Transcript
U.S. Chemical Safety and Hazard Investigation Board Public Meeting
On
West Pharmaceutical Accident Investigation

7:00 p.m.
Thursday, September 23, 2004
Kinston High School Performing Arts Center
Kinston, North Carolina

Contents: Page

Transcript of Meeting ……..….. 1 – 64

Statement of Congressman G.K. Butterfield ……..……. 65

Statement of Senator John Edwards ……..…….. 66

Statement of Congressman Walter Jones ……..…….. 67

Statement of Senator Elizabeth Dole ……..……. 68

U.S. CHEMICAL SAFETY & HAZARD INVESTIGATION BOARD
PUBLIC MEETING

HELD AT: KINSTON HIGH SCHOOL PERFORMING ARTS CENTER
2601 N. QUEEN STREET
KINSTON, NORTH CAROLINA

HELD ON: SEPTEMBER 23, 2004

PROCEEDINGS

MS. MERRITT: Thank you, everybody. I would like to call this meeting to order. Good evening and welcome to this public meeting of the US Chemical Safety and Hazard Investigation Board. I'm Carolyn Merritt, Chairman and CEO of the US Chemical Safety Board, or the CSB.

Before we begin, I would like to give you some safety information. If you would, please look around and note where the exits are. These two exits do go outside and the two in the back, obviously go through the front doors.

Also, if you would please, turn off or mute your telephones so that we are not disturbed in our proceedings. Thank you.

We'd like to welcome all of you tonight to this public meeting where the Board will hear, deliberate, and vote on the final report into the tragic explosion and fire that occurred a West Pharmaceutical Incorporated, here in Kinston, North Carolina on January 29, 2003. This accident cost the lives of six people: Faye Wilkins, William Gray, Alvin Graft, James Boyd, Milton Merrill, and Kevin Cruis. Thirty-eight others were injured, some, of them permanently with disabling injuries and burns. The Chemical Safety Board has spent

the last 18 months investigating every detail of this accident, and in a few moments, we will be ready to consider the staff's complete findings, the root causes for this accident, and their recommendations for preventing this from happening again.

I would like to thank Lenoir County and Kinston city officials for their kind welcome to us, and we particularly thank the Kinston High School authorities for allowing us to make this presentation at this beautiful facility.

With me at the table tonight are Board members, Mr. John Griffin and our newest Board member, Mr. Gary Visscher, who comes to us from his previous position as Deputy Assistant Secretary of Labor at OSHA. This is his first public meeting. Gary, we're very glad to have you with us.

Our fourth Board member, Dr. Jerry Poje, could not be with us today, as he is doing a presentation in Sweden on an international conference on safety.

Joining us also tonight is our Chief Operating Officer, Charles Jeffress, and our general counsel, Chris Warner, and other members of the CSB staff.

Our agenda tonight includes a detailed presentation of the findings by Mr. Steve Selk, the lead

investigator for this accident. Mr. Selk will then take questions from the Board members. And Mr. Jordan Barab, of the CSB staff will present the proposed safety recommendations. At that point we will have an opportunity for any members of the public who would like to make a comment on the investigation or the incident to have that opportunity to speak. I would ask that you please keep your comments brief, under five minutes, and relevant to this issue and this investigation. If you plan to comment, please sign up at the table near the front, and I will recognize you in order.

Before we begin, I would like to offer a few personal thoughts. The date January 29, 2003 left an indelible impression on me as it did for many people here tonight. I traveled down to Kinston that evening, along with a team of investigators from the Chemical Safety Board headquarters in Washington. We arrived just before midnight in a very cold rain, with the West Plant still in flames. Even then, the community and the resilience of this community was apparent.

The emergency response organization to this accident was truly exemplary and that is not often the case, so you have a lot to be proud of with your emergency response to this incident. It was very professional and organized, and we applaud you for the

effort.

That heroism has continued to this day with the community rallying to rebuild here in Kinston and to survive through this tragedy. We all owe it to the victims in this case to ensure that we learn every lesson that we can from this accident, and that we do everything that we can to prevent its repetition, not just here, but anywhere where these circumstances might also exist.

With that objective in mind, we conducted this investigation and are conducting this meeting tonight. Unfortunately the explosion at West was but one of three fatal dust explosions that occurred last year in the United States. The Chemical Safety Board is still investigating two of those. One in Corbin, Kentucky and one in Huntington, Indiana. Altogether those three incidents cost 14 lives and caused untold human suffering.

Preliminary information that we have collected indicates that there have been scores of industrial dust explosions in recent years. The Board remains extremely concerned about this issue. For that reason, in addition to the various specific accident investigations that we have conducted, we are also committed to a nationwide study of the problem, which will continue

throughout next year. The purpose of the study will be to determine what needs to be done on a national level to reduce the occurrence of these tragedies.

With that, I would open it, if there are any opening statements from the Board. Are there any statements?

(No response from the board.)

MS. MERRITT: I would like at this time to recognize Mr. Reggie Holly from Senator Elizabeth Dole's Office who would like to have a statement made.

MR. HOLLY: Madam Chair, distinguished members of this Board and staff, and all of you gathered this evening, Senator Dole dispatched this letter and asked that I read it to you.

She states:

"Dear members of the United States Chemical and Hazard Investigation Board:

I am glad to take this opportunity to welcome you to North Carolina, and thank you for holding this valuable forum regarding the chemical explosion at West Pharmaceutical Plant on January 29th, 2003. That event was a tragedy that we as North Carolinians and Kinstonians, particularly, will not forgot. As we move forward, however, it is vitally important that we learn as much as possible about what happened that day, in

order to prevent future disaster and to continue to raise our standards of safety and excellence.

West Pharmaceuticals is on outstanding corporate citizen of Eastern North Carolina. I support them in their efforts to improve their facilities. I am pleased that the United States Chemical and Hazard Investigation Board has provided its expertise for this project. With the knowledge that today's report will give us, along with the dedication I have seen from the West staff and management, I feel confident that West Pharmaceutical and the city of Kinston will continue to benefit from their partnership.

With my warmest, best wishes;

Elizabeth Dole."

Thank you.

MS. MERRITT: I also have two statements, one from Congressman G. K. Butterfield, who sends his regards and says:

"I have been watching the process carefully and will do everything possible to support the many people effected by this tragedy."

And also I have a statement by U.S. Representative Walter Jones, who offers his sympathy to the family of the deceased and to the community, and also thanks the Chemical Safety Board for its efforts in

identifying the causes of this accident. Those will both be entered into the docket.

If there are no other statements then, I would like to recognize Mr. Charles Jeffress who will introduce the investigative team.

MR. JEFFRESS: Thank you, Madam Chair. Following the incident, actually the day of the incident in Kinston, the Chemical Safety Board dispatched a team ultimately of about ten people here to Kinston to investigate the accident, to analyze the evidence, and produce the report that you will hear tonight.

Two members of that team are here to participate in the presentation. Other members of the team you see before you. I will introduce them and save the presenters for last.

On my right, next to the screen, is Johnnie Banks. He is our Chemical Incident Investigator. He's been with us about two years. Prior to joining the Chemical Safety Board, he worked for 22 years at Chevron Texaco Corporation in Richmond, California. Has extensive background in oil refining, including plant operations, process control and maintenance. He is a graduate of the University of California at Berkeley, and has been busily involved in a number of CSB investigations since he's been here in the past two

years.

Next to him is Lisa Long who joined the safety board in December of 2000. She has been lead investigator on a number of Chemical Safety Board investigations, including one of Georgia Pacific Corporation down in Alabama and Catalyst Systems in Ohio. Prior to joining us she worked for 11 years in chemical safety for several major chemical companies. She has a degree in chemical engineering from Virginia Polytechnic Institute and State University, better known as Virginia Tech.

