UNITED STATES OF AMERICA

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CHEMICAL SAFETY AND HAZARD INVESTIGATION BOARD

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Public Meeting In the Matter of
CAI/ARNEL CHEMICAL PLANT EXPLOSION
DANVERS, MASSACHUSETTS

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Wednesday
May 9, 2007

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Grand Ballroom
Sheraton Ferncroft Resort
50 Ferncroft Road
Danvers, Massachusetts

BEFORE:

CAROLYN MERRITT, Chairman

I N D E X

P R O C E E D I N G S

(7:00 p.m.)

MS. MERRITT: Good evening. Welcome to this public meeting of the United States Chemical Safety Board, the CSB. I'm Carolyn Merritt, I'm Chairwoman and CEO of the Board. With me tonight are Board Members Gary Visscher, John Bresland, William Wright and Bill Work. Also with us tonight our General Counsel Chris Warner and also our team of investigators headed by John Vorderbrueggen, who is our lead investigator. Also, I would like to thank the CSB staff who are here to facilitate at this meeting.

The CSB is an independent, nonregulatory federal agency that investigates dangerous chemical accidents at six industrial facilities. The investigations examine all aspects of the chemical accident, including physical causes related to equipment, as well as inadequacies in regulation, industry standards and safety management systems. Ultimately, we issue safety recommendations which are often national in scope, they are designed to prevent similar accidents from happening anywhere in the future. The purpose of this evening's meeting is for the

CSB investigative team to present its preliminary findings concerning the tragic explosion that occurred at the CAI/Arnel facility here in Danvers. And then, equally important, we'll hear comments from the community, so there will be an opportunity for public comment.

Before we begin, I would like to point out some safety features. If you would, take a moment to note the locations of the exits from this room, the exits on this side as well as this side lead outside in case of an emergency. I would also ask that you turn off or mute all of your cell phones and pagers, and I'll wait a minute for you all to do that, because somebody always forgets, so that these proceedings are not disturbed. Thank you very much.

During the early morning hours of November 22, 2006, a powerful explosion destroyed the CAI/Arnel ink and paint manufacturing facility in Danvers. Scores of nearby homes and businesses were damaged, some beyond repair. There were no injuries in the plant, which was unoccupied at the time, but a number of residents required hospital treatment. We at the Chemical Safety Board have kept this community in our thoughts, as we've

investigated, as our team continue to do its scientific investigation into the root causes of this incident. We know that you are vitally interested in what caused this frightening event.

This accident caused the most severe community impact damage of any U.S. chemical accident in nine years that our agency has existed. We believe that if this had not happened in the middle of the night, that the results of this event would have been more tragic.

The CSB continues to observe companies that are not prepared for even small scale chemical releases. As in this case, harmful materials were located in close proximity to neighborhoods, schools and other businesses. Chemical facilities with the capacity to destroy homes and lives should apply the highest level of safeguards to their operation.

Had this explosion occurred during the day, the community impact likely would have been far greater and the loss of life inevitable. Companies must exercise diligent hazard recognition and implement procedures and practices to control chemical hazards, companies and their employees cannot afford to become victims of

complacency.

The CSB investigation process is extensive and we hope to have a final investigative report on this explosion issued publicly and released to the community within the next six months.

This public meeting is the Board's chance to hear the preliminary finding of the investigative team and also to hear comments from the Danvers residents and the general public. We'll consider your comments thoroughly as we move forward with this investigation. If anyone in the audience wishes to comment publicly after the investigators' presentation, please sign up at the table in the check-in area and we'll call your name at the appropriate time. I'll first call those who have signed up and then we'll be happy to open the floor for anyone who wishes to speak.

Please note that we'll have to limit public comments, depending on how many people are signed up and wish to speak. Also note that we are not able to take questions for the investigators directly from the audience, and so I'll ask that all comments be directed to me, as the presiding official. If there is a point that

is raised in your comments that I believe the investigative staff can provide some immediate clarification, I'll ask them to do so, otherwise we'll certainly take your information, your questions and comments back to Washington and analyze them during the future course of this investigation.

I would like to thank the team for their work on this investigation thus far and I would also like to thank you, the audience, for wanting to be informed members of the community and for having an interest in chemical safety.

I would now like to recognize any of the board members for any opening statements that they might have. Does anybody have any comments?

Then, with that, at this time, I would like CSB investigator, Manager Steve Selk, to introduce the investigation team.

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

Again, before the team begins its presentation, let me have the opportunity to introduce each of them to you and tell you a little bit about their qualifications. The lead

investigator is Mr. John Vorderbrueggen, Mr. Vorderbrueggen is a mechanical engineering graduate of the California Polytechnic State University, he has more than 30 years of experience in process safety, regulatory program management, human factors, mechanical and structural design and work force training program development. A registered professional engineer, Mr. Vorderbrueggen was a Vice President of General Physics Corporation before he entered public service a few years ago.

Sitting to Mr. Vorderbrueggen's left is Mr. Robert Hall, Mr. Hall graduated in nuclear engineering from Penn State. A commissioned Naval officer, he also holds a masters degree in energy resources and environment from the George Washington University. An expert in gas pipeline safety, Mr. Hall was previously employed by the Office of Pipeline Safety and the Pipeline and Hazardous Materials Safety Administration, he has studied hundreds of natural gas explosions. Mr. Hall too is a registered professional engineer.

Sitting to Mr. Hall's left is Mr. Jeffrey Wanko, Mr. Wanko is a chemical engineering graduate from Syracuse University, he also holds a

masters degree in environmental engineering from the Illinois Institute of Technology. Mr. Wanko has served on the National Fire Protection Association's Combustible and Flammable Liquids Code Committee and also on their Combustible Dust Committee. He has 15 years of experience and is a registered professional engineer and a certified safety professional.

To Mr. Wanko's left is Mr. Johnny Banks. Mr. Banks worked for 22 years at the Chevron/Texaco refinery in Richmond California. In addition to being a chief operator, he was involved with health and safety programs at the refinery. Mr. Banks is a graduate of the University of California at Berkeley and is a certified fire and explosion investigator.

To Mr. Banks' left is Ms. Angela Blair, Ms. Blair is a chemical engineering graduate from Auburn University, she has almost 30 years of industrial experience covering a wide variety of chemical and mechanical processes. A registered professional engineer, Ms. Blair has participated in hundreds of hazard analyses.

Finally is Katherine Leskin, Katherine is a chemical engineering graduate from the

Massachusetts Institute of Technology, she is also pursuing a masters degree at the George Washington University. The investigation team is highly qualified and they are impartial, their only interest is the public interest.

I now call on Mr. Vorderbrueggen to present their preliminary findings.

MR. VORDERBRUEGGEN: Thank you, Mr. Selk.

Madam Chairman, members of the board and Mr. Warner, General Counsel, ladies and gentlemen. First let me summarize the subjects that we are going to discuss this evening. First, we will summarize the incidents or we will provide an incident summary, then we will summarize the investigation activities that have been ongoing for the past nearly six months, we'll provide a description of the companies involved, the activities that they were performing at that facility.

We will then go into or preliminary findings that we have identified from our investigation. At the conclusion of our findings, then we will return the podium to the board for any questions back to the investigation staff and

the ultimately the board will turn it over for public comment.

The view in this slide here was taken, is an aerial shot that was taken a few years ago. Across the bottom of the picture is Water Street, north is to the left in this view. Bates Street runs almost up the center and Riverside Street you'll see in the extreme left side of this photograph. The marina, which of course is on the river, is to the extreme upper right corner which would be to the southeast.

A couple other points of interest, the bakery/pizza parlor facility, building, is located pretty much lower center, the Danversport Bottled Gas's building is in the lower corner and next to that was a little building called Abbey Fence.

The facility itself, the CAI/Arnel facility, is shown to the right in this view. What is highlighted in yellow is what is the office/administration portion of this facility, it includes the restrooms, some laboratory space, a change room, that type of layout. To the north of that wing of the building, if you will, is the production side of the building, and I'll show you some more details of these two, of the production

and how it was divided among the companies here in a second.

This photograph was taken early in the morning of November 22nd. As you can see and as all of the news reports and reports from the community, it was a tremendous fire, preceded by an explosion, and what remains of the building, which was, again, early in the morning, is nothing but structural steel and some equipment. We are looking pretty much due east, meaning we are looking at the west side of the building and to the right in this picture, pretty much right beside the fireman in the lower corner is the Danversport Bottled Gas building, just for orientation purposes.

This photo was taken Friday afternoon, November 24th, I believe it was, and it shows what was left of the structure and the extent of the damage in the immediate portion of the community. The structure was right here and there is nothing left but rubble. The Danversport Bakery where six personnel, I believe it was six personnel were working in that bakery that night preparing their products for the holiday, for the Thanksgiving holiday. The bottled gas building is in the lower

corner, the pretty much unoccupied Abbey Fence.

Emergency response vehicles of course are situated in the street and heavy damage to the Bates Street. I will later mention 3 and 5 Bates Street, that is 3 Bates Street, that is 5 Bates Street. All of the windows, by two days into this event, for those homes that had broken windows, which goes extensively out into the community, and we will summarize that later on, but you can see all the windows are boarded up. Pretty much any window that faced the structure was blown out by the over-pressure concussion wave.

The marina took on, took significant damage for the boats that were parked for the winter in the marina, there were large chunks of concrete as far as 400 feet from the facility, inside a few of those boats. The marina building itself, which is just out of the picture, was ultimately razed because of its extent of destruction.

I'll summarize the emergency response. First, the team found that the emergency response was well coordinated and executed, and that specifically addresses the fire suppression activities, first responders on scene. Community

evacuation was well executed, well orchestrated, and certainly search and rescue was very effectively executed.

The extent of the damage, the expectations were it was going to be grim, and miraculously, it turned out not to be that case. Many parties, many emergency response organizations participated in this response. The Danvers Fire and Police Departments, of course, were first and foremost on scene, the Salem, Peabody, Beverly and other fire and police departments, mutual aid participated in the response, Massachusetts Environmental Police participated in the response, the U.S. EPA responded, the US Coast Guard partly because of the fact that the river was adjacent to the property and there was some involvement with run-off.

The US Bureau of Alcohol, Tobacco, Firearms and Explosive participated, that's typical for an explosion, they would respond, and finally, Massachusetts Department of Environmental Protection, Massachusetts State Fire Marshal and the Massachusetts State Police all actively participated in this emergency response starting

in the early morning hours of November 22nd.

Community impact. In spite of the tremendous and devastating explosion that occurred November 22nd, there were only ten people that were, that required some treatment at the hospital for lacerations and bruises. Some of those people, they were serious lacerations and we are certainly not downplaying this, but again, it's been reported to be miraculous that nobody was injured beyond this level.

Multiple homes and two adjacent businesses were damaged beyond repair by the initial explosion, structural damage to the homes and businesses extended as far as a quarter of a mile from the facility. Window breakage extended as far out as one mile and there are probably some that extended beyond that, but principally a mile, and dozens of boats at the marina, as I mentioned, were heavily damaged or destroyed.

