And let them know how valuable it is. And how important it is for us to have government agencies who are fully-funded, who are dedicated to what they are doing and who are going to police the corporations and other people who do business so that they toe the line and this kind of accident does not happen in the future. Thank you.

### **10.11 DANIEL HOROWITZ**

Thank you, Mr. Cutler. Are there any other? Yes, ma'am, please come up and say your name, spell your name if you would.

### **10.12 KATHLEEN BARNES**

Good evening. My name is Kathleen Barnes. I am a chemical engineer in a chemical company not located in Louisville. And I do not have any specific experience with the arc furnaces but lots of experience with PSM. And I do believe, I think someone asked a question about whether or not this PSM was part of this if it would have helped with this incident. I think it would have helped quite a bit as far as mechanical integrity and facility siting. I think it would have completely changed the outcome here. I did want to say that I have followed the Chemical Safety Board for many, many years to learn and to improve the safety of the places that I have worked. And I find it to be extremely valuable training material. And I noticed I do not think anybody here has a lot of experience with EAFs, so it's new to me and I think you even mentioned that the NFPA did not have a lot of expertise there. And the only thing I would say is that I think I read that there were about 200 operators of EAFs in the United States somewhere in your literature. And, I think it would be worth it if the Chemical Safety Board or somebody would send these reports to those 200 operators, so that they can learn and possibly make some changes there because that is really – if I understand the Chemical Safety Board all the years I have been watching them -- that is really what they are trying to do is to educate and prevent further accidents. And I do appreciate the work that you do and that is all I have to say.

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### **10.13 DANIEL HOROWITZ**

Thank you, Miss Barnes, and much appreciated. Yes, sir, please come up.

### **10.14 LARRY MAZE**

My name is Larry Maze. Good evening and I would like to thank everyone for coming here to Louisville, Kentucky and presenting the investigation on behalf of the community. First of all, I do have a lot of experience in general industry and working in a chemical plant and I know how the regulations from OSHA, the Environmental Protection Agency, NFPA, CSB. And from my understanding, I do not like to see events like this occur. But on behalf of the regulators and our cabinet under the OSHA Administration, I think we can do a better job doing enforcement by doing that at the local level and the state level and the federal level. And, therefore, what I am trying to say is that to prevent accidents in our community, in our plants, in our work environments, we need to come together and use our tax money to come down to the level of having engineers and people who can be on-site and to prevent something like this from happening. I think federal oversight of this type of industry, we can be better if we have inspectors come out more often and do a good job of looking at that furnace. And, then the other thing I would like to see is the chemical process safety management be a little bit more broad. By definition, what we can do to broaden the guidelines, standard operating procedures, and, also, under a regulatory standpoint of what needs to be spelled out to prevent this from happening again. Thank you.

### **10.15 DANIEL HOROWITZ**

Thank you, Mr. Maze. Any others? Anyone else? That appears to be it, Mr. Chairman.

## 11 Vote to Approve Carbide Report & Closing Remarks

### 11.1 CHAIRMAN MOURE-ERASO

Thank you, Dr. Horowitz. I would like to thank everybody from the public for their comments. And, now we are going to proceed to the vote on this final report. I now move as a member of the Board that Item Number 1307, the Carbide Report, be approved. Do I hear a second from a board member?

### 11.2 MARK GRIFFON

Second.

### 11.3 CHAIRMAN MOURE-ERASO

It has been moved and second to approve the report on the Carbide Industries as presented today and as printed today as it appeared today. Is there any discussion among the Board Members on this additional discussion? Any discussion from the floor? Hearing none, I then will call for a vote. How does Member Rosenberg vote?

### 11.4 BETH ROSENBERG

I accept it.

### 11.5 MARK GRIFFON

I vote in support of the motion.

### 11.6 CHAIRMAN MOURE-ERASO

I also vote in support of the motion. So, that means that the report of the Chemical Safety Board on the Carbide Industries investigation has been officially approved by the Chemical Safety Board and it is published on our website and will be accessible to anybody who wants to read it. It becomes a public document. I would like to make some closing remarks now. I would like to thank all the public that is in attendance here, and especially the people that participated and talked about this incident. I think this has been a very insightful and stimulating day. I especially would like to thank the CSB investigative team and the recommendations team for their dedication to this project. I would like to summarize that what we see here in this particular investigation is that three factors basically brought us to this tragedy. Those factors are (1) the tolerance for explosions that happened through the years in the plant. (2) The acceptance of continuing operations where there was a number of water leaks during the operation. (3) And the failure to change the location of the places where the workers functioned, the operating room, after there were two incidents of explosions that actually destroyed the place to work. Those are the lessons that we specifically learned from this incident. I also would like to thank the board members for their comments. And I also would like to say that we all here share a strong interest in preventing these tragic explosions in the future and we pledge to you that we will all be working together now with the staff of the Chemical

## Vote to Approve Carbide Report & Closing Remarks

Safety Board to see that important recommendations adopted today will be swiftly implemented. Thank you very much.

This ends the public meeting for the investigation of Carbide Industries. We have some additional public business to transact and you are welcome to stay here. Before we conclude tonight, I would like to put a motion to vote on a calendar notation item and this is basically tabled notation item, Notation Item 20132 that refers to recommendation number 2005-04-I-TX-R6B. This is a recommendation to the United Steel Workers and this comes from the investigation of the BP American Refinery in 2007. This notation, we will vote to approve the recommendation of the status of the response from the stakeholders, the steelworkers. And we declare the recommendation reads that it should be up and acceptable. So I am making a motion that we declare a recommendation 20032 up and acceptable. Is there a second for this motion?

### 11.7 BETH ROSENBERG

I second it.

### 11.8 CHAIRMAN MOURE-ERASO

Member Rosenberg seconds this motion. Is there any discussion?

### 11.9 MARK GRIFFON

Just a brief comment on this and I know it does not pertain to anyone here. But I plan to vote in support of the classification of this recommendation as up and acceptable because I believe the USW, their actions to withdraw from the committee were appropriate. I would further urge that the API reconsider the make-up of this committee to achieve a better balance of perspectives as they review the guidelines in the future.

### 11.10 CHAIRMAN MOURE-ERASO

Thank you for your comment. I think the motion was made, it has been seconded. So, we are going to proceed to a vote. All those in favor, say aye, say your name, and say if you approve.

### 11.11 BETH ROSENBERG

Aye. I approve.

### 11.12 CHAIRMAN MOURE-ERASO

Member Rosenberg says aye and approve.

### 11.13 MARK GRIFFON

Aye, I approve.

## Vote to Approve Carbide Report & Closing Remarks

### 11.14 CHAIRMAN MOURE-ERASO

And I also approve. So, this motion passes unanimously. I will again thank all that came here to be in this public meeting with us today. Again, I would like to thank the participants in the audience for your attention and participation. And with that, I declare this meeting adjourned.