And then between George and Steve is Angela Blair, Professional Engineer, investigator with the Chemical Safety Board who has extensive experience in process safety both within industry management and as a consultant in the industry. She has helped design and evaluate and implement process safety programs in industries ranging from refining to specialty chemicals, to roofing manufacturing, to food refrigeration. She is also the lead investigator on one of the dust investigations that you mentioned, Hayes Lemmerz, in Indiana.

Two her left is Jordan Barab. He's a Recommendations Manager with the Chemical Safety Board, Has 22 years experience in occupational safety and

health work, designing, administering, and evaluating the safety and health programs. He has been with the Board two years. For three years prior to that he served as assistant to the OSHA Administrator in the U.S. Department of Labor. He is a graduated of Clarmont College and John Hopkins University.

The lead investigator for this incident, the person who will lead off the presentation this evening, on the left, is Steven Selk. He is the Investigation Manager with the Chemical Safety Board. He has almost 30 years of experience in chemical engineering and plant operations, in design and management, as well as in accident reconstruction. He served as a field investigator in charge of numerous investigations, including this one. He is a licensed professional engineer in several states, and is a member of number of professional societies in this country and Canada.

To begin the presentation, Madam Chair, recognize Steve Selk.

MR. SELK: Good evening, Madam Chair, members of the Board, Mr. Warner and Mr. Jeffress. Good evening, ladies and gentlemen.

The last time we were here in Kinston, the investigative team presented our preliminary findings on the fire and explosion that occurred at West

Pharmaceutical Services. For the most part, the findings we presented earlier had to do with the physical causes of the incident. Tonight we'll again identify those causes, but we will go farther, presenting more findings that became apparent over the full course of our investigation. Specifically, we will address the underlying causes, and finally and most importantly, prevention.

From the outset, when we arrived here the night of the explosion, the team's purpose was prevention. We sought to identify how similar incidents could be avoided here in North Carolina and elsewhere.

Here is how we plan to proceed this evening. First of all, I will just introduce the team again and acknowledge other agencies that responded to the incident. Then I'll provide some background information on the West Company itself. That will be followed by a discussion of the manufacturing process that was in use in the area where the explosion occurred, and the materials that were in use. There will be some explanation of pertinent design features of the building itself, and I will invite questions of the Board.

Going forward from there, I will review the incident and move on to our findings and analysis. The material that exploded will be identified,and I'll

explain how it came to accumulate in the building.

This will be followed by a presentation of several theories and what may have ignited it. We will talk about important engineer issues pertaining to the design of the building, particularly those related to fire codes. Management system will be reviewed with an explanation of how they failed to function effectively. And that will lead to what the team has concluded are the root and contributing causes of the incident.

That is quite a bit of ground to cover, therefore I have to ask for some endurance on everyone's part. May I proceed, Madam Chair?

MS. MERRITT: Yes, please, thank you.

MR. SELK: In addition to myself, the investigative team consisted of Johnnie Banks, Jordan Barab, Recommendations Manager; Angela Blair, Lisa Long, Francisco Altamirano who is not with us here tonight, and Steven Wallace is also not with us tonight.

We retained individuals from the private sector. They were selected for their highly specialized expertise. They were C. James Dauhn of Safety Consulting Engineers. Jim's expertise is explosives and explosions. He has a great deal of experience, in particular with dust explosions.

Walter Frank of ABS Consulting also worked

with us. Both Walt and Jim are members of a National Fire Protection Association committee on dust explosion hazards. Finally, Mark Whitely of the firm Analytical and Computational Engineering helped us with measurements of the buildings and mathematical modeling of blast effects.

The team acknowledges the cooperation of Lenoir County and Kinston Emergency Management Services, consisting of firefighters, police officers, paramedics and emergency managers. The United States Bureau of Alcohol, Tobacco, Firearms and Explosives, also known as ATF, the North Carolina State Bureau of Investigation, The North Carolina Department of Labor, and the U.S. Environmental Protection Agency. With regard the ATF, our investigators worked with them in the early phase of the investigation. None of us observed any damage patterns that would be consistent with the use of explosives, and the ATF ruled out potential criminal activity.

A little bit about West itself. West is a medium size company with 4,000 employees. Equity in the company is publicly traded in the New York Stock Exchange, and the firm conducts business internationally. Annual sales have recently been on the order of half a billion dollars. West does not make

pharmaceutical drugs. It manufactures and sells drug delivery devices.

West Kinston Plant manufactured small rubber parts, such as syringe plungers, septums and seals for drug vials. It had operated since 1975. There were approximately 260 employees, and an additional staff of contractors.

From a process perspective, the facility was divided into two main sections; one for compounding and one for molding. The explosion occurred in the compounding section of the plant where rubber was blended, rolled into strips and coated. This part of the building and the manufacturing equipment involved were added when the plant was expanded in the late 1980s.

Here is a photograph showing what the rubber produced in the compounding area looked like. This is a long strip of rubber that has been folded and stacked for storage. The strip would later be converted into small parts in the extrusion and molding section of the plant.

Well the explosion occurred in the compounding section that led to a fire that enveloped a large portion of the facility including the warehouse where the raw materials were stored and rubber strips such as

this. In order to appreciate why the explosion occurred, it's necessary to understand a bit about the compounding process. This is a very simplified conceptual diagram that depicts the process that was used to compound the rubber and to form it into strips. Ingredients were first loaded into a mixer. The ingredients included rubber, pigments, curing agents, fillers and solvent. There were actually two mixtures, both located on the upper floor of the compounding structure of the plant, and there were two production lines. The ingredients would be blended in a mixer until either a preset time lapsed or until a specified temperature was reached. Then the rubber would be discharged from the bottom of the mixer through a shoot that led from the second floor to a bucket that was located on the ground floor of the plant. The bucket hung just below a ceiling. That ceiling is going to figure importantly into why the accident happened. It was comprised of acoustical tile hung ten teet above the floor level. The bucket would transfer the rubber to a rolling mill. The rollers of the mill cooled the rubber and flattened it into a strip.

Just animate that, if you would, Angela, and watch the rubber as it is rolled in the mill and cooled, flatten into a strip, and then it goes into a machine

called a batch-off machine, at least that's what it's known as in the industry. This machine here. As the rubber strip moved through the batch-off machine, it first passed through a dip tank. That is this yellow tank in front of the machine. The tank was filled with a water based suspension or slurry of coating agent. From here on in tonight, I will refer to that coating as the antitack agent.

There were two reasons for running the strip through the dip tank. The first was to cool the rubber, additional cooling, and the second was to coat it with some of the antitack agent. That way, after the rubber was folded and stacked, as you saw in the previous picture, it wouldn't stick to itself. The powdered antitack agent is going to figure predominately in the accident.

One other detail about the batch-off machine you should be aware of is that it was equipped with air fans. After the strip leaves the dip tank, it was run in front of the fans, and the air from those fans would further cool the rubber, and also dry it. The fans were integral to the machine itself, and the air blown by them was discharged into the room.

Over the years, two different antitack agents were used in the batch-off machines at the Kinston

plant. From 1987 until 1996, zinc stearate was used. West purchased it as a water based paste from the National Milling and Chemical Company. I will call them NMCCO from here on in. West would add the water based paste of zinc stearate to the dip tank,and the batch-off machine, where it would be further diluted with water. West wasn't the only company that used NMCCO's antitack agent, zinc stearate and water was used elsewhere in the rubber industry as well.

Let me pause for the moment and talk about another issue, and that's Material Safety Data Sheets. Regulations require all chemical manufacturers, suppliers and distributors to provide Material Safety Data Sheets for their products. Commonly referred to as MSDS's these data sheets are supposed to describe the basic hazards of the material. Customers are to use Material Safety Data Sheets to understand the basic hazards and importantly to convey that information to workers.

When it is in a powdered form zinc stearate is a combustible dust. Disbursed in the air in sufficient quantity, it can explode. But zinc stearatein water is not a combustible dust. Material Safety Data Sheet that NMCCO provided to West did not include any combustible dust warnings. The reason for that was it only

addressed the properties of the water based suspension itself, and not the use of the product, which was to create a powder coating. It wasn't as well prepare an MSDS as it could have been.