This view happens to be 3 Bates Street, they, for all intents and purposes, we are looking at the back of the home and the CAI/Arnel facility would be to our back, as we are looking at the home. So, if you are standing on the patio or the deck of this home, you would have been looking

directly at the facility with essentially no interference, other than landscaping and as you can see by this photo, this building was heavily damaged. Not only were the windows broken out but the entire window frames and walls were blown in. There were people in this structure. The door up on the patio was blown in, the door frame, the entire structure. The debris around in the backyard was extensive and, again, thank God nobody was standing there when this occurred.

This shot is the same home, we are looking northwest in this view, standing in 5 Bates Street back yard. This pile of debris and rubble in the foreground happens to be what was a second story patio and first story patio covered area, as well as some of the wall of the structure, and not shown in this picture is a significant portion of the roof was blown off and landed in this pile. These are the cars that were parked in the corner of 5 Bates Street and they show what happens to vehicles, the windows, the side windows, the rear windows are shattered and blown in, in this case.

The front windshield, typically because of their different strength characteristics, they

just break, shatter, and you can see that. The dents in the body work are a result of over-pressure concussion wave, and there is another shot of that debris pile that was the result of the roof structure, or the roof and patio structure collapsing into the back yard, and all of this happened in a matter of seconds.

This shot, this car was actually facing the structure, Bates Street is in the background and, again, this just shows how windshields respond to over-pressure concussion waves, the sun roof is shown on top.

Some other details on the community impact. About 300 residents were evacuated the night of this event. Out of those 300 residents, 77 of the families were originally displaced, and we are almost six months since this event and there is still at least 50 families unable to return to their homes due to the damage sustained. Since the event, 16 homes have been razed, some of those were damaged beyond repair from the explosion, some the cost, it was cost prohibitive to repair, so they will be rebuilt, and more are expected.

Two nearby businesses, not including

CAI and Arnel of course, were destroyed, the bakery and the pizza facility. Five nearby businesses were heavily damaged, the propane facility to the west, the marina and that sort of thing. This happens to be a shot taken Friday afternoon of the pizza facility, this was a living quarters and storage quarters and it was reported, I believe somebody was up in that area when that roof structure came down, and of course all the windows are blown out, all of the interior ceilings collapsed, and there were workers in the bakery side of this that night the event occurred. Back in the background is what's left of the CAI/Arnel facility and the homes on Bates Street are on the left.

This shot is the marina, fairly close, this is a section of the marina that was close to the facility. Boats, typical damage to the boats, all the glass was blown out of the boats, hatches were blown out, including hatches going below deck, the instrument panels, the instrument clusters up on the bridge and the other portions of the boats were actually blown out of their mountings. Large chunks of concrete were found inside some of these boats, you can see some

debris from the building across the floor, and the tarps and plastic windows were blown out. And then this building in the background was damaged beyond repair and it has since been torn down, it was one of the first ones identified as not being repairable.

Our investigative activities today, our investigation activities to date, we have conducted many interviews and discussions, it includes CAI and Arnel employees, the CAI electrical contractor who took care of the work inside the facility, the contractor working at Abbey Fence. There happened to be some ground clearing going on in preparation to take down the Abbey Fence and the Danversport Bottled Gas facility to build a new restaurant. The Maritimes and Northeast Pipeline that operates the high pressure pipeline to the south of the facility, we will talk more about that, and of course KeySpan, who is the natural gas utility in Danvers.

We also talked to some of the local residents, not all of them, but we certainly talked to a number of local residents as we surveyed the damage. We talked to other local businesses, such as Eastern Propane, Harvey

Industries, we talked to the owners, we toured the inside of their structures. We talked to the Town of Danvers key personnel, the town manager of course and his staff, we talked to police and fire department personnel in the Town of Danvers. We've met with the Department of Code Administration and talked to folks related to building permits and those activities, and of course we've talked to the Public Health Department representative as part of our investigation.

Documentation. We have asked for and received numerous documents from CAI and Arnel, most of Arnel's documents did not survive but they did have some that were off-site, so we've been somewhat successful in a few of those documents. Duke Energy and KeySpan, and just a clarification, Duke Energy is the Maritimes and Northeast Pipeline, the names have changed but that's who that, that's who that is supposed to be. Documentation has been provided to us from the Town of Danvers, permits, other documents, piping drawings and that sort of thing for the area.

We have obtained documents from the raw materials suppliers who provided material to the

companies, material safety data sheets, good practices for handling certain of their hazardous materials, that type of documents. Of course we collected the EPA remediation records as they progressed through the cleanup of the damage site and we have reviewed various state regulations, fire code regulations, the laws, that sort of thing from the State of Massachusetts or the Commonwealth of Massachusetts.

We have also taken many photographs and collected photographs that others have taken. We photographed the community, the damage in the community, as part of our blast survey, which we will talk about later. We of course took many photographs within the CAI/Arnel facility as we went through the debris, looking at equipment and that sort of thing. We have obtained photographs from the township fire and police photos, that included the aerial photos and some of the ground photos that were taken early on in the event. And as I mentioned, aerial photos both before or in the morning, early morning hours, as well as the final activities from the emergency response organizations.

We have also collected other evidence,

we have looked at the facility equipment, we've looked, we actually have collected raw material chemical samples and have conducted some testing on those liquid and solid material samples. We've collected fragments or reviewed fragments from the CAI/Arnel building that were found in the community, chunks of concrete block. I did not mention, I apologize, the building was built with concrete block 8 inch to 12 inches wide, all exterior walls were constructed that way, as well as many interior walls.

We also are in the process of conducting explosion dynamics modeling, we are part way through that activity, we have more work to do there and we'll talk a little bit about that later. And then, finally, we are in the process of conducting chemical testing of the batches that the companies were making in the facility.

I'll move on to a summary of the two companies that were involved in the operations at the Danversport facility. First of all, the building was constructed early in the 1900s and it's had many different uses and, in 1985, a company called Danvers Chemical divided into what is now known as CAI, Incorporated, and Arnel

Company, Incorporated.

CAI is a private company, they have operated, as I mentioned, since 1985. They are actually headquartered about 12 to 13 miles north of here in Georgetown, Massachusetts, they have 25 employees, or they had 25 employees at the time of the incident, and they manufacture water and solvent-based printing inks. At the Georgetown facility, they maintain or they handle all of their company administration, their marketing and sales, they also manufacture water-based inks in the Georgetown facility, and they also provide all of their product warehousing and shipping activities out of Georgetown.

At the Danvers facility, they manufactured the solvent-based inks that they sold and the daily production was shipped to Georgetown for distribution to their buyers, and in fact the daily production on November 21st, that Tuesday afternoon, had actually been loaded. It was loaded late in the day, as they normally did, and delivered up to their Georgetown facility.

Arnel Company, Incorporated, they also have operated in the Danvers facility since 1985. At the time, they had nine employees and their

products include solvent-based stains, lacquers, coatings and paints, polyurethane coatings and adhesives and water-based urethane coatings. Quite a few similarities between the two companies, although their end products were different.

This is a view of the facility, the floor plan. For orientation purposes, north, in this view, is up, to the west is Water Street, about 200 feet west of the end of the building is Water Street, the bakery would be up to the north, to the northwest. Bates Street is about 150 feet to the north of the facility. The total overall size of the facility, approximately 100 feet north-south direction and about 150 feet east-west, and you'll notice we've identified the approximate square footage of each of these principle areas, the C area being 5,100 square feet, E area is 1,100, F is 1,200, which is this area, and then the office, labs and restrooms combined, including fuel oil storage and boilers, is about 4,000 square feet.

This area here, as I mentioned earlier, is their office area, laboratories, restrooms were down near the corner. The CAI office reception

area, if you will, was here, the Arnel was here. The highlighted area in this view is the production area that was shared by both companies, and I'll provide more detail to that sharing here in the next couple slides. I also want to note that not shown in the view but just north of the, primarily of the E building, they had three underground storage tanks, we will discuss, briefly, those and they were about 30 or 40 feet north.

The Arnel had trailer storage just off the edge of the concrete pad and they stored their nitrocellulose there, we'll give more detail later, and CAI stored their nitrocellulose in an outside tractor trailer just to the south of that and just off the building, off the footprint proper.

CAI did handle hazardous materials, we've reviewed their documents and there is a list of flammable solvents or the various containers that held flammable solvents. I mentioned the three underground storage tanks that were just north of the facility, there were four approximately 3,000 gallon production mix tanks in the C area. There were eight 500 gallon

containers, that are commonly called totes, that are standard containers used to transport, store, and store liquids, including flammable liquids. There were several ink product mixers of various sizes ranging a couple hundred gallons each, there were many 55 gallon drums and small containers, five gallon, one gallon, quart containers, some of those contained raw materials, some contained final product.

CAI also handled a flammable solid called nitrocellulose, it was contained, they had about 150 fiber drums that were stored in the truck trailer to the east of the facility and that actually is a photograph of what it typically would look like what the nitrocellulose fiber drum was, it is a cardboard, essentially cardboard drum, plastic bag and the nitrocellulose was a pellet sized, kind of a pellet type and it was actually pourable, at least the CAI's was.

CAI also had fuel oil tanks to provide the fuel for their boilers to make the steam to both heat the building and to provide heat to the production equipment, and actually those fuel tanks were relocated from being in the courtyard for many years to inside the building about a week

before the accident occurred.

This is a close-up view of area C from the earlier footprint, it's about 5,100 square feet and primarily CAI's production is in the upper quadrant here. The mix tanks, their primary 3,000 gallon mix tanks are in the center of the picture, tank one, two, three and four in this view. I don't show in this view, but some people may wonder why I didn't, but there was a fifth tank located here but it was brand new, not in use, so it's not shown. Their small, pigment, color mixing mixers are located primarily along the walls, pigment grinders.

This is an elevated platform that you walked up a set of stairs, some of the materials were loaded into the tops of these tanks, some of the material was pumped in from various storage tanks through overhead piping. Notice that the area was shared with Arnel, Arnel had storage racks along the side of the CAI production and Arnel had some storage in storage totes located along the south wall of the C building.

A few other things I want to point out in this view. This fire door that moves into the E room, which we'll show in a minute, was commonly

left open and confirmed to have been open the night of the incident. This fire door provided access and really the only direct access into the office, restrooms, laboratory section of the building, and it was closed at night, as it was the night of the explosion. And then the only other item of interest in this view is the exhaust fan, this was a wall-mounted fan, fairly low to the floor, and it exhausted air out into the open area and we will talk more about that fan and other fans as we move forward.

Before that, I'm backing up one, the view of the picture I just flashed at you, we are standing essentially south of the facility looking northeast, so we are standing about at the totes or just outside the totes and that's what we are looking at.

This happens to be tank two, number three and number four. The steel you see crumpled and lying above primarily tank four is part of the structure that supported the roof over area C. The debris you see in the foreground is Arnel's raw material storage, what's left of the raw material storage, and you can see some of the concrete block and the extent of breakage that

occurred. In fact this isn't very bad here, some of this, but you can see other pieces that were really extensively broken into small pieces from the violent explosion.

On the Arnel side of the operation, they also handled hazardous materials, they shared the underground storage tanks, they had a 1,000 gallon product mixer. They had two 300 totes, and I'm talking specifically totes that held the flammable solvents, they had other totes but they did not, they were holding nonhazardous liquids. Several paint product mixers were located in their production area and, like CAI, they had many 55 gallon drums containing various raw materials, five gallon containers, one gallon containers, quart containers for their products and raw material.

The picture to the right is a typical tote and in fact this one is made by the company that made, it's like Kleenex, we call them totes. These are totes in the background, they were actually sitting outside of the facility to the north and slightly west and they were all empty, these stainless steel totes here, and they were in, and you can see some damage from blast, some

compression on those.

The Arnel flammable solid was also nitrocellulose, it came from a different supplier and they used a much smaller of quantity or they maintained a smaller quantity, they kept about 14 drums of similar configuration, cardboard with plastic liners in their own truck trailer and in fact that's what's left of those 14 drums in the debris pile. The trailer actually was toppled sideways from the explosion and then everything burned in this area, many of these 55 gallon drums were actually empty drums that were in storage in that trailer.

The area that Arnel primarily worked in for production is shown in this view, the C area is to the left, there is a courtyard just south of this area and on the other side of the courtyard is the office and laboratories. The Arnel production, 1,000 gallon production tank is shown there with a, there was a platform that they worked from to add dry materials into it and a couple other mix tanks that they had over in this location. There was an exhaust fan mounted near the floor that blew into the courtyard in the E building or the E room, if you will. And there

was a fresh air intake fan located in the courtyard that distributed fresh air throughout the F, the E and the C area, it ran down the ceiling and it did a general fresh air intake into the building.

There was another exhaust fan, exhaust blower located just north, just outside the building, the motor and fan assembly was outside the building and there was a duct pipe that went into the building and near the floor, and it sucked air out and exhausted air from this production area zone here. There are two pump assemblies and manifold assemblies that were used to transfer solvents both from the underground storage tanks that were located outside as well as the totes, there are eight totes here, stacked two high, and there were some 55 gallon drums that were used for storage and they would pump, the two companies, one company used one of these manifold stations and one used the other.

And in fact the CAI equipment, I didn't mention, this is a 1,200 mix tank that CAI operated in this area and the totes belong to CAI containing the flammable liquids and one of these two transfer manifold systems. The next picture

you are going to see we are more or less standing at elevation in this area, and we are looking to the southeast, and we will be looking down on these totes and we will see, in the corner of the picture, those manifolds. The totes were double stacked, hard piped or piped, there were flexible connections.

These gaps is where there were flexible pipes that were burned out by the fire. The manifolds, this is one of the manifolds, piping manifolds, that transferred solvents over to the various tanks and mixers in the C area, and then there was another one that was against the wall here and you can see some of the brick work, wall, cinder block or concrete block wall work that was behind these totes and toppled in the explosion and subsequent fire that burned in this area. There is a number of fuel sources in this facility. I mentioned there are flammable solvents, that's exactly what they are.

Nitrocellulose is a flammable solid, fuel oil is not classified as a flammable liquid but it does burn and it can burn vigorously, if you get it hot enough to get it ignited. Natural gas, there was a high pressure pipeline to the

south of the facility and there was a low pressure city gas system that ran down the length of Water Street to the west, Bates Street to the north and of course it ran throughout the community and then, as I've been talking, the various flammable liquids that both companies used for their day to day production.

First I would like to discuss nitrocellulose, the nitrocellulose is an industrial grade nitrocellulose, it is not an explosive grade. It is very difficult to get it to do anything but burn and it will burn very vigorously, it's an intense fire, but it does not explode. It's a flammable solid by the fire code definition. As I mentioned earlier, it was stored in fiber drums in the trailers, it was not typically stored in the building, other than the day production quantities, and as the evidence clearly identified, all of the fiber drums burned in place in their trailers.

This is what's left of the metal rings that contained the nitrocellulose, they literally, the cardboard burned out, the rings fell in position and with the assistance of some CAI representatives, we pulled out every ring, counted

them and determined that essentially the quantity that CAI had routinely in their warehouse trailer did match what we found.

The next fuel source we considered, we looked into, was the fuel oil that was used at the facility to power their steam boiler. They actually had two steam boilers located side by side and just outside of the steam boiler room and located inside the building a week before or a week or so before the event were the fuel oil storage tanks which are circled in yellow in this view. You see two of the tanks there, the tall, oblong tanks. I'm sure many of the residents have similar tanks in their homes that they use for their furnaces, for heating their furnaces. The third tank is actually lying in the rubble, and again, you can see the extent of destruction of the concrete block and the extent of destruction of the structure in this view.

The tanks were intact after the explosion, they were not split open, they essentially burned in place. And furthermore, there is no mechanism to form a flammable vapor cloud from fuel oil, you need, you would need extreme heat before and that just doesn't happen

with fuel oil.

The next fuel that was considered was natural gas and, with that, I'm going to turn the podium over to Mr. Robert Hall.

MR. HALL: Thank you, Mr. Vorderbrueggen.

Madam Chair and board members, I would like to talk to you about our investigation of the possibility of natural gas fueling this explosion.

Natural gas is a lighter than air gas that rises when it's released, it can accumulate in structures and, in some cases, accumulate to explosive levels. For this reason, federal and state regulations require that the natural gas be odorized with a chemical known as methyl mercaptan, this methyl mercaptan can be detected at extremely small levels and is there so the public is notified early of a natural gas leak.

Even so, every year in this country there are a number of building explosions that occur due to natural gas, the most common cause of these building explosions is a leak of the internal gas piping. The CAI/Arnel facility did not have gas service nor did they have any internal gas piping, thus ruling out a leak of

internal piping.

Two less common sources of natural gas migration in the building that causes explosions are migration through the soil or migration through another utility that runs through the structure. To look at this possibility, we calculated the volume of he building of 110,000 cubic feet and calculated the amount of natural gas that would be required to explode such a building as the CAI/Arnel facility.

We then looked towards the area where the building was located to see what possible sources of natural gas existed that might fuel an explosion and there are two sources, as Mr. Vorderbrueggen has mentioned, the Maritimes and Northeast Pipeline which is a very high pressure natural gas transmission line that runs to the south of the property and the KeySpan city gas utility system that runs to the west and north of the property.

Here again is an aerial view with north to the left, the facility here is circled in black, this red line here on the right side of my figure shows the routing of the high pressure interstate natural gas pipeline operated by the

Northeast and Maritimes Pipelines Company and here, shown in yellow, is the KeySpan gas pipelines that run along Water Street, Bates Street and Riverside Street. It's important to note that this high pressure line is over 200 feet, at an explosive's point of approach to the facility, the line on Water Street comes about 150 feet from the facility and the line on Bates Street again is a little over 200 feet from the facility.

The Maritimes and Northeast Pipeline, 215 feet south of the CAI/Arnel facility, operates or has a maximum operating pressure of 1,440 PSI and normally operates at a pressure of 800-1,100 PSI, pounds per square inch, these are very high pressures. It's 30 inches in diameter, it has a 0.618 inch wall thickness, over a half inch of high strength steel used to contain the high pressure in this pipeline. It's of welded carbon steel construction, it's less than four years old and the gas in this pipe is odorized.

One of the things to look at when you look at a high pressure gas pipeline such as this is there is enormous energy stored in that high pressure, and looking at the size of the leak that

would be required to fill the CAI/Arnel facility in a reasonable length of time, the time that the facility was unoccupied, a leak of that size would vent very close to the pipe. The soil would not be able to contain the pressure within the pipe and it would create a crater. And this an example here of an actual leak site on a high pressured gas transmission line after the gas has been shut off, the gas is not flowing in this picture, but you can see a crater that's been created by the very pipeline and the boulders that have been thrown out of the hole from that high pressure gas. And that's what happens when a high pressure gas pipeline gets a sizable leak.

We also found that there was no conduit that could contain the pressure to keep the gas underground to travel to the building 215 feet away. And one of the most important things, in my experience, in looking at natural gas explosions is leaks don't heal themselves after the explosion, so a very important thing is that when you have a sizable gas leak that leaked into a building to cause an explosion is that that gas leak still exists after the explosion, and there is usually either blowing gas or a fire coming

from the pipe or the source of the leak and there was no post explosion natural gas fire or leak.

We also, with the Maritimes and Northeast Pipeline, obtained from the operator, Duke Energy, which is now known as Spectra Energy, their leak survey records that were conducted, and reviewed those records in detail, and found no evidence that there had ever been any leaks in this pipeline either before or after the event.

The KeySpan gas system, as I mentioned earlier, the CAI/Arnel facility did not have natural gas service nor did they have any gas pipes in the facility, it was also not connected to the two nearest businesses, Abbey Fence or the Danversport Bottled Gas business.

The pipeline was 150-200 feet away, depending on whether you are looking at Water Street or Bates Street. The other thing is that this pipeline operates at a very low pressure, 0.36 pounds per square inch or the pressure created by a ten inch water column, not very high pressures, and this gas is odorized, again, for public safety.

The KeySpan gas system is a very old system, it's over 90 years old, it's constructed

of cast iron pipe and what's known as a bell and spigot type joint, and one is shown here on the right, this is an actual joint from the KeySpan gas system that was excavated during the repairs.

One of the things you can see here is that the pipe has moved a little bit from the joint, as you can see that it's kind of exposed, and I'll talk about that in just a second. These old systems do leak and it is not uncommon to have leaks in the old cast iron piping systems in cities. And as part of the state and federal regulations, the utility is required to conduct periodic leak surveys looking for these leaks. As part of the investigation, we requested the records from KeySpan of all their leak surveys done on the Bates/Water Street and Riverside Street both pre and post incident, and we extensively reviewed those leak reports and found no evidence of any leaks of a size that could have created this explosion. There were leaks before the event, there were leaks after the event but there were no leaks of a size that could have caused this explosion.

I have here a figure, a cross section of the CAI/Arnel facility here on the right, a

representative house here on the left, Bates Street here on the extreme left. There is a couple important points that I really want to make with this figure. When you look at the possibility of natural gas, the gas line on Bates Street is buried approximately three to four feet below the surface of the street, the sewer line is buried nine to eleven feet, the sewer line is well below the gas pipes where it's buried. Gas likes to rise when it's released, it's highly unusual for gas to migrate down through the ground to reach a sewer line.

Also, when you look at the construction of plumbing systems, following the plumbing system codes that are in place, plumbing systems have vents to allow the plumbing system to work properly, but these vents also provide a leak path for any gas that might collect in the system to leak out the vent. I have one here shown on the roof of the house, there was one on the roof of the CAI/Arnel facility. Also, note that the house and the CAI/Arnel facility are connected to the same sewer pipes. If we had had a significant leak of gas into the sewer pipe, it would have gone to the houses on Bates Street as well as the

CAI/Arnel facility.

There was no evidence that any of the houses on Bates Street had an accumulation of natural gas nor did we find any evidence of an accumulation of natural gas that could cause the explosion in the CAI/Arnel facility. But even in the unlikely event that we had gas that flowed into this sewer system, I would also like to point out that here in between the sewer pipe and the CAI/Arnel facility is a manhole that the pipe runs into and then the CAI pipe also runs into. This manhole has a loose fitting cover with holes in it that allow you to remove the cover, the holes are on both sides and, when we inspected it, those holes provide a significant leak path.