As the years went by, West decided to replace the zinc stearate as the antitack agent used at Kinston. West wanted to switch to powdered polyethylene and they chose a product called ACumist. At this time West was already purchasing ACumist powder and applying it as a coating on small parts at their St. Petersburg, Florida plant.

So West asked a company called Crystal Incorporated, PMC, to make a water based paste of ACumist for them for use in the batch-off machines in Kinston. In 1996 West began to use that ACumist paste supplied by Crystal.

You will recall that earlier I mentioned that the batch-off machine was equipped with air fans, and the air fans were used to blow air across the rubber strip. That was to dry the strip and cool it. Most of the antitack agent would remain on the surface of the rubber. However, a small portion of it was carried off the surface and into the facility on air currents. The dust would settle from the air on the surfaces in the production area. But the Kinston plant employed a

sizable cleaning staff. Cleaners worked around the clock, vacuuming, wiping up dust, so that visible accumulation was minimal. Because West manufactured products for pharmaceutical use, they were quite concerned about keeping the Kinston plant clean. and keeping it clean was a high priority. Management focused on the extent and effectiveness of housekeeping working areas, and the effort was a matter of facility pride. But some of the dusty air made its way above the ceiling that overhung the ground floor in the compounding part of the plant.

Again, that ceiling was a suspended design, comprised of acoustical tiles. It would have looked something like this, this photograph. This isn't an actual picture of the ceiling at West. We couldn't get one of those because the plant was so badly damaged, there was little left in the compounding area, but it would have looked like this. West installed this ceiling primarily for aesthetic reasons, in other words, for a appearance. But it also reduced noise levels in the plant.

Something else that bears on why the accident occurred has to do with the heating, ventilation and air conditioning system. The HVAC system took air from the room and would heat or cool it, depending on the season,

and then return it to the room. But it also created a slight negative pressure or vacuum above that suspended ceiling. And I'll explain why that was the case.

For the most part, air was drawn through grates installed in the ceiling, taking up through ducts directly to the air handlers in the roof of the building. However, a portion of air was taken through some other ducts that ended above the ceiling and up to the air handles. That is what created the slight negative pressure or vacuum in the space above the ceiling

Air would leak around the edges of the tiles and grates, the light fixtures and make its way up into that space. Once this dusty air was up there, the environment was ideal for settling. That is what happened. Dust settled from the air in the space above the ceiling and it accumulated on top of the tiles, and on top of other surfaces up there. Witness accounts vary, but personnel who had been above the ceiling to conduct maintenance activities prior to the explosion reported an accumulation they estimated to be a quarter to a half an inch of powder.

Madam Chair, and members of the Board, that is the background information. Before I discuss the incident itself, do you or the other Board members have

any questions?

MS. MERRITT: Are there any questions from the members of the board. Mr. Bresland?

MR. BRESLAND: I have one question about the change in the antitack coating, the change that was made in, I believe in 1990s where they changed from zinc stearate to ACumist powder polyethylene, can you expand somewhat on that change? Was the company using the ACumist, which is the polyethylene, in the time before they made the change of the then contract with Crystal? And also, were they aware of any potential hazards of ACumist at that time?

MR. SELK: The company had used ACumist on a smaller scale for different purposes than coating rubber in the batch-off machine. And I will discuss later further details. I can't tell you whether or not they were aware of the hazard. It would appear unlikely they were aware of the hazard. They did have in their possession information from the manufacturer of ACumist that provided warnings that it was a dust explosive -- a dust hazard, a dust explosion hazard.

MR. BRESLAND: Was that material safety data sheet that they had?

MR. SELK: Yes, they had a material data safety sheet for ACumist, because they had used the

material for other purposes.

MR. BRESLAND: What did that material data safety sheet say about the hazards of ACumist?

MR. SELK: Well, it warned that it was a combustible dust, and it referred users to the National Fire Protection Code. There were warnings pertaining to static electricity and the use of material with solvents, warnings to -- of good housekeeping practices, that sort of thing.

MR. BRESLAND: Okay,thank you.

MS. MERRITT: Mr. Visscher.

MR. VISSCHER: Thank you. Thank you, Steve. Did your investigator find a number of sources of dust or was the polyethylene the principal type of dust in the facility.

MR. SELK: West used many materials that could be categorized as dust. The vast majority of those materials were not combustible dusts. They were used in the area of the plant called the kitchen. They were conveyed to the mixers for use in the blending with rubber. But on the lower level of the plant, this was the only dusty material used in the compounding part of the plant.

MS. MERRITT: Mr. Selk,could you go back to slide number 11? Is that possible. I got a little

bit lost here. If you could explain -- you used the term West as a corporate entity I guess, but in one of your statements your mentioned, at a St. Petersburg facility. Could you tell me which West you are talking about in each of these sentences?

MR. SELK: Sure, for the first bullet, West in Kinston, although really, the work was also -- the work was done at corporate, West Corporation chose to replace zinc stearate with ACumist at the corporate level, for use as the coating for large strips of rubber in Kinston. West was already using ACumist or had used it in the past to coat small parts at its St. Petersburg, Florida facility. That is the second bullet. Corporate office contracted eventually with Crystal, Inc. PMC who was located nearby to Mineville, is where West's corporate office is. Crystal is located the Lansdale, Pennsylvania. West contracted with them on a corporate level to make the paste. Then of course, finally in 1996 use began here in Kinston.

MS. MERRITT: Could you tell me a little bit about Crystal. Maybe you do this later on, but who else did they have as customers? I mean, was this a large organization?

MR. SELK: Crystal is a small company, and to the best of our knowledge, this was the

only customer for this material. West was the only customer for the ACumist based paste that Crystal made.

MS. MERRITT: So they would have been familiar with how this product was going to be used?

MR. SELK: Crystal was familiar with the use of the project, yes.

MS. MERRITT: Okay,Thank you. Are there any other questions?

(No response.)

MS. MERRITT: Proceed please. Thank you.

MR. SELK: Let me tell you, members of Board now, about the incident itself. At 1:28 in the afternoon, a Kinston police officer on patrol about a mile from West's plant saw smoke. At first he thought it might be coming from the airport. He called in to his dispatch to inquire if some kind of special activity was ongoing at the airport. And then he saw what he described as an explosion cloud. He estimated it rose to a height of 400 feet. The blast from the explosion broke windows at a school located three-quarters of a mile from the plant, injuring one student. Outside the plant itself, witnesses saw the siding blow off the second story of the building where the compounding section was located. They saw a rising fire ball. Inside the plant workers heard a sound some described as

rolling thunder. a few observed a bright flash. Some were knocked off their feet by the pressure wave. concrete masonry walls, particularly those that flanked the lower level of the compounding section blew down or collapsed. Those that could, made their way from the darkened building, while others located flashlights and began searching for the injured to help them get out. Army reservists from a quartermaster battalion who were stationed next door in the same business park, told me that they responded and entered the damaged building within three minutes, helping several individuals to escape. Fire, police, and emergency response personnel began arriving as well, assisting others with egress, stabilizing the injured and transporting them to hospitals.

Fires were still in the early stage of development at this point. Some individuals clung to the exposed frame of the building until they could be rescued by firefighters using ladders. Helicopters were used to transfer to most seriously injured. The explosion broke water lines that supplied the fire sprinkler system, disabling it. Consequently, as time went by, a large fire developed, particularly, in the raw material warehouse, and this slide here shows the extent of damage that occurred there. The fire was so

intense the steel has become ductile and has sagged under its own weight. So you have really complete structural collapse. Four plastic tanks used to store combustible mineral oil, an ingredient West used to soften rubber, failed and spilled their contents. These added much more fuel to the fire, which once fully developed, burned for two days. A large portion of the facility was destroyed.