Even had gas had been in the sewer pipe, it would have found the easiest way to rise out and get into the upper atmosphere and that would have been through the holes in this manhole cover. It would have been highly unlikely that any gas could have gone into the facility, and even if it had, the plumbing vent would have allowed a release point.

One of the things about this explosion and one of the concerns raised in the community

are the large number of leaks that occurred after the explosion. When you have an explosion of this magnitude, and this explosion was recorded on seismographs in the region, this was a small seismic event in the Danversport area, and like an earthquake, the earthquakes in California, the one in San Francisco in `89, these old cast iron pipe systems get shook up and those joints move, like I showed in that picture, and that creates leaks post explosion. So the leaks that were experienced after the facility exploded were in all likelihood caused by that explosion, not by, not preexisting.

We also, as I said, reviewed those leak records and all of those leaks were also too small to give the quantity of gas that would be required to explode the building. And like the high pressured gas pipeline, we found no pipes that were flowing gas or had a burning fire coming out of them after the incident, again another telltale sign that natural gas was not fueling this event.

We did some further work because we really wanted to look at what went on and so we did blast modeling. When we first looked at this

event, back when we saw the first pictures and first arrived on site, there was one thing about this event that struck us as very different.

I have studied hundreds of gas incidents and looked at explosions but, in this particular one, the one thing that stuck out is the extent of the community damage, the fact that vast amounts of the community experienced severe damage, quite distant from the facility. That would be highly unusual for a natural gas explosion so, to answer this question, we did some further, we did blast modeling to look and to answer this question. We began our blast modeling with a neighborhood damage survey, we went through the neighborhood house by house and documented the damage that occurred, the broken windows, the structural damage, the dented cars.

We recorded all of that information in an extensive data collection, we tied those with the GPS location of each of those structures and buildings to create a map of the damage in the community. From that damage estimate, from that reported information on the specific damage that occurred to each structure, each automobile, we estimated the over-pressure and, from a multitude

of sources that have been collected over many years, there are standard values that are assigned from a specific type of damage to a specific over-pressure, and from that, we were able to establish what over-pressures might have existed at the time of the explosion.

And then lastly, we looked in our blast modeling and compared the available explosive energy of natural gas to the actual explosive energy that we calculated would be required to cause the damage that occurred in the community. Here is a table of that standard damage that I was talking about, that the glass windows will break at an over-pressure of just .15 PSI, that at .4 PSI, pounds per square inch, you get minor structural damage. At one pound per square inch, partial building demolition, the building would be considered uninhabitable. At two, you would get wall and roof collapses and at five to seven pounds per square inch, nearly complete destruction of wood framed structures. And these are standard tables that have been collected over years of explosive events review.

This is a map, an overhead photograph that overlays the damage information that we

collected and each of the buildings, and structures and vehicles that we collected are here with the numbers throughout the area. This double circle in here is around the CAI/Arnel facility, here, out at 365 feet, we estimated that the over-pressure was at 2.3 pounds per square foot, and here at 581 feet, we came up with 1.2 pounds per square foot. Square inches, I'm sorry.

From that, we then looked at the volume of the CAI/Arnel production facility and determined that the volume there was about 110,000 cubit feet. We then took and theoretically filled that volume with natural gas to the absolute optimum level that would give us the great amount of explosive energy, and then we compared those explosive energy estimates to our observed community damage. And what we found is that this information corroborated our observation that there was no enough energy in this explosion to cause the far field, the extensive community damage that was so distant from the facility. Natural gas, at the optimum level, would have destroyed the building but it would not have destroyed the number of homes in the Danversport area there were destroyed.

So we found, although, in summary, no credible path to get gas in there but even had there been gas in there, we just couldn't get enough energy to do the damage that was observed, we needed something more energetic to cause this explosion and, as I just stated, the maximum blast energy was not sufficient to do this.

Thank you. I'll now turn it over to Mr. Wanko who will continue to discuss the remaining fuel sources.

MR. WANKO: Thank you, Mr. Hall. Good evening. Members of the board, if I may take a few moments to discuss and review what we've just learned.

My colleagues have considered three possible fuel sources, nitrocellulose, fuel oil that was used for the furnaces and natural gas, all three of these have been eliminated as possible fuel sources for this incident, nitrocellulose because it burned in place and was not involved in the explosion, fuel oil because it could not have created the vapor cloud that was needed to perform this explosion and natural gas because there was no credible pathway into the building, and as Mr. Hall just stated, our blast

model indicates it did not have sufficient energy to perform the damage in the Danversport community.

That leaves the only credible fuel source for this incident as the flammable solvents that were used by both CAI and Arnel in the building. In fact, the blast modeling that Mr. Hall discussed does support this as the possible fuel source, therefore the team is considering two potential scenarios for this. As we know, both companies used flammable liquids or flammable solvents inside the building and they stored amounts of the flammable solvents inside the building as well.

So the first scenario that we are evaluating is a large leak from one of the storage containers causing a pool of flammable liquid to spread throughout the building.

The second is a solvent filled, heated process tank overheating and creating a vapor cloud that spread throughout the building. A large leak from a storage container could have occurred inside this building, the release would have spread flammable solvents throughout the building and slowly evaporating, creating a vapor

cloud above the pool. As this vapor cloud accumulates, it would eventually find an ignition source and explode. However, the more likely scenario is that a process vessel used by one of the companies continued to heat throughout the evening.

As the vessel heated and the contents overheated, this would have created heavy vapors that escaped the vessel, traveled throughout the building, finding an ignition source and exploding. In both of these scenarios, however, the investigation team has been unable to identify the ignition source. However, the primary control here is to keep the fuel in its container and away from ignition sources.

As we know, both companies used flammable liquids in their processes. However, there were differences into how each company handled and processed those materials. Arnel had, as Mr. Vorderbrueggen stated, a 1,000 gallon mixer. However, Arnel employees reported to the team that this mixer was empty on November 21st and had not been used in the two weeks prior to the incident. Typically, Arnel processed small batches, 55 to 100 gallons were typical. Arnel

did not heat their batches at all, it was a simple mixing operation. And finally, Arnel employees reported to the investigation team that there was no overnight heating on November, or no overnight processing, excuse me, on November 21st.

CAI, however, processed large quantities of flammable solvents, as we'll see, 2,000 gallon batches were not uncommon. CAI heated their batches in order to facilitate dissolving solids in these flammable solvents. And finally, CAI employees reported to the investigation team that a 2,000 gallon batch that was prepared on November 21st was left on a slow stir overnight, this overnight processing was a common practice for CAI, even though the facility was unoccupied overnight and no operators were there to monitor the batch.

CAI's processing took place in a tank that looks much like this, a typical batch would be prepared with the operator dispensing solvent into the tank, a prescribed amount of solvent, and beginning agitation and starting heat by opening two steam valves, a supply valve and a return valve. The steam here is at a maximum of 240 degrees and is capable of reaching the boiling

point of these two materials or these three materials that are in this vessel. The mixture that day, in this particular tank, on November 21st, was of heptane and two alcohols, all three of these materials are flammable.

Agitation is started and the operator begins to dispense a prescribed amount of solid materials through the open manway. When the operator performs this, he opens a valve to a dust collector, a ventilation system, to minimize dusty conditions while he is doing the solids dispensing. However, when he is finished dispensing the solvents, it is common practice, as reported to the team, to close off the ventilation to that dust collector. The mixture or the contents of the tank are heated to 90-100 degrees Farenheight. Once the operator reaches that temperature, he will check to see that the solids are dissolved and then shut off the heat by manually closing these valves.

There may have been a cover on the manway. However, there was no way to seal this manway and it provided an excellent path for the escape of dense flammable vapors that could cascade out and travel along the floor. The CAI

operator reported to the team that he operated the tank following this sequence on that day. However, this tank has no administrative or engineering systems that could help prevent an overheat situation, there were no formal operating procedures, there were no temperature, high temperature shut down systems and there were no high temperature alarms, and as Mr. Vorderbrueggen stated, the ventilation system inside this building was shut down each evening.

This tank was a basic human operated system. Without a human operator, this tank had no safety systems to prevent an overheat situation or emergency situation and nothing installed that could have stopped it once it began.

Members of the board, if this sounds familiar it's because just a few months ago you published the results of a ten month study into an identical incident, the Universal Form Clamp incident in Bellwood, Illinois involved just that, an unsealed container with flammable solvents overheating and creating a flammable vapor cloud that ignited, killing one and injuring two.

Similar to CAI's vessel, UFC's, Universal Form Clamp's vessel had no safety

systems that could have prevented the incident from occurring. Therefore, the team is looking at three ways that the overheat situation could have occurred, first, that the steam valves were left open that evening; second, that the steam valves were not fully closed; and third, that the steam valves malfunctioned and leaked steam into the tank's heating chamber and because we know steam, at 240 degrees, was always available, the boilers were always on creating steam, each of these is equally likely.

But how this incident happened is not nearly as important as why and to understand that we need to look at some of the codes and standards that govern industrial use of flammable liquids. There are three primary codes that we need to understand. First is the Occupational Safety and Health Administration's standard 106 for flammable and combustible liquids, second is the commonwealth's fire code for flammable and combustible liquids, and finally is the National Fire Protection Association's code 30 on flammable and combustible liquids. All three of these are very similar, they require an amount of ventilation and they also require certain features

on indoor storage for flammable liquids.

These are codes and standards that CAI and Arnel Management must have been very familiar with, and we'll take a look at a few of the requirements. The first is ventilation. As I mentioned, all these codes require ventilation. OSHA's requires that the general processing area be ventilated and that ventilation must meet certain requirements in order --. One way to show that I meet those requirements is to provide one cubic foot per minute per square foot of floor area.

So, on the map that Mr. Vorderbrueggen showed you, area C, which is 5,100 square feet, there should have been 5,100 cubic feet per minute of ventilation at a minimum. This ventilation system must also consider that these are dense vapors, they travel to the ground and they collect at ground level, the ventilation system must be designed such that that ground level accumulation is evacuated.

Secondly, OSHA requires that unsealed or open process equipment have local ventilation, that local ventilation must limit flammable atmospheres to within five feet of that equipment.

The investigation team has made three preliminary findings. First, CAI and Arnel employees reported to the team strong odors of solvent when CAI heated its batches, this led the team to believe that the ventilation system, even when it operated, was most likely inadequate.

Second, that the local ventilation that is required by OSHA was shut off, a common practice, and was used only when dispensing solid materials into the vats. Third and most importantly, the building ventilation was turned off at night and this was done on November 21st, this is mainly due to noise and heat loss in the building.

Madam Chair, the investigation team considers this to be a most unsafe practice and probably the immediate cause of this incident. Shutting off the ventilation could allow for the uncontrolled accumulation of flammable vapors throughout the building and since the building was unoccupied for the eight hours prior to the incident, it is central to this incident.

The team has some suggestions and these are based on good practice and they represent the

safest method for operating flammable liquid systems. The first is that a tank such as this be provided with automatic temperature control that can turn off and turn on the steam automatically and alarm the operator if the temperature of the contents goes above a set point. Secondly, a high temperature shut down and alarm, independent of the process temperature control, that again could shut down the steam and alert the operator if a high temperature event is occurring.

Finally, that process equipment such as this be sealed and vent safety to the outdoors so in the unlikely event that temperature control is lost, vapors would be safely vented outdoors. None of these features were in place at the facility. In addition to the ventilation requirements that were just discussed, the commonwealth requires certain features for flammable liquid storage inside of buildings. These tanks and containers must be vented to the building exterior to allow any vapors generated to safely exit the building and not accumulate indoors.

Second, that these tanks and containers be fitted with self-closing valves that close if

they are exposed to fire so that the contents of the tank do not add to a fire and make it much worse.

Third, gravity draining is prohibited, these tanks and containers must be dispensed from the top and dispensed with a pump and not through gravity, again to prevent the uncontrolled release of flammable liquids in emergency situations.

Finally, fire resistant pipe material must be used, again to prevent the uncontrolled release of flammable liquids if piping and containers are exposed to fire.

All these features prevent flammable liquid storage inside of buildings from adding to already bad situations, fires inside the building. The flammable liquid storage at the CAI/Arnel facility had none of these features.

With that, I'll turn the podium back to Mr. Vorderbrueggen to discuss the last point and summarize.

Thank you.

MR. VORDERBRUEGGEN: Thank you, Mr. Wanko.

Before I move on, members of the board, I would like to add one additional point that has

come to light. Approximately two months ago we sent written questions to CAI/Arnel and the town, requesting any permits that were in place for the hazardous materials at the facility. All parties responded by saying they were unaware of any permits for the solvents and other flammable materials at that facility, apart from the permit for the underground storage tanks, which in fact we did receive for more than one of the parties we requested it from.

Then just today at about 2:00 p.m., following our report this morning to the press, one of the companies produced a document labeled a registration for flammable materials used at the site. It refers to a license under Massachusetts General Laws that was issued to a former occupant of the site back in December, 1944, more than 62 years ago. The document indicates that on May 1st of this year, 2007, the Town of Danvers renewed this registration to CAI and Arnel for a one year period. Our investigation team plans to research this document further and determine how it might relate to the requirements under state codes, it's just not clear at this point in time, that last bullet, that's what I'm addressing.

So, with that, let me move forward.

We are finally at the summary.

As the team has identified and discussed over the past our or so, the team has concluded that the available energy from the optimum quantity of natural gas inside the building could not generate explosion over-pressure sufficient to cause the damage observed throughout the community. Furthermore, there is no evidence of a natural gas leak that could provide enough gas to destroy the CAI/Arnel building and cause the damage. Next item, the industrial grade nitrocellulose did not explode, it burned inside the storage trailers, both the Arnel and CAI.

And the boiler fuel oil did not cause the explosion, you could not generate vapor from the fuel oil system. And finally, in summary, flammable vapor from highly volatile heptane and alcohol solvents was the only material capable of fueling this explosion that caused such widespread community damage and destruction.

There is more work that the team is conducting, we are looking at the sufficiency of flammable liquids fire prevention standards, we

are primarily interested in the automated controls and alarms and unsealed container issues that Mr. Wanko just briefly presented to you.

We are also looking at the urban planning and land use near hazardous chemical manufacturing facilities. Of course there is two issues here, one would be preexisting facilities and one would be the planning side for potential installation of new facilities. And we are looking for, looking at the guidance provided in the Massachusetts fire regulations to the local fire departments, and more specifically, we are interested in learning more about the hazardous material permits that the fire codes require, including licenses and in some cases, inspections and what guidance does the state provide to the local fire service to administer those processes.

And with that, I will turn the podium back to the board for any questions to the team.

MS. MERRITT: I would like to thank the team for an excellent presentation. At this time, I would like to open the floor to the board members, if you have any questions. Do I have any board members with questions?

Mr. Wright?

MR. WRIGHT: You indicated that the ventilation system was insufficient or inefficient due to the fact that the workers at CAI and Arnel had smelled fumes during the normal processing of a batch. My question is, do you believe that the inefficiency of that ventilation system, even if the ventilation system was on, could have led to an accumulation of vapor sufficient enough to cause an explosion of this type?

MR. VORDERBRUEGGEN: Unfortunately, the extent of destruction prevents us from identifying the specifics on the design flow capacities and those issues associated with adequacy for the one cubic foot per square foot of production area. And yes, as we mentioned, an augmentation of odor during handling and transfer of solvents is an indication of possibly less than adequate capacity. As was identified by the operators of the facility, shutting down the system rendered it totally nonfunctional and therefore, it did not meet the standard of both OSHA and the Massachusetts State regulations for venting flammable vapor while the process was operating.

If it had been left on, it would be

somewhat speculative on our part to try to suggest that this event wouldn't have happened. It might be fair to say that the explosion would have been less energetic because I think it's fair to conclude that some of the accumulated vapor would not have, it would not have accumulated to the density that it so apparently did, so it might have been a lesser event, it probably still would have taken out the building ultimately.

MS. MERRITT: Mr. Visscher?

MR. VISSCHER: Thank you Madam Chair.

In Mr. Wanko's presentation there was a slide that showed that there were three possible ways for the overheating to have occurred -- the tank, either the valve had been left open, perhaps the valve -- I think in looking at that section, is there a way to determine -- what might have, if it was left open, whether there was a leak?

MR. VORDERBRUEGGEN: Yes. On the steam valves and--

MR. VISSCHER: The steam valves and what might have been involved in, is there a way to be able to determine whether they were left on or whether they leaked or something like that.

MR. VORDERBRUEGGEN: As you saw in the

many photographs, the extent of the destruction was all but total. We did look very hard for those valves in the debris, we were able to use a manlift to survey, safely survey the top area where those valves were reported to have been physically located upon the, on the mezzanine deck, and we were unsuccessful in locating the valves. We do know what the make and model was so we do have general understanding of what those valves were, they were quarter turn ball valves with teflon seats on them.

But because we can't conclusively identify that the valve was full open, part open, full closed and leaking, we can only say that one of those three things had to occur for the vapor to develop. If there had been no steam flowing to that tank, we would probably not have been generating vapor to the extent that this would have caused this event.

MR. VISSCHER: Regarding the ignition, the possible ignition sources, have you identified possible ignition sources?

MR. VORDERBRUEGGEN: That's always the first question people ask, what caused, what lit the fire? We know that it was lit, obviously. In

discussions with the contractor that did the electrical work and in viewing or reviewing what was left in the debris from the permanent hardwired electrical equipment in the production area, in general, we concluded that they worked hard, both companies worked hard, they respected the hazard, the flammable hazard of the solvents, to the extent that they made, that they strived to get the right equipment installed for their permanent electrical devices, the motors on those agitators. The lighting system in the ceilings, fluorescent lights, were all what we call rated for flammable environment, some people call that explosion proof, that sort of thing.

However, in a structure like this, in a building like this where there are operating things going on, day to day activities, it's all but impossible to absolutely prevent every candidate ignition source. Somebody might have a foot warmer at a work desk. We didn't find anything like that but that could be a candidate.

We did find some nonrated equipment but part of the problem was the extent of destruction and blast outward, we couldn't identify exactly where it was before the explosion. Ignition

sources are free is what is sometimes said in industry and again, it's very unfortunate that, as Mr. Wanko pointed out, the first line of defense is to keep the hazard commodity in the container.

MS. MERRITT: Mr. Bresland?

MR. BRESLAND: Thank you, Madam Chair.

I've got several questions.

The first one is for Mr. Hall. How deep was the high pressure gas line? How deep was it buried or how deep is it buried?

MS. MERRITT: How deep is the high pressure gas line buried?

MR. HALL: At this point, I don't know the exact depth of cover, it is a number of feet deep. Typically, they are in the range of five to ten feet deep but the exact depth of cover was not shown on the drawings that I had.

MR. BRESLAND: If there was a leak of an 800 PSI line, would you hear it?

MR. HALL: You would certainly hear it.

MR. BRESLAND: It's a very, very loud noise?

MR. HALL: Yes.

MR. BRESLAND: The codes that you talked about, you listed codes that applied to

this facility, was compliance with those codes mandatory or voluntary?

MR. WANKO: Compliance with OSHA and the Commonwealth's fire codes are mandatory National Fire Protection Association Code 30, it is a voluntary standard and not applicable in Massachusetts.

MR. BRESLAND: I think you mentioned this, but was it a routine practice at the facility to leave the three 1,000 gallon tanks full of flammable liquids overnight? I mean was that typical of what would happen?

MR. WANKO: Certainly leaving them full and on a slow stir overnight was a common practice, these tanks were debatched maybe once a week and then they would slowly use up, use out of those tanks over the course of a week or two. But certainly leaving them on a slow stir overnight, after what we saw on November 21st, after just batching it that afternoon, was a very common practice for them, yes.

MR. BRESLAND: One final question, it's more, this is a combination of a question and a suggestion for further evaluation and it really ties into the final slide where you talked about

continuing investigation activity. The people in the community who live around this facility and the people who live around other chemical plants or other facilities that perhaps don't look like chemical plants but in reality are small chemical plants, how would they find out or how do they find out what chemicals are being used, stored, manufactured, processed in those facilities? I'm not suggesting that you necessarily answer the question now but make it as a part of your evaluation that you put together.

MR. VORDERBRUEGGEN: That is part of our ongoing investigation in the urban use and planning activities and that is the subject because that is an important element of all of the residents in the area.

MR. BRESLAND: Okay, thank you.

MS. MERRITT: But aren't there already regulations? I mean are there emergency planning and community right to know, that facilities notify and also notify their communities about what materials they have? There are already certain reporting requirements and regulations that require companies that have hazardous materials, flammable materials to report to local

authorities what they have on site, don't they?

MR. VORDERBRUEGGEN: Yes, that is in fact correct, the Emergency Planning and Community Right to Know act does require companies to report to the community authorities. In this case, I believe the information is provided to the Danvers Fire Department and one of the terms is known as tier two reporting, and I won't get into the specifics of that classification, but in general, companies that handle flammable materials and other hazardous materials are required to provide a report to, in this case, Danvers Fire Department, that information.

There has been challenges with disseminating that information out and not because Danvers Fire Department doesn't want to do it but it's a nationwide problem. The intent of that was Community Right to Know, exactly as it's titled but, with 9/11 and homeland security, everybody is concerned about how readily you share the information and that's been an ongoing problem, we have seen it in other investigations. And it's something that does need to be looked at because, again, Congress has mandated that the community has a right to know what the chemicals are, in

general terms, but it has become a problem and, you know, the fire department feels that their hands are tied and it's hard for them to disseminate that out.

MS. MERRITT: In order to ignite this flammable, the flammable vapors that we believe were in this building, what kind of energy do you need? Would you have to have a large fire to do this or what kind of energy would ignite an explosion of this magnitude when you had flammable vapors collected in a building?