When it was all over six individuals would die. Thirty-eight other were injured, some seriously. In addition to these, the most tragic human costs, the West facility was rendered unusable and employment was interrupted. The community of Kinston would then suffer adverse economic impact.

Turning to the team's analysis of the incident, we have concluded that the explosion was in fact a dust explosion. The fuel was the finely powder antitack agent used in the batch-off machine to coat the strips of rubber. We considered the possibility that natural gas could have been involved. Gas was used to fire boilers in the plant, but the natural gas lines in the facility did not run anywhere near the compounding area. In fact the gas lines passed a part of the plant that was among the least damaged. That ruled natural gas out. Propane bottles were used on fork lift trucks

throughout the plant, but those were small containers. No one reported a problem with any of the fork lift trucks, and even had there been one, the team knows that a small tank of propane could not produce an explosion like this. Propane was ruled out as well.

Small portions of solvent and water were used for wiping surfaces in the plant, but it was dispensed from small containers. Like the propane, that couldn't cause an explosion like this. there was simply nothing else present on the lower level of the compounding section of the plant capable of producing a large explosion except for the dust above the ceiling. My colleagues and I have no doubt what the fuel was. It was the powdered antitack agent. During the field investigation we took samples of the ACumist slurry directly from the dip tank of the batch-off machine. We dried the material to a powder and brought some of it with us to Kinston at the time we presented our preliminary findings. We ignited it in a test chamber here on the stage, demonstrating it's explosive potential. We won't do that again tonight. However Jim Dauhn, our explosive expert has devised a simple demonstration of just how explosive this dust can be. We have a video of Jim's experiment that we will show you in a moment. But before we do so, let me tell you a

little bit about ACumist. The powder used at West had a normal particle size of only 10 to 13 microns. That's a consistently similar to talcum powder, and that's a primary reason that it was as explosive as it was. Another property of the material that is of interest is that it has a minimum of ignition energy of approximately 15 millijewels. To, put that in perspective, 15 millijewel spark is about as energetic as the spark one might receive when walking across a carpet on a winter day and touching a door knob. That is not much energy. Finally, our testing of the ACumist powder determined it to have what we call a K St value or deflagration index of 140 bar meter per second. What this number is, it's a number that's derived from testing the standard test chamber. And it is the maximum rate of pressure rise that occurs in the test chamber corrected for volume of the test chamber. It is a somewhat arbitrary measure,but it is a measure of the severity of explosion that a particular dust can produce. A value of 140 that we got for this particular material, puts in the same general range as grain dust or flour.

Let's take a look at the video of the experiment Jim Dauhn conducted for us. Jim has spread just a few grams of ACumist powder on a table, and a

wooden match has been taped to one end of the table. Jim is going to sit down at the other end and is going to blow the dust towards the flame on the match with a puff of air. Keep in mind that this is experiment is being conducted by an eminent explosive expert. It is not the type of experiment that someone should conduct if they are not an expert. Let's watch what happens.

Jim's assistant's going to walk in here now, he is going to ignite the match. Here is the match being ignited right there. Jim is going to sit down at the end of the table and blow the dust toward the flame.

Madam Chair and members of the board, the flash you just observed resulted from just a few grams of powder. One can imagine the explosion that could result from a ton of this powder. Earlier it was mentioned that witnesses estimated that there was anywhere from a quarter to a half an inch of powder above the ceiling. No one knows exactly how much was up there. If for example the average thickness was three-eights of an inch, and it was entirely ACumist, there could have been roughly a ton of dust above the ceiling in the compounding section of West Plant. To use a colloquial phrase, it was a sleeping giant, growing larger, about to be awakened.

Many folks are familiar with the fire

triangle. It is something they are exposed to in school. The sides of the fire triangle represent the three elements necessary to have fire or explosion. Fuel is necessary, an ignition source, and an oxidizer which is often air. Dust explosions are more complex than that. They involve two further elements. These are sometimes described by a pentagon. The first element is fuel, the fuel itself. And our National Fire Codes define a combustible dust as any materials 420 microns or less in diameter that represents a fire explosion hazard. Well 420 microns is about four times the thickness of a human hair. That's the largest size particle that's going to be explosive. Anything larger than that isn't classified as an explosive dust.

Of course an ignition source is required. I mentioned earlier that in the case of ACumist,not much energy is required to ignite it. The next element is an oxidizer which will almost always be air. It was in this case. the two further elements are dispersion and confinement. The classic theory of dust explosures requires that the dust be dispersed into a cloud before it is ignitable. It needs to be quite a dense cloud. The final requirement is confinement. Without confinement, there could be a flash which you saw a moment ago in the video, but when there is confinement,

enough confinement, the pressure is going to rise and something is going to blow. If you have enough dust in a building, that is confinement and the building will explode which is precisely what happened at West.

The National Fire Codes warn that it takes only one-thirty-second of an inch of settled dust on a floor of a room to lead to a dust explosion. Moreover, the code explains that the accumulation doesn't even have to cover the entire floor area, just a portion of it. In West Kinston plant, the amount of accumulated dust on top of the ceiling tiles was far greater than the level warned about in the National Fire Codes. one-thirty-second of an inch is less than the thickness of a dime. Okay. Again, witness estimates were that there was a quarter to a half an inch of powder up there. Far greater than the amount warned about in the National Fire Codes, in fact, 16 times as much, eight to 16 times as much.

There is other evidence that leads to the conclusion that this was a dust explosion involving powder that had settled on the top of the tiles, and that's the analysis of the physical damage patterns to the building itself. The investigative team determined that the location in the plant where the blast forces were greatest, and that was near rolling mill number

one. We know this because blast damage was at its maximum in that area, and it radiated outward in a 360 degree pattern. The batch-off machine itself was displaced out in this direction here. That is the batch-off machine, and it's pushed out this way. There was a tour hallway that ran along here beside the kitchen. And that hallway, masonry blocks that the hallway was constructed from were blown into the kitchen. So we have now 180 degree blast damage going toward the kitchen and going toward the batch-off machine.

Further more, there was an elevator shaft located here in the stairwell, and the masonry for that was all blown toward the raw material warehouse. Okay, so you get the -- what I'm describing as 360 degree blast damage from this area. Looking at a rendering of the facility, the blast location is on the lower level. It didn't occur in the upper level.

We can be certain, certain it was on the lower level because the concrete second floor was heaved upward. This photograph here shows a small section of that concrete floor for the second level. See how it is pushed upward. That type of uplift is a direct result of blast forces from below. Moreover, other evidence places the explosion not just on the lower level, but

above the ceiling on that level. We observed florescent light fixture which were flatten by forces applied from above. And the burn patterns on ceiling tiles we recovered in the woods, was almost exclusively to the top face. These both indicate that the explosion occurred above the tiles.

So we know the explosion occurred on the lower level, and we know it was above the ceiling. and we know it reached its greatest magnitude near mill number one. All of this serves to confirm it was the dust settled on top of the ceiling tiles that fueled the blast. But while we know where the blast developed its greatest magnitude, we can't be certain where the dust was first ignited. The reason for this has partly to do with the complex dynamics of dust explosions. Dust explosions are not always a single event, although they can be. frequently they are sequential events closely secondary in time. The sequential events are known as secondary dust explosions. They occur when some initial event, which might itself be a small dust explosion disperses dust that is resting on a surface into the air. That resulting dispersion is then ignited by the advancing flame front from the initial event. It is also possible for this to occur -- for the phenomenon to occur continuously as one continuous event. But

whatever, the important point is that its turbulence, it's kicking up more dust, that's being ignited by an advancing flame front.

It goes something like this. Here is a surface and dust get settled on the surface, and then something kicks it up, which could be a small explosion. Gets it into the air, and then there is a secondary explosion, which is typically much larger. And it can profugate onward after that. Because of this, it be can be difficult to precisely reconstruct dust explosions. That's the case in this instance. We can't be certain what initially dispersed the dust, but yet the team is prepared to put forward some possibilities. The following are potential initiating events that we have considered.