MR. VORDERBRUEGGEN: In the engineering field, in the chemical engineering field there is a term called minimum ignition energy required to ignite a flammable material or flammable vapor, in this case. The ignition energy for heptanes and other typical solvents are around, I think it's about a quarter of a millijoule of energy, comparing that to static electricity spark, when you walk across your carpet and you get zapped on the metal of your car or whatever, you are generating about 20 millijoules when you create an electric spark by static, it doesn't take much.

The other interesting thing is it takes a lot more to ignite natural gas than it does the

solvents, but still below this representative comparison, so it doesn't take much.

MS. MERRITT: Are there any other questions from board members? No?

Well then, at this time, I would like to pause briefly so that we can move the podium down. And I would ask people who have signed this sheet to assemble and I'll call your names, Kenneth Smith, Susan Tropeano, Mike Ellenbecker, Ardiman --. Mr. Ardiman, I can't read your writing. Is it Merganza? Does that sound familiar to anybody? Tara Ranhollif and Tracy Greene, if you would assemble, we would start with that group for public comment.

If you would, please state your name and affiliation, if there is one, such as resident or, and, if you would spell your last name, that would help us with our record. Did I give you enough time? Are we ready?

I assume you are Kenneth Smith.

MR. SMITH: I am.

Madam Chairwoman, I'm here as an expert of CAI and I have several questions that I hope you would be willing to address with the panel for us to quantitate some of their comments. The

first is that we were told on several occasions that even the optimum amount of natural gas would have been insufficient to explain the amount of damage observed; I wonder if we could be told how many pounds of natural gas that might be. Similarly, by inference, I gather they believe that there is enough solvent to explain the damage observed, I wonder if we could be told that.

And lastly, since the solvent would constitute a dense vapor, there is a challenge as to how it got mixed with the air in the building and I wonder if we might be told how that was examined.

Thank you.

MS. MERRITT: Thank you very much. We have recorded those questions. I don't think, at this point, I would ask the team to answer those, but we certainly will answer those in our report.

MR. SMITH: Thank you.

MS. MERRITT: Thank you.

Susan Tropeano? Did I get it right? No?

MS. TROPEANO: It's Tropeano, T-R-O-P-E-A-N-O, I'm a resident.

First, I wanted to thank the CSB for

calling this meeting, and notifying the residents and inviting us to come, and also for all the consideration that the CSB has had for us in putting this report together so far in this preliminary report, we appreciate it.

The group, the neighborhood group, we've been talking to some investigators of our own and we have a few questions that I'm not sure have been addressed in this report, and I'm wondering if I could maybe put them in writing and submit them to you?

MS. MERRITT: Absolutely.

MS. TROPEANO: To get answers to those questions?

MS. MERRITT: Certainly, and what we would do is we will look at those and make sure that those questions are included in our report.

MS. TROPEANO: Okay, thank you.

MS. MERRITT: Would you like to review them now?

MS. TROPEANO: Well just, in general, I will probably have a couple more afterwards because I'm not the only one in the neighborhood. One of the things I wondered is was a combination of gas and solvents considered as a possible,

enough energy to make this explosion? There was, in the very early minutes of the explosion, there was a torch-like fire, long before it spread out and enveloped the whole company, it was a torch, it was hundreds of feet in the air, just straight up, and it was amazing to all of us who had never seen anything like that, and I would like to know what was responsible for that.

Oh, and when they were talking with the slide of the sewer line that went to the house and to CAI, and then they pictured a manhole cover, I'm wondering was that the same manhole cover that blew off and was found 20, 40 feet away? Thank you.

MS. MERRITT: All right, thank you very much.

Mike Ellenbecker?

MR. ELLENBECKER: Good evening, it's Mike Ellenbecker, E-L-L-E-N-B-E-C-K-E-R, and I resent that you didn't ask Mr. Smith to spell his name.

(Laughter)

MS. MERRITT: I got that one.

MR. ELLENBECKER: Not like the rest of us.

I'm a professor of occupational hygiene at U-Mass Lowell and Director of the Toxics Use Reduction Institute here in Massachusetts, and I would like to suggest to the board in your report that you discuss strongly the potential of substitution of less flammable or nonflammable materials as a way of avoiding this type of accident in the future. The Toxics Use Reduction Institute was formed as part of a state Toxics Use Reduction Act, which was passed in 1989, and this act was designed to encourage Massachusetts industries to reduce their use of toxic chemicals.

If companies use particular chemicals that are on a particular list and meet certain other requirements, they participate in the program, and among the participating firms, we have seen a more than 40 percent reduction in the use of toxic chemicals and a more than 60 percent reduction in the waste generated by those companies, all voluntary changes. Now these two companies did not participate in the TUR program so they did not have an advantage of the services that we could provide to them at the institute and also our sister agency, the Office of Technical Assistance.

I guess my main message here is I would like to encourage any small businesses and large businesses, anyone in Massachusetts, whether you are part of the TUR program or not, to, and you are using toxic chemicals, flammable, nonflammable, if they are toxic chemicals, please contact us, we will work with you to reduce and eliminate the use of those toxic chemicals. Our services are free and confidential, so please get a hold of us, we want to work very hard with anyone in Massachusetts to prevent a recurrence of this tragedy.

Thank you very much.

MS. MERRITT: Thank you very much.

This may be Amanda? Is there an Amanda who signed this list? No? Okay. Tara Randhowa? Randowa? Oh, then, fine, sure, say your name, and you might want to spell it for us.

MR. CHIARADIA: My name is Andre Chiaradia, that's spelled C-H-I-A-R-A-D-I-A, I'm a resident of Danversport.

And the first, there is two points that I would like to make, one is that I live on the other side of the, it's the Kern River, I believe, and I had significant damage, at least in terms of

cracks, not in terms of the total destruction, but my neighbors also lost windows, so I kind of wonder about the representation of the pressure wave. And I'm wondering about a question about why does it have to be just natural gas or solvent? Why can't it be one setting off the other?

MS. MERRITT: Okay, thank you.

MR. CHIARADIA: That's what I wonder, if the Board has considered that.

MS. MERRITT: Thank you, we will, thank you very much.

Tracey Greene?

MS. GREENE: Hi. Tracey, T-R-A-C-E-Y, Greene, G-R-E-E-N-E, a lot of E's.

I would like to resonate with what Susan said, we want to thank you, CSB, for helping us out with the investigation, you've been very kind. I've been talking to Hillary, I talked to Sandy and it's been a great connection, so I would like to thank you.

I have four follow up questions I would like answered. One is, in your report, will you include the folks who you actually talked to that reported smelling gas the day of the explosion?

There were some workers in the bakery that reported smelling gas and I just wonder if their names are going to be in the report and if that was documented.

Question two, is how did you actually go and investigate the sewer line? I know you saw, you did the drawing of the house and the actual plant, and how the sewer line was under the ground and the manhole cover, but exactly how you investigated that.

Three, the neighborhood has requested to see the KeySpan documentation that they provided you, and we filed, under the Freedom of Information Act, that we should have rights to be able to see that and I'm just wondering if we'll get those rights to see that documentation that KeySpan provided you guys.

And sorry, four, this is going to resonate, I think you've been kind of asked this twice already, but have there been any 3D models made at this time that show a combination of natural gas and chemical solvents to come together and culminate and make one massive explosion or whatever? I know you've done 3D models that show one or the other but have you done something that

does both?

MS. MERRITT: Okay, thank you.

MS. GREENE: Thank you.

MS. MERRITT: Yeah, I could address a couple of those questions. In our investigative reports, we do not identify people by name who have been interviewed, we never do. We report what might have been said in some of our interviews but we don't report or identify individuals. If you read any of our materials on our website, you'll see that that's a consistent policy, so we would not identify people, particularly. Now we may identify such as residents, employees, those types of things and I think the report will give a pretty good indication of who we spoke to as far as where they were or what their position may have been.

Rob, do you want to talk about the sewer line, how it was investigated, or do you want to, rather report that in the --.

MR. HALL: One of the things we looked at that I didn't mention when I was on that slide is we had some extensive conversations with the city engineer, and the city had actually conducted a videotape survey of the sewer line along Bates

Street and did not find any indications that it would be a hole large enough to create a leak path that could get gas into that part of the sewer system.

MS. MERRITT: Okay. And then, as far as KeySpan documents, would you like to comment on that? Our General Counsel actually gets to talk.

MR. WARNER: During an investigation, it is our practice not to release documents until the full investigation is completed. We are a very small agency, we are focused on this investigation, it is a safety investigation. We do our best to avoid involvement in civil, criminal and other types of investigation and we are solely cited on looking at the safety implications and how we can improve not only the safety at this facility but all over the country. And therefore, given the tight timeframes we try to work with, we really do not release these types of documents until we are finished with the investigation.

MS. MERRITT: But, at that time, they could file a FOIA request and we will take that into consideration.

I would like to call on Ted Spiliotas,

Massachusetts State Representative.

REPRESENTATIVE SPILIOTIS: Thank you, Madam Chair. Excuse me for taking so long, it's a long way from the back, I didn't expect to.

For the record, my name is Ted Spiliotas and I represent the Town of Danvers in the Massachusetts Legislature in the 12th Essex District. I also am somewhat of an abutter where I live on the other side of the river, so I'm kind of an observer of the entire event. I really come this evening to thank you as much as I possibly can for your involvement here. If there is ever a question in D.C. for your credibility, this evening and the past few months show all the evidence of why you should be part of this process.

You bring another voice to a very difficult situation and you allow us, as a Commonwealth and as communities, to review our actions, unfortunately in the most difficult of circumstances but also extremely necessary, so I thank you for that.

I also, I'm not going to ask any specific questions because I feel the neighbors, and the residents and our local officials have

done that and are doing that this evening. But I would like you to know that this is an extremely tight neighborhood that is trying very hard to answer the questions that you're observing and have no other, no other reason than to be able to answer what happened to me when my neighborhood blew up?

And they are not experts, and they are not scientists, and they are not attorneys and they are not, you know, professional politicians, they are just neighbors that saw their homes explode. And I thank you for coming from all over the country to be here in our community, I thank you for listening, I thank you for the comprehensive nature of your work. And I do, I can't help though but say, in my own eyes, that we will never experience an explosion like that again, I'm fairly confident.

MS. MERRITT: We hope not.

REPRESENTATIVE SPILIOTAS: No, I know we won't because I know that there will be safeguards and I know that, you know, if you've lived all of this time, just the percentages tell you you are there. But the point is if you live, like I did, across a river and have a home shake

for several seconds or minutes, and then not be able to see a flame for a minute or so and then see an explosion as large as you've ever seen in your life, even if you've seen the biggest factories, that's quite different than what you would have imagined in which you would as I --. I don't know what transpired those few seconds but I know that I felt the sound and didn't see the flames. Now maybe for others that wasn't the case but I would like to be able to point that out.

I would also, and as I said, again, these folks created a neighborhood group called SAFE and I want you to know that they are just trying to find out the answers and if you can just, we serve often times in elected office and appointed office to provide character references, if I can do that, I lend my name and my office to that character, so that's my role this evening. But thank you, Madam Chair, and thank you to the Board.