The first of these is that a batch of rubber may have become overheated. One witness stated that he observed a batch of rubber that had been produced to mill number one just prior to the explosion, appeared unusually hot. If overheated, rubber can decompose and release flammable gases that are ignitable. In fact, batches of rubber had ignited in the drop bucket at the West plant on several occasions over the years. The drop bucket was mounted close to the suspended ceiling. The workers report that sizable static discharges could

occur from time to time in the mill area. If something had caused the temperature control to fail in one of these mixers, the rubber may have become overheated. It could decompose and the vapors released could be ignited by static discharge. Now only one witness described the batch of rubber produced before the explosion as appearing unusually hot. And we couldn't examine that batch because it was consumed in the fire. Other workers who were in the same area did not survive the incident. So we have no other witness information one way or the other as to whether vapors from the rubber actually did ignite.

West's own investigation postulates that a worn coupling in a cooling air duct that ran above the ceiling allowed dust to enter and accumulate in that duct. This particular duct provided cooling air to an electric motor. West's team concludes that the dust in the duct suddenly became unsettled and entered the motor and that it ignited. That in turn led to a small explosion in the duct that spawned the larger explosion.

Another possibility is a failure of an electric ballast from a lighting fixture. Florescent lights were install in the suspended ceiling. Each light fixture was equipped with a starting ballast. References in the scientific literature describe how

overheated ballasts can explode. The lighting fixture in the West plant compounding area would have been covered with a layer, a very thick layer of dust, and that would have impeded heat flow from the fixtures. It is possible that failure of one of these ballasts in contact with the accumulated dust was the source of ignition. This remains only a possibility. But I would point out that the National Electric Code already stipulates that combustible materials shall not be allowed to contact the starting ballasts, because they are known to be potential ignition sources.

Finally it's possible that another type of electric fault could have ignited the dust above the ceiling. Further leading to dispersion, which in turn led to the propagating explosion or the big explosion. While we did not identify any electrical components above the ceiling that would produce arcs during normal operation, there were electrical lines, fixtures and junction boxes up there. The National Electric Code warns that fittings and boxes in areas where there is combustible dust should be dust tight. The fittings, junction boxes, and fixtures at West plant were general purpose, not dust tight. It is possible that a short in one of these components ignited some dust and the event grew from there.

Madam Chair, that is all for the incident itself. Do you have any, or the board members, any other questions?

MS. MERRITT: Are there any questions from the board. Mr. Visscher? No. Mr. Bresland? No. Thank you, very much.

MR. SELK: Let me now turn to the underlying causes of the event. simply put, West Kinston facility was not engineered with combustible dust in mind. The National Fire Codes describe construction and process details that should be followed when designing facilities where combustible dusts are produced or used, and these were not followed. In particular, National Fire Code Standard 654, titled prevention of fire and dust explosions from the manufacturing, processing, and handling of combustible particulate solids represents the accumulated technical knowledge base for protection of the built infrastructure from dust explosions. The standard states: Systems that handle combustible particulate solids shall be designed by and installed under the supervision of qualified engineers who are knowledgeable of the systems and their associated hazards.

While the standard is of primary use to engineers and architects. It contains operational

guidance. Versions of the standard and its predecessors have existed for decades. Examples of provisions in the standard include: spaces inaccessible to housekeeping shall be sealed to prevent dust accumulation. penetrations of floors, walls, ceiling and partitions, shall be dust tight.

Areas where hazardous quantities of dust accumulates shall be electrically classified per the National Electric Code. And employees shall be given training and given refresher training.

Madam Chair, members of the Board, it cannot be said that these provisions were provided for at West Kinston plant. And a further look into the company's systems and other circumstances leads to some insights as to why not.

Let me now address product warnings. Again, as I mentioned earlier, manufacturers of chemicals are required to furnish their customers with Material Safety Data Sheets. these data sheets are a source of basic information on the hazards of the product. They are supposed to include fire and explosion hazards, firefighting measures, toxicity information, and other precautionary matters. The 1998 material safety data sheet issued by the manufacturer of ACumist and provided to West included warning on combustible dust hazards.

In 1990 the manufacturer released the new version of the data sheet. This revision advised users to refer to National Fire Protection Association Standard 654.West had this data sheet, but they never consulted NFPA 654.

In 2000 the manufacturer again released another this version of the data sheet, this time type setting improvements gave increased emphasis to the combustible dust warning.

I will explain some reasons why West missed these. West had a management system identified -- a management system that was directed at identifying the hazardous properties of new materials. New materials that they were considering using in their business. And that's a good thing for them to have had. They called it the new material review. It focused primarily on food and drug administration issues, but also waste disposal and toxicity. It doesn't seem to have been as comprehensive as it could have been and here's what happened.

West first planned to use ACumist in a small scale application in St. Petersburg, Florida to coat small parts. The new material review committee studied documents pertaining to ACumist, but they didn't pick up on the combustible dust warning, even though they were there in the data sheet. It turned out to be

inconsequential, because the use was on a very small scale. But later on West decided to use ACumist on a larger scale, to coat the big rubber strips that were being produced from a batch offs at the Kinston plant.

Corporate reviewers at the company's head office again considered the material. This time they didn't re-review the data sheet for ACumist itself, even though they had it. Documents indicate that the reviewers only considered the material safety data sheet for the water based paste that was supplied to them by Crystal. And Crystal's MSDS didn't include any combustible dust warnings, okay. That is a contributing factor why West missed this.

So while West was in possession of the Material Safety Data Sheets for ACumist that advised users to refer to National Fire Protection Code, they didn't use those MSDS's and it didn't get done. This isn't the first time that a business has failed to recognize a hazard, particularly a chemical hazard. That is one one reason the government sets standards and regulations pertaining to the use of certain classes of chemicals and materials. It's part of the system of safety that protects workers and the public.

In the face of a mounting number of fatal dust explosions in grain elevators, OSHA promulgated a

standard for grain handling facilities in 1987. And the Mine Safety and Health Administration has standards for coal dust in mines. There is currently no specific federal standard addressing combustible dust hazards in industry. One federal standard that does apply to some extent to the incident at West Kinston plant, is the OSHA HazCom Standard, Hazard Communication requires employers to convey the hazards of materials used in the workplace to the work force. The MSDS for ACumist did include combustible dust warnings. West had it in their possession, both in the corporate office and at Kinston, but the information was not communicated to the work force.

One lesson then, in this incident, one lesson, is that MSDS's are important. Care should go into their preparation, and all companies should take them seriously and if necessary, look beyond the MSDS to appropriate reference information.

Now a most important regulatory system that does specifically address hazards of dust explosions are fire codes. Fire codes are usually adopted at the state or local level. And generally they have the force of law. There are two fire codes in use in this country. The National Fire Codes and the International Fire Code. Now, the National Fire Codes contain extensive treatment

of dust hazards. They set out in clear directive language preventative measures industry should take to prevent dust explosions.

On the other hand, the International Fire Code or the International Code Council, the publishers of the International Fire Code chose for the most part not to write their own measures for preventing dust explosions. Instead, they recognize the validity of the information that was already in the National Fire Codes. So what the International Fire Code does with respect to dust, is it refers to the National Fire Codes. In fact, the International Fire Code only has one page on dust hazards, one page. Whereas the National Fire Codes have about 55 pages.

Another issue related to the International Fire Code is instead of stipulating clearly the measures industry should take, the International Code leaves it to the judgment of the local fire official what elements of the National Fire Codes industry will have to take as precautionary measures. So it's up to the local code official, that could be firefighters, the fire marshall or the fire inspector to decide what industry is going to have to do.

One thing that concerns us, Madam Chair and members of the Board is we are not sure local officials

are well positioned to that. North Carolina had not yet adopted a fire code when West's Kinston facility was built. But it does have one today. In 2002 North Carolina adopted the International Fire Code. But do counties and small cities really have resources to advise industry on what protective measures industry needs to take? And the way the International Fire Code is written, in effect, that is the case. The preventative provisions that are in the National Fire Codes, appear to be an option for industry, not a requirement, where as in many other states, the National Fire Codes have been adopted and provisions there are there in, must be taken by industry.