MS. MERRITT: Thank you very much.

Mr. Knox or Ms. Knox? K-N-O-X, I can read that one. Jay Donnon? Oh, wrong list, okay. Jay Donnan of F. Wilson Way? I have no idea what the next one is, it's Al, from Texas. Okay.

Robert Smallcome? Oh, good. It wasn't him, he was just moving.

(Laughter)

MS. MERRITT: At this time, I would open the floor. If there is anybody else though, please state your name, and tell us how to spell it and have your comment.

MR. MILANES: My name is Jose Milanes, J-O-S-E, first name, Milanes, M-I-L-A-N-E-S, I'm a resident of 8 Riverside Street in Danversport.

Just, first of all, thank you for the report, very comprehensive, very educational. Just two quick questions, on the slide that showed the manhole with the gas pipes between the house and the company, I couldn't see where it the intake air valve, the intake air system was in relationship to that diagram. My question goes if we were venting through the manhole cover, would it be possible that, you know, the intake was taking the gas in? Just something to look at, I'm not sure of the relationship, maybe there isn't any.

The other is many years ago I worked for an insurance company as a safety engineer, casualty and fire, they normally send out safety

engineers on a regular basis to do inspections, I was wondering if you guys have looked at reports from the insurance companies, from the fire carriers, regarding in particular the ventilation issue, it's a big one, from a fire prevention perspective, if any reports were provided regarding that issue.

MS. MERRITT: Thank you. We will be looking at that and we usually do, in our investigations, look at insurance inspections and recommendations made to the company, so we will be doing that. And it would be easy in our diagrams to orient where that manway was with regard to, or the sewer cover with regard to the ventilation intake, and we will certainly do that in our final report and look at that also as to whether or not that's a possible source.

Yes, sir?

MR. EAGAR: My name is Thomas Eager, E-A-G-A-R, expert for CAI.

In Room E, there is a vessel on four legs in which the steel is ripped very severly and I was wondering if the report will address how the damage to that vessel occurred in the deflagration, as opposed to a detonation. In

addition, I'm wondering how the board concluded that the nitrocellulose was only located in the storage area and was not located in some area such as underneath this vessel.

MS. MERRITT: I don't know if anybody on the panel is prepared to answer that. John, would you like to comment on that?

MR. VORDERBRUEGGEN: We are looking at the tank that you are talking about, that's the 1,000 gallon tank that was located up against the, pretty much against the wall of E, and that is something that is part of our ongoing investigation.

As far as the nitrocellulose is concerned, it was a final mix product that was underneath that container, not a raw material of nitrocellulose. There was in fact a few pounds, approximately 20 pounds, of unconsumed nitrocellulose located during the cleanup by the EPA and we are fully aware of that. And in fact it points out that in spite of the tremendous explosion that occurred, and the events and destruction, the small quantity of nitrocellulose which was left over from the previous day, they typically did not keep any nitrocellulose in the

room, but if they had, a few pounds, 20-30 pounds, they would keep it there overnight, but it actually survived the event, even though it went through the event, including the fire and everything else, and it was still there.

MS. MERRITT: Intact.

MR. VORDERBRUEGGEN: So that, again, it's somewhat of a testament to the nonexplosive characteristic of this industrial grade material that the companies used.

MS. MERRITT: Thank you.

Yes, sir? Or, yes, ma'am?

MS. RUOTOLO: Yes, Anne Marie Ruotolo, first name is two words, Anne Marie, and the last name is spelled R-U-O-T-O-L-O, resident of Bates Street whose home was damaged in the explosion.

I have two comments and questions. You talked about the Maritimes Pipeline and what would happen if there had been a leak, I was wondering if, as a point of comparison for the neighborhood, you might explain to us what would have happened if the pipeline, which is the 30 inch pipeline, had exploded, so we would have some point of comparison to the explosion that we experienced. I was wondering if you could do a characterization

to give us a point of comparison.

And the second one is, and this may be an argument for siting these facilities a fair distance away from residential neighborhoods, what if the ventilation system, which I believe you characterized as being inadequate and shut off that night, what if it had been adequate and the heptane and the isopropyl alcohols, those fumes got into the neighborhood, would we still be alive? In other words, these chemical vapors, if they are being vented to the outside, what is the, what would happen to human safety or would they have ignited outside of the facility? Perhaps there is two questions there, but I would like a little more information. I appreciated all the information you gave today, but those are two questions that come to mind.

MS. MERRITT: Mr. Hall, would you like to take the first one with regard to the 30 inch pipeline?

MR. HALL: The explosion of a high pressure natural gas transmission line is something that, one, is an extremely rare event, it happens very infrequently in the country. It usually happens as a result of some external

damage to the pipeline. But of those that I've looked at and studied in the past, it tends to be again a more localized, although it's a very tremendous event, typically will result in a very large fireball. The event tends to be more vertical and up in the sky with less damage further away, so it would not be that kind of event, but again, they are extremely rare events.

And those particular pipelines, in contrast to the KeySpan pipelines, they have extensive regulations that require periodic inspections with specialized tools internal to the pipeline and the like to make sure that they are, the integrity is maintained. They also because, in the natural gas transmission pipelines, because there are houses close by, there are actually requirements that steel in that pipeline be thicker where there are houses close by to reduce the probability of an event.

That particular pipeline in that area is classified as a class three pipeline and I don't know of a particular event, I can't recall an event where a class three pipeline ever exploded, that the explosions that I have seen typically are class one, which are very rural,

where the steel is thinner.

MS. RUOTOLO: Thank you. I just wanted to know if you can compare would the damage had been as extensive if that had happened, compared to what happened to us?

MR. HALL: No, I don't believe that would have been as extensive a damage.

MS. MERRITT: And your answer concerning the vapors in the community is something that we will look at and try to give some information on.

Yes, sir? Let's see, the fellow with the blue shirt.

MR. JOYCE: Hi. John Joyce, I'm a resident of 9 Bates Street.

MS. MERRITT: Is it--

MR. JOYCE: Joyce, J-O-Y-C-E.

MS. MERRITT: Thank you.

MR. JOYCE: I've been an abutter of the CAI for 27 years, I work basically night shift so I'm up late at night and I know and, from what I heard tonight, doesn't really go along with what I've observed as a neighbor all those years. One thing I, and that's why I agree with the possibility of it being two things because I've

never really smelled anything coming from CAI and their vent fans go north and that's right where my property is.

I have seen the fans and I have seen them running at night, so what the other thing was, it didn't go along with that and I've never really smelled anything coming from that place. And I wondering if there was a difference between the smell between natural gas and the solvents that would be there, if it would be more noticeable because the natural gas smell I have smelled from time to time, but I've, a solvent smell, I really have never really had any problems with. And I just wanted to say that because I was up the night of the blast and I wasn't 150 feet from it when it happened, and the ball I saw, as I said, was amazing.

MS. MERRITT: Mr. Hall, would you want to talk about the odorizer and the very small amount it takes to detect it? Or would you prefer to address that in the report?

MR. HALL: The odorant that's added to natural gas, the methyl mercaptan, is added because, one, it's a very strong odor, it's a very distinguishable odor and it can be smelled in very

small quantities. It would be quite, at least my nose, and I've smelled a number of solvents, would say that natural gas is orders of magnitude more smelly than the solvents that my nose has smelled, but smell is kind of an individual experience.

MS. MERRITT: And we'll address that.

Yes, sir?

MR. SANBORN: My name is Ed Sanborn, S-A-N-B-O-R-N.

I have three questions, one is from a neighbor of mine, she would like to know why investigators from CSB and also the local and state investigators, why they did not interview the neighbors on Riverside, or Bates Street or the surrounding areas about the problems that we have had with natural gas leaks. Now we understand that you talked to KeySpan, you've got documents from them. But there is a number of residents and a number of them that we have spoken to in the neighborhood that say that they have never been interviewed by you folks, or anyone else, for that matter.

And I will also say that, you know, a lot of the gas leaks that we smell we report, there are also times we don't report them because,

you know, it's a chronic problem down there, you know, we report them and then KeySpan may come out, they may look into the issue, not find something, maybe try to find something and notoriously the leak smell will come back again, and again they'll come out.

I mean this may repeat itself ad nauseam a number of times to the point where you get tired of calling. So relying on the objective data that's been provided by KeySpan, in our opinion, doesn't really do justice to the fact that there is probably more leaks than has been reported in the KeySpan data, so I would like to know why. As part of the investigation process, I'm sure you did go around to some residents and some business owners, but there is quite a few that we've spoken to that have reported smells in the day and night previous to this explosion and none of those to my knowledge, to our knowledge, have they been interviewed. So we would like to know why that did not happen and will that happen going forward so you can collect that data and hopefully use it.

MS. MERRITT: The investigative team will report to the Board on the extent of their

interviews and, you know, the Board will determine whether or not we feel that those interviews were appropriate.

MR. SANBORN: Okay.

MS. MERRITT: You had more than one question?

MR. SANBORN: Two more, yes, please. Also, the group that we put together, SAFE, we are actually performing our own investigation and in the next coming weeks, we plan to be back on the site at CAI, with their permission, to further our investigation. We invite the CSB to hopefully join with us and you know, as a partnership, be there with us to explore a number of different avenues, one of them is a continuation of the exploration of the sewer line, this is the spur, the little piece that goes from the manhole cover and joins the northeast portion of the building. Again looking for and trying to rule out any other possibilities of natural gas leaking into the system and, for whatever percentage of the overall fuel in the building, fueling the event.

And also, one last question, with regard to the 30 inch pipeline, the Mass Maritimes Pipeline, has anyone talked to them about this

explosion and found out whether or not they are aware that this business existed 200 feet or so from the pipeline, as it was run through that area? Has anyone ever spoken to them about are they surprised that this explosion happened so close to their pipeline and were they aware of the potential of an explosion like this so close to the pipelines?

MS. MERRITT: All right, thank you.

I have some other, well I have some other names here, let me ask some of these. Lee or Claudia Gelzer? Maurice Dubet? Carlisle Smith? Jan Schlichtmann?

MR. SCHLICHTMANN: Yes, Jan Schlichtmann, S-C-H-L-I-C-H-T-M-A-N-N, just like it sounds.

(Laughter)

MR. SCHLICHTMANN: I'm an attorney for SAFE.

And I have had the pleasure, and I want to echo the comments of the pleasure of working and trying to share our information with the investigative team, and we want to continue that as well, we see this as very, very important to have this very cooperative effort to understand

what happened so that the right steps can be taken to ensure it never, ever happens again. Now, in that regard, the community is very concerned that all avenues, potential contributors, be examined, as I know you are, and we are concerned that there have been very strong statements made by the fire marshals office and now echoed tonight that natural gas has been ruled out.

But we feel that the reasons given for the ruling out are weaker than the strong statements and so we would urge both the fire marshals office and the CSB to keep an open mind and take these as preliminary findings, not final ones. And we are actually going out in the field to do things such as look at the potential pathways into the building, which are of course very important to look at. There has been a lot of talk about the sewer line but we have determined that from the manhole that goes to the building, there is an abandoned sewer line that goes to the northeast corner of the building which is, as you have identified, the seat of the explosion.