The team believes that in order to prevent further incidents, all industries should want to, and be required to use the measures that are in the National Fire Codes.

I shall now read the root and contributing causes of the accident.

The first root cause is that West Pharmaceutical Services did not perform an adequate engineering assessment of use of powder zinc stearate and polyethylene antitack agents in the rubber batch-off process.

The second root cause: The company's

engineering management systems did not ensure that relevant industrial safety standards were consulted.

The third root cause: The company's management systems for reviewing Material Safety Data Sheets did not identify combustible dust hazards.

And finally, the hazard communication program at the Kinston facility did not identify combustible dust hazards or make the work force aware of such.

We also conclude that there was one contributing cause. That is that the material safety data sheet for the polyethylene paste developed by Crystal Incorporated, PMC, did not warn that the product was a combustible dust when dry.

Madam Chair, members of the Board, the justification for the recommendations we are about to make tonight are the facts of the case in front of us. But it should be noted that there is a history of other dust explosions in this country. The following is a list of major dust explosions that have occurred in the United States in the last five years.

In 1999 plastic resin dust exploded at the Jaun Foundry in Springfield, Massachusetts. Three were killed and 12 others injured. The very same year, a massive dust -- coal dust explosion, massive, occurred in a power plant at the Ford Motor Company in River

Rouge Plant in Dearborn, Michigan. Six were killed, 14 others injured. In 2002, a tire rubber dust explosion occurred in Rouse Polymerics, Vicksburg, Mississippi, five were killed and seven injured.

I mentioned before, Madam Chair,just after the explosion in Kinston, plastic resin dust exploded at CTA Acoustics in Corbin, Kentucky. Seven were killed, 42 injured. CSB's investigating.And then finally, again last year, there was an aluminum dust explosion in Hayes Lemmerz, an automobile wheel manufacturing plant in Huntington, Indiana. One fellow was killed and two others injured.

Madam Chair, members of the Board, the knowledge of how to prevent dust explosions has existed for decades. For the most part, it involves keeping the dust from speeding around, keeping it from accumulating and using inappropriate electrical equipment. Yet the investigative team is concerned that the danger posed by accumulated dust is not as well known as it should be. Action is needed if we are to be faithful to those that lost their lives in this incident and in previous incidents. Therefore, the team brings specific recommendations which we hope will prevent a similar incident from happening here in North Carolina again.

Mr. Jordan Barab, the recommendations manager

for the team will now present our recommendations for preventing future incidents.

MR. BARAB: Thank you. Madam Chairman, members of the Board, Mr. Jeffress and Mr. Warner, I will present the staff recommendations:

Safety recommendations are the primary tool used by the Chemical Safety Board to motivate implementation of safety improvements, and to prevent similar future incidents that could endanger lives, communities and the environment.

CSB'S recommendations may be directed to businesses, trade associations, government entities, safety organizations or labor unions.

The CSB's independent accident investigation process identifies trends or issues that may other wise be overlooked. The CSB's recommendations seek not only to address specific issues that caused the incident to occur, but also to identify needed changes in the management systems that could have prevented not only this specific incident, but other incidents as well.

In developing these recommendations, we researched the issues, consulted with experts familiar with combustible dust hazards, and industry best practices. We held a public meeting here in Kinston where we presented preliminary findings and listened to

the comments from members of the public and employees who were affected by this incident. In addition to participating in the development of the Board recommendations, the CSB recommendations staff will communicate these recommendations to the recipients and work with the recipients as well as other interested parties to help insure the successful adoption of Board recommendations. Board recommendations were issued and closed only by a vote of the Board

I will now read and explain and the recommendations. The first recommendation goes to West Pharmaceutical Services, Incorporated, which owns the West Kinston facility. As I stated earlier the CSB's recommendations seek not only to address specific issues that caused this incident, but also to identify needed changes in the management systems that would have prevented this incident as well as other incidents.

Before new materials are introduced into a manufacturing process in the work place, it's good practice to review them for hazards and potential safety issues. Reviews of this type typically consider the information contained in the Material Safety Data Sheets, and more comprehensive scientific and technical information.

The CSB found that West had done a preliminary

new material safety review for ACumist when the powder was first introduced for use in 1990 in a different process, and that West had in its possession Material Safety Data Sheets that identified the combustible hazards of ACumist dust. West's review of the material did not identify the combustible dust hazards associated with the process, either when it was first reviewed in 1990 or when its use was introduced into the batch-off as an antitack agent in 1996.

We are therefore making the following recommendations to West Pharmaceutical Services, Incorporated: Revise policies and procedures for new material safety review. In particular, use the most recent versions of Material Safety Data Sheets and other technical hazard information.

Fully identify the hazardous characteristics of new materials including the relevant, physical and chemical properties to ensure that these characteristics are incorporated into safety practices as appropriate.

Include an engineering element that identifies and addresses the potential safety implications of new materials on the manufacturing processes.

The next recommendation to West address the safety reviews of engineering projects. The CSB investigation of this incident found that West managers

had relied on engineering design firms they hire to ensure that work met all applicable codes and standards, although only West is in a position to fully understand the materials, their use, and their potential hazards. Our investigation found no evidence that West engineers had the expertise to determine whether applicable codes were met or that they were involved in reviewing with their contractors potential hazards posed by the replacement of powdered polyethylene for zinc stearate.

The goal of the following recommendation is to ensure the use of comprehensive engineering reviews that include formal project safety reviews when introducing new processes. We are therefore making the following recommendations for West Pharmaceutical Services Incorporated: Develop and implement policies and procedures for safety reviews and engineering projects. In particular, address the hazards of individual materials and equipment and their affect on the entire processes and facilities. Consider hazards during the conceptual design phase as well as during the engineering and construction phases. Cover all phases of the project, including engineering and construction performed by outside firms. Identify and consider applicable codes and standards in the design.

As the investigation indicated, the National

Fire Protection Code 654 effectively addressed the hazards of combustible dust at the time the compounding process was designed. The CSB's investigation found no evidence that this code had been consulted or followed by West. In order to ensure that West consults and follows appropriate guidance contained in NFPA 654 in the future, we are making the following recommendations to West Pharmaceutical Services. I shall read the recommendation.

Identify West manufacturing facilities that use combustible dusts, ensure that they incorporate applicable safety precautions described in NFPA 654 standard for the prevent of fire and dust explosions from the manufacturing, processing, and handling of combustible particulate solids. In particular, ensure that penetrations of partitions, floors, walls, and ceilings are sealed dust tight. Ensure that spaces inaccessible to housekeeping are sealed in order to prevent accumulation.

The fourth recommendation to West Pharmaceutical Services addresses their hazard communication program. The purpose of a hazard communication program is to effectively communicate through training, labeling, and access to Material Safety Data Sheets, information on hazards that workers

need to know in order to perform the job safely. The CSB found through our research and interviews with workers, that although the Kinston plant was in possession of the 1990 MSDS for ACumist that described the combustible dust hazard of polyethylene dust, workers revealed that their training had not made them aware of combustible dust hazards. Had workers been more fully trained, they would have been more likely to raise concerns about the accumulation of potentially combustible dust above the drop ceiling.

We are therefore recommending that West Pharmaceutical Services improve hazard communications programs so that the hazards of combustible dust are clearly identified and communicated to the work force. In particular, ensure that the most current Material Safety Data Sheets are in use, and that employees receive training on the revised and undated information.

Finally, it is important that the entire work force at West Pharmaceutical Services be familiar with the root causes of this incident and the recommendations that we are making. We are therefore recommending that West Pharmaceutical Services Incorporated, communicate the findings and recommendations of this report to the West Pharmaceutical Services work force.

Our next recommendation goes to the North

Carolina Department of Labor, Occupational Safety and Health Division. our investigation found indications that the awareness of combustible dust hazards is generally not high in industry. The North Carolina Department of Labor has developed an educational pamphlet on the hazards of combustible dust. We believe that an outreach program, based on the information in that pamphlet and on the findings of this report, would raise the consciousness of combustible dust hazards in the state of North Carolina.

We are making the following recommendation to the North Carolina Department of Labor, Occupational Safety and Health Division: Identify the manufacturing industries at risk of combustible dust explosions and develop and conduct an outreach program on combustible dust hazards.

The next recommendation goes to the North Carolina Building Code Council. As the report indicated, Chapter 13 of the International Fire Code, which was adopted by the state of North Carolina in 2002, leaves to the discretion of local code officials to determine whether or not to enforce NFPA 654. We are therefor recommending to the North Carolina Building Code Council that it amend Chapter 13, section 1304, of the International Fire Code as adopted by the North

Carolina Fire Code, to make compliance with NFPA 654 mandatory.

A further issue identified by the Board's investigation into this incident is limited level of awareness of combustible dust hazards among North Carolina Fire Inspectors. We are therefore recommending that the North Carolina Code Officials Qualification Board which determines the training curriculum for North Carolina Fire Inspection Code Officials, incorporate training in the provisions of NFPA 654 into the training program for state and local building and fire code officials.

Our final recommendation goes to Crystal Incorporated PMC. As the report indicated, Crystal was contracted by West to formulate the slurry containing the polyethylene powder. The MSDS prepared by Crystal did not, however, identify the combustible dust hazard, presented by the components of the slurry after they dried. We are therefore making the following recommendation to Crystal: Modify the Material Safety Data Sheet for manufactured polyethylene antitack agents to include hazards posed by the end use of the product.

Madam Chairman, Board members, this concludes my presentation. I'll be glad to take any questions.

MS. MERRITT: Thank you. Thank you, Mr.

Selk also. I now open to the Board, are there any questions from the Board? Board Member Visscher.

MR. VISSCHER: Thank you, Madam Chairman. Just a question, I guess to Mr. Selk. You mentioned a couple of times that there was at least some awareness by employees of dust accumulation above the ceiling. Was that kind of widespread knowledge? Was there -- to what extent was that awareness of the dust in your investigation, showed that?

MR. SELK: I don't think it would be fair to say that the knowledge was widespread. Among those workers who had occasion to go above the ceiling to conduct maintenance, they were aware that the powder was there. Those that conducted cleaning operations of the lower surfaces of the ceiling were aware that there was some dust up there. And I think maybe certain components of the management team, members of the management team were aware that there was dust up there. They may not have been aware of what it exactly was. But the only dust used in the lower level of the plant was the batch-off antitack agent.

MS. MERRITT: Board Member Bresland.

MR. BRESLAND: This is a question, it is not for Mr. Barab, but it is about recommendation number 4, which recommends that West Pharmaceutical improve

hazard communication programs about combustible dust to the work force. Can you talk to us about the sort of training that the employees did received on the hazards of combustible dust over the last period of time?

MR. SELK: The team members and I have not seen any documentation to indicate that workers received training on combustible dust hazards. And furthermore, the interviews we conducted with workers were pretty clear that the workers were not cognizant of combustible dust hazards, so we don't think that that was an element of their training.

MR. BRESLAND: For example, if you were to stop a typical worker of the facility who was working around the batch-off area, working with the ACumist material, and asked them how hazardous is this material, or does this material have any particular hazard, would you think they would have been aware of those hazards.

MR. SELK: No, no, I dont. We interviewed workers. And they were not cognizant of the hazards.

MR. BRESLAND: Still talking about combustible dust hazards, what sort of expertise did you find out that the West company had in the area of the hazards of combustible dust?

MR. SELK: I don't think the West

company did have the expertise. They could have obtained that expertise had they referred to fire codes. But we don't think that West understood the hazard themselves. it's only logical to think that had they understood the hazard, they would have cleaned up there. They ran a very clean plant. So I can not logically conclude and my colleagues can not logically conclude that they understood the combustible dust hazards. And I think that's our big concern on the team, is that this is a hazard that is not as well understood in some industrial sectors as it needs to be.

MR. BRESLAND: Where would you expect them to get that technical knowledge, technical expertise, knowledge about the hazards of the material?

MR. SELK: Well, it's not something that they are going to come by without specialized training. And we have pointed out that we think a root cause of this event was the fact that West did not refer to fire codes and the National Fire Code does provide the knowledge of why the problem exists and how to deal with it. So there management systems need to be more directed towards discovering the codes and standards and using them. The engineering curriculum doesn't include this type of knowledge. It is only out in the workplace that we can lean about it through codes and standards.

MR. BRESLAND: As you discussed earlier, one source of knowledge is the Material Safety Data Sheet then?

MR. SELK: Sure, and I think I mentioned that paying attention to the Material Safety Data Sheets is important, and going beyond the Material Safety Data Sheet. In this instance, the Material Safety Data Sheet for ACumist referred the user to NFPA 654. It said go look into this.

MR. BRESLAND: Just out of curiosity, I think it was yesterday or the day before -- it was yesterday, before I came down here I was reading a report, I got on my computer and I typed into Google, Material Safety Data Sheet for ACumist, and up it popped, it was there, 2000 version, which states exactly what you stated about the high levels of dust -- product dust in the atmosphere may present a dust explosion. So it appears to be relatively accessible.

MR. SELK: I think Material Safety Data Sheets today are more accessible than they've ever been, given that we have access to the internet.

MS. MERRITT: Board Member Visscher, do you have a question.

I have a question. We spent a lot of time talking about the dust hazard, but we really were not

able to identify a source of ignition. Could you explain to me why we did not find an ignition source?

MR. SELK: This isn't the first time this issue has come up. It is not there any more. It is gone. So it is not there to be found. It can only be inferred from the evidence that is left over. If it was a static spark, it is not there anymore. If it was an electrical fault, the fault itself isn't there any more because the power is disconnected to the plant. Whether or not one can identify an arc imprint on a piece of conduit or something that indicated a short circuit, well, the devastation in this plant was so severe, that we gave up on that.

If I could make the point, if one were to bring gasoline into the home for cleaning, that would be a very unsafe act. And the unsafe act is bringing the gasoline into the home in the first place, because it is very volatile and vapors will accumulate, and there could be an explosion. Would we argue much about what ignited that gasoline, no, because the unsafe act is bringing the gasoline into the home in the first place. And it's the same with dust. This incident, or the one in -- the others that we're investigating, involved accumulations of dust. The sleeping giant I referred to. And it's keeping those accumulations to a minimum

that's going to prevent these things.

MS. MERRITT: When you were describing the development of this antitack agent, one of the questions I had all along has been, Crystal did not provide an adequate material safety data sheet for this product describing the warnings. Why was -- what was the situation or the relationship between West and Crystal that would let Crystal off the hook, so to speak?

MR. SELK: I don't think anyone is off the hook. West went to Crystal and West had in mind to use ACumist and water. West wanted to use ACumist based paste. And they gave a specification to Crystal who made this paste for them. Crystal, on the other hand, knew what the application was. Crystal knew what a batch-off machine was, and knew what coating rubber was about, and didn't include those warnings in their material safety data sheet, the combustible dust warnings. So Crystal's material safety data sheet was not a good a data sheet as it could have been, and that is because it didn't deal with the use of the product. It only dealt with perhaps the shipping of the paste. And there is a standard. There is an ANSE standard that guides preparers of Material Safety Data Sheets, and the standard just says that one should consider the uses of

the product when one is preparing the data sheet and that didn't get done.

MS. MERRITT: Does Crystal have other customers to whom they supplied Material Safety Data Sheets that might be inaccurate?

MR. SELK: Well, we didn't look at all Crystal's product line. This particular product, ACumist paste in water was only supplied to West.

MS. MERRITT: Thank you. Are there other questions.

(No response.)

MS. MERRITT: Then at this time I would like to open the floor for public comment. I do have a list of people. Ms. Joyce Mitchell from Senator John Edwards office, unfortunately we missed her before. And I would like to open the floor and allow you to speak please.

MS. MITCHELL: Thank you, Madam Chair, and good evening to you and members of the Board.I Cheerfully submit this letter on behalf of Senator John Edwards, and ask that it be entered into the record.

"Dear Ms. Merritt:

I offer my sincere thanks to the United States Chemical Safety and Hazard Investigation Board for the work that you have performed in determining the cause of

the tragic explosion of the West Pharmaceutical plant in Kinston, North Carolina on January 29, 2003.

Lives have been lost, families have been devastated, and the healing process continues even beyond this day. As you and members of the board present your facts and findings this evening, please know that I extend my gratitude for the time, energy and dedication that you have given to bring closure to many unanswered questions.

To Mr. Morrell, the West Pharmaceutical employees, family members and friends, may you continue to strengthen and support one another as you strive to renew your hope and faith in this ever changing world. I offer my full support in the days ahead as we strive together to make America a stronger nation for all.

Yours sincerely, John Edwards. "

Thank you.

MS. MERRITT: Thank you. Would you give that letter to Mr. Horrowitz and we'll enter that in the record. Thank you very much.

I also have several other names. I'll call them in order. If you would state your name for the court reporter, I would appreciate it. Ms. Patsy Gates.

MS. GATES: I'm not going to say anything.

MS. MERRITT: Mr. Jim Edwards?

(No response.)

MS. MERRITT: Ms. Barbara Tark?

(No response.)

MS. MERRITT: Are there any other comments from the floor that would like to be made at this time?

(No response.)

MS. MERRITT; If not, then I would like to call for a motion to accept the report and recommendations. Is there someone who will make that motion?

MR. BRESLAND: I make a motion to approve the CSB Investigation Report 2003-07-I-NC regarding a dust explosion and fire that occurred on January 29, 2003 at the West Pharmaceutical Services, Inc. plant in Kinston, North Carolina.

MS. MERRITT: Thank you, Board Member Bresland. Is there a second?

MR. VISSCHER: Second.

MS. MERRITT: That's seconded by Board Member Visscher. At this time I would like to call for any discussion that there might be concerning this motion. Is there any question or discussion on the floor?

(None heard.)

MS. MERRITT: Then I'd like to call for a roll call vote. Board Member Bresland?

MR. BRESLAND: Approve.

MS. MERRITT: Board Member Visscher?

MR. VISSCHER: Approve.

MS. MERRITT: Board Member Poje has given us his proxy which approves this report. And I as Chairman also approve the report. That allows this report to be approved unanimously.

At this time the Board would like to express our thanks to the West investigative team. A great deal of effort, blood, sweat, and tears have gone into this. We also extend to the survivors and to the families of those who lost family members our condolences on this event. We are glad to see that this facility is reopened and that jobs have been refilled here in Kinston. This is an important and a very vital company here.

I would like at this time to recognize the other team members, Angela Blair, Lisa Long, Johnnie Banks and Jordan Barab for all of your hard work. Your expertise has allowed us to produce a thorough and pain stacking report under very challenging circumstances. In the coming months the Chemical Safety Board

recommendation team will follow the actions that are taken in response to this investigation and to the report, and the recommendations, and will be reporting back to the Board on progress made. In the meantime, the Chemical Safety Board is working on the investigation of two other chemical dust explosions in Corbin, Kentucky and Huntington, Indiana. We expect those reports and the findings to be concluded by the end of the calendar year.

I thank all of you who are here tonight for your attention, for attendance and for your interest in our work. Your participation is a crucial element in this process. The full report of the West Pharmaceutical Investigation will be available to download on our website, www.csb.gov in the next few days. With that, I call this meeting adjourned.

G.K. BUTTERFIELD
1ST DISTRICT, NORTH CAROLINA

413 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-3301
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Congress of the United States
House of Representatives
Washington, DC

September 22, 2004

Carolyn Merritt, CEO and Board Chairman
U.S. Chemical Safety and Hazard Investigation Board
2175 K Street NW, Suite 650
Washington, D.C. 20037-1809

Dear Ms. Merritt:

Thank you very much for your gracious invitation to the public meeting on September 23, 2004 regarding the chemical accident that occurred at the West Pharmaceuticals facility in Kinston. I appreciate your willingness to include me in this event so that I might have an opportunity to speak with the community about this critical issue.

It is unfortunate that my congressional duties here at the Capitol will not allow me to attend the meeting. I have been watching this process carefully and I will do everything possible to support the many people affected by this tragedy.

A representative from my office will attend the meeting so that I can continue to closely monitor this process. Please extend my regrets.

Very truly yours,

G. K. Butterfield
Member of Congress

JOHN EDWARDS
NORTH CAROLINA

United States Senate
WASHINGTON, D. C. 20510

September 22, 2004

Ms. Carolyn Merritt
Chairman/CEO
U. S. Chemical Safety and Hazard Investigation Board
2175 K Street, N. W.
Washington, D.C. 20037

Dear Ms. Merritt:

I offer my sincere thanks to the U. S. Chemical Safety and Hazard Investigation Board for the work that you have performed in determining the cause of the tragic explosion of the West Pharmaceutical plant in Kinston, NC on January 29, 2003. Lives have been lost, families have been devastated and the healing process continues, even beyond this day.

As you and members of the Board present your facts and findings this evening, please know that I extend my gratitude for the time, energy and dedication that you have given to bring closure to many unanswered questions. To Mr. Morel, the West Pharmaceutical employees, family members and friends, may you continue to strengthen and support one another as you strive to renew your hope and faith in this ever-changing world.

I offer my full support in the days ahead as we strive together to make America a stronger nation for all.

Yours sincerely,

John Edwards

JE:jmm

Statement of U.S. Representative Walter Jones

Ladies and Gentlemen:

Thank you for the invitation to tonight's release of the findings of the investigation into the West Pharmaceutical explosion. I regret that I am not able to be in attendance, but I must be in Washington for votes.

Everyone in this room will never forget the tragedy of the West Pharmaceutical Explosion that shook this community in January 2003. I will never forget the horrific stories that were shared with me by employees, rescuers and county officials who experienced the explosion first hand. I pray that the families that lost a loved one and that those who were injured are finding peace and healing after such a difficult time.

Tonight the final report on the findings of the Chemical Safety and Hazard Investigation Board's investigation into the West Pharmaceutical Explosion will be released. It is my hope that this report will bring closure for many who still have questions.

Thank you to the Chemical Safety and Hazard Investigation Board for your commitment and the hard work put into this investigation. Through your efforts, the information shared in this report will give insight into why the explosion occurred and help reduce the risk of such a tragedy from happening again.

I ask that God bless everyone here tonight and God continue to bless America.

September 23, 2004

United States Chemical and Hazard Investigation Board
c/o Dr. Daniel M. Horowitz
2175 K Street, Northwest
Suite 650
Washington, D.C. 20037

Dear Members of the United States Chemical and Hazard Investigation Board:

I am glad to take this opportunity to welcome you to North Carolina and thank you for holding this valuable forum regarding the chemical explosion at the West Pharmaceutical plant on January 29, 2003. That event was a tragedy that we, as North Carolinians, and Kinstonians, particularly, will not forget.

As we move forward, however, it is vitally important that we learn as much as possible about what happened that day in order to prevent future disaster and to continue to raise our standards of safety and excellence. West Pharmaceuticals is an outstanding corporate citizen of eastern North Carolina; I support them in their efforts to improve their facilities. I am pleased that the United States Chemical and Hazard Investigation Board has provided its expertise for this project. With the knowledge that today's report will give us, along with the dedication I have seen from the West staff and management, I feel confident that West Pharmaceutical and the town of Kinston will continue to benefit from their partnership.

With my warmest best wishes,

Elizabeth Dole

Elizabeth Dole