And over the next few weeks, we are going to be, with the owners' permission, in an

open process that we are hopeful that you'll join with us, excavating that area and, as they say, bringing daylight to that line so it can be fully, the integrity of the line and any evidence about its condition can be examined to determine if that particular abandoned line, that was abandoned in the late `80s, we believe, that does go to the northeast corner, may have been a portal of entry, so we want to do that with you.

Also, we have identified a six inch pipe that comes in on that production area C that was identified in your diagram, that's on the Water Street side, that may very well be an abandoned water line that went to the building and we have traced that building, that line out and it does go, as one would expect, to the street, right in the location where the old gas line was at the night of the explosion and could be, depending on how that water line was closed off in that area, could be another potential pathway into the building. And we are going to try and do work using video cameras going through the pipes and other things, again, along with you, we hope, to be able to determine if in fact that water, potentially abandoned water line was another

potential conduit into the building.

And by doing that over the next few weeks and sharing this information, we hope that when we have another meeting together we'll be able to have confidence that we have really explored all possibilities so we can rule in or rule out what those happen to be and, again, pledge to do it in a very open and transparent process with you. And thank you for the cooperation that you have shown so far with the community and we want to encourage you to continue to do that.

Thank you.

MS. MERRITT: Thank you.

Mr. Stephen Coan? Did you intend to make comment?

MR. COAN: No.

MS. MERRITT: Oh, okay. Yes, sir? I'm sorry.

MR. MCDERMOTT: Hi, thanks. My name is Mark, with a K, McDermott, M-C capital D-E-R-M-O-T-T.

And Mr. Spiliotis, I just want to let you know I probably had the best view of what happened that night, I was living at 3 Bates.

That big hole in the wall, that's where my bed was and I woke up to a boom and a fire, the fire did happen right away, so I just want to kind of clear that up.

And also, I just want to, I mean basically everything that Jan said, I was going to say too, so he stole my thunder, but about the gas being ruled out, like he said, there is no clear cut evidence that it couldn't be gas so, as far as ruling it out, it just doesn't seem to be the best course of action. I mean it was unlikely that gas went there but explosions of this magnitude are very unlikely too, so something unlikely probably had to happen.

So, obviously us, as the people that got affected, we have agendas, we lost a lot of stuff. If CAI is responsible for it, they are not going to be able to cover it all, so we have our agendas and we are just hoping that we get the best, the best representation possible. We want every single stone unturned, the stones that are still left, most of them are blown up.

And yeah, I just, thank you for coming here and giving us the forum to address people of your stature and your background, it's an

opportunity that we'll probably never get and hopefully we won't have to have again, but I just wanted to thank you for your time.

MS. MERRITT: Thank you very much.

Yes, ma'am?

MS. STAMM: Stacey Stamm, S-T-A-M-M, and I'm very nervous so if I stutter, I apologize in advance.

I'm a resident at 108 Water Street, I wasn't there very long but I think I know my neighbors probably better than almost anyone in this room now, and we have heard a lot of stories reporting odors within 12 hours or so prior to the explosion and within three to five days after the explosion, as well as some various diggings to discover the source and stop any future odors, and I guess it's certainly been brought up over and over again during this meeting.

And I just wanted to clarify some of the thoughts of many of the neighbors and that is that we had a water barrier on either side of this explosion. We had an explosion at 3:00 in the morning when everyone was under their windows. If this explosion had happened in the daylight at 2:00 in the afternoon when kids are returning home

from school, without the natural barriers of the water on either side, the damage would have been extensive, the loss of life could have been huge. We don't necessarily need it to be gas, we need it to be known, we need to know what happened and how to prevent it and that's why the odors of gas keep coming up.

Is there a chemical within this building that could have given off a similar odor to the gas that would explain all of the scents that people are complaining about in the area? That would be my first question.

Also, you mentioned 3D scaling and reproduction of the explosion, was there an explosion done to scale of just those solvents, alcohols and heptane, I believe, mentioned, that showed the damage radius that we saw? I question, to some degree, the level of damage in that radius, I'm located right on the outside of it, my house was totally damaged. However, it was built of certain materials that become damaged in this type of situation, the rock foundation, things like that. So was that blast radius, could the fact that you had certain materials certainly have made you more likely to get damaged?

And then the residents that might have something they would like to add, is there a hotline or a number we can call to be heard, to put our two cents in and possibly be considered as part of this investigation, if we want to let you know that, you know, we were walking our dog at 11:30 last night and we saw some guy out digging in his back yard? I mean is there somewhere that we can go to get this information to the right pair of hands?

That's it, thank you.

MS. MERRITT: Thank you.

Mr. Hall, would you like to try some of those questions?

MR. HALL: Well I would like to address the odor question, initially. In an event like this, it's very difficult to determine, particularly when you have odors that come and go, where they could have specifically occurred from. But there is a possible source of natural gas odor that exists very close to the community and that is the Eastern Propane Company and propane, like natural gas, has odorant added so that people can detect leaks, and at that particular facility, they have large what are called bullets of

propane, very large pressure vessels that contain the propane, and they use that to refill trucks and smaller containers.

And businesses of this type, in the course of refilling those containers, occasionally have releases and propane will stay low to the ground, unlike natural gas that quickly rises up in the atmosphere, and so some of the things, when you are close to that business, could be smelling propane and natural gas and that could explain some of the random odors that people are experiencing.

With respect to the blast radiuses, those circles on the graph are kind of averages and based on the building construction, certain buildings are more susceptible to damage than others and we tried to fit that curve as best we could to show, you know, where those particular over-pressures were, based on the observed damage.

But we certainly recognize and documented the damage that went much further out than those particular circles, those circles were just, for an engineering basis, to understand about what the over-pressure was at that location.

MS. MERRITT: Also, did CAI or Arnel

employees that you interviewed ever complain about gas odors inside the building?

MR. VORDERBRUEGGEN: There were a few employees that actually acknowledged that natural, they smelled natural gas as well. I wouldn't characterize it as being inside their building, they definitely characterized it, in, fact they called it a regular occurrence, one of the employees called it a regular occurrence. And again, as Mr. Hall just mentioned, any time the wind is blowing out of the west to southwest, it's coming across the Eastern Propane filling operations and coming across the community.

I would offer to the community that the next time you smell gas be consciously thinking which way is the wind blowing and also think about how hard it's blowing, the harder it's blowing, again, I'm not going to suggest whether it's going to be stronger one way or the other, but that will play into the source. As Mr. Hall mentioned, propane is heavier than air so the propane will tend to hug the ground and if you have a real light, almost no breeze moving, but if it is coming from that direction, it could very well be propane.

The natural gas itself, regardless of where it's coming from, goes pretty much straight up in the air, unless the wind is blowing very hard, and of course a hard wind will tend to dilute it. So think about that in the future, as you are trying to figure this out because this is a perplexing issue that I know you are trying to deal with. I have natural gas in my home and I get nervous if I smell it and I have a little understanding of piping systems so I probably could fix it myself, which could be dangerous.

(Laughter)

MS. MERRITT: And one of the questions also was is there a hotline? We are a very small agency, we only have 36 people that work at our agency, in total, and that includes receptionists and the board members, and our accountants and lawyers, so we really don't have a hotline set up. However, I would encourage you to go on our website, on our website you can contact us through the info line that is how do you contact us and those e-mails come directly into our IT operation and they will distribute them as necessary. And I would encourage you, I think we could probably handle any e-mails that you might send in with any

comments or questions that you might have through that.

Our website is www.csb.gov, as it's on the screen right, and so I, there is our telephone number. But it's very difficult for us to handle telephone calls with the small number of people that we have. So, if you would, we would appreciate hearing from you, we encourage you to communicate with us and we would be happy to take your e-mails and try to handle them in that way, but keep in mind also that we have a very, very small organization, very limited resources.

Mr. Hall, did you have something else? No?

Yes, one more question and you get it.

MR. O'KEEFE: Members of the board, Madam Chairman, members of the board, technical staff, my name is Joseph A. O'Keefe, O'-K-E-E-F-E, I life in Salem, Mass and the ladder truck that's in one of the slides there is actually from the, I believe from the Salem Fire Department. I was a state fire marshall in Massachusetts for 15 years, I'm a licensed professional engineer and I support the findings and conclusions of the probably cause that Marshal Coan and the state police and, again,

the fire department, and now the Chemical Safety Board has arrived at.

I would just ask, and I heard the licenses and permits issue and I think that should really be addressed because the licenses are given by the town, the selectmen and the city council. I am on the city council in my town, city, and we have to grant permission for someone to use the land to pump gasoline, to get the tanks in the ground, the fire chief has got to give a permit. So you have the legislature deciding that the owner of the land must license before them and then you have the fire chief, and the board of selectmen and the city council in my city cannot do that until the fire chief has said it's okay.

The legislature and case law going back almost 50 years has said that the board of selectmen are the licensing authority, even the City of Boston can not do that without the fire chief's say so. I would respectfully request that at the end of your conclusions, and findings and recommendations, that you petition the marshall, Marshal Coan, and the Board of Fire Prevention, and the Fire Chiefs Association and the legislature to change the law, 148.13, to require

the fire chief and the selectmen to know what is this flammable material.

I realize that with Title 2 you can't get that information but if you had MSDS sheets that would tell, material safety data sheets for the people that perhaps don't know, if you had those before the selectmen, or the city council and the chief, you would know what this product is. It's not milk that they are working with here, so what do they have? And I would respectfully request that you bring that to the attention of the legislature, that the towns and cities ought to know what's in the tanks and what the materials are, and then give a license and then let the chief give the permit.

Now I might just add a, I've been around a long time and I recall that that area down there was a tank farm and I recall, as a boy, that the tanks, that the barges would be pushed up or come up the river and there was a dock there, that you see little remnants of, and they would unload gasoline, and there were several big, enormous, above ground storage tanks on that property and if you look at some of the land there, I think you might see that there was some

of that there. So, when you go back to an old registration, which means that's annually and you can't get that one without a license, you'll find that there's all kinds of other things that might have been in there.

But I support basically your Board and especially my staff and my staff are still there, some of them, and the Fire Marshal Steve Coan for what they did and you did.

Thank you.

MS. MERRITT: Thank you very much.

Well, we respond as quickly as we can to your requests. I am told that we have set up a special e-mail address that you may use in contacting us, it is Danvers, D-A-N-V-E-R-S, @CSB.gov and if you e-mail us at that address, we will know specifically that those are e-mail requests or comments from you. You certainly can use our general address as well but if you want to use Danvers@CSB.gov, then we'll know what it is.

With that, first of all, I would like to thank all of you for the courtesy shown us this evening. This has been a long process, putting this together, we appreciate your attention, your courtesy and the way that you've received us here

this evening, and we look forward to finishing our report and publishing this for you. It's possible we could come back for a final meeting in which we could report our final findings.

We thank you very much for the hospitality shown us here and for the work that is continuing to go on here in this neighborhood. Thank you, team, very much for your contribution this evening. And drive home safely and we thank you very much for your attendance.

(Applause)

(Whereupon, at 9:35 p.m., the hearing was concluded